

TURNOVER ANALYSIS OF UNEMPLOYMENT IN AUSTRALIA

by

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This thesis is my own work,
except where quotations and
direct acknowledgements
appear in the text.

A handwritten signature in cursive script that reads "Paul Paterson".

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ABSTRACT

Turnover analysis is concerned with flows in the labour market. This study involves analysis of the inflow and duration (outflow) aspects of unemployment in Australia. Very little work has been done on this for Australia, and much of the overseas work is severely restricted by data limitations and/or conceptual errors. In this study many of the problems previously encountered are avoided through the use of a suitable data base and appropriate methodology.

Turnover analysis methodology are developed and applied to a subset of total unemployment, those in receipt of Unemployment Benefit payments. The turnover information obtained is used to consider why unemployment rates vary over time and between labour force groups, and on a broader scale the nature and determinants of structural change in the Australian labour market. The study finishes with some preliminary work on the interesting issue of the take-up of Benefits by the unemployed.

From carrying out turnover analysis of unemployment, many important insights into the nature and behaviour of unemployment and the labour market in general are obtained. It is apparent that this study is only a beginning, there is much work yet to be done in the area.

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INTRODUCTION

The unemployment situation in Australia has changed dramatically over the 1970s. Total unemployment has risen from an average level of 90 000 during 1970 to 410 000 during 1978. This represents a change from about 1.5 to 6.5 per cent of the labour force, more than a four-fold increase.

The average number unemployed longer than 3 months has changed from 8 500 during 1970 to 200 000 during 1978. Thus in 1970 about 10 per cent of those unemployed at any point in time had been in the pool longer than 3 months, while in 1978 this proportion was almost 50 per cent.

For the subgroup of total unemployment receiving Unemployment Benefit payments, the changes over the past decade have been even more dramatic. The number of UB recipients has increased from 12 000 in 1970 to 280 000 in 1978, or from 0.2 to 4.6 per cent of the labour force (a twenty-fold increase!). The proportion of total unemployment receiving Benefit payments has escalated from 0.14 in 1970 to 0.68 in 1978. Finally, the average number in receipt of Benefits longer than 3 months at any point in time has increased from 3 000 during 1970 (25 per cent of those in the pool) to 163 000 during 1978 (almost 60 per cent of the pool). Coinciding with these changes, there have been large increases in Benefit payment rates relative to average weekly earnings.

In this study we use turnover analysis of unemployment to examine this changed situation. The major part of the study is concerned with UB recipients, but in the final stages our findings are related back to total unemployment.

WHAT IS TURNOVER ANALYSIS OF UNEMPLOYMENT?

Turnover analysis of unemployment is concerned with flows of labour into and out of the unemployment pool. As with other labour market stocks, the pool of unemployment is always turning over, with a continual stream of workers entering unemployment and leaving after different durations. These inflow and completed duration aspects determine the level of unemployment.

Our turnover analysis focuses on measuring and analysing the inflow and completed duration aspects of unemployment. This extends the conventional approach to studying unemployment of merely looking at stock levels.

WHY CARRY OUT TURNOVER ANALYSIS OF UNEMPLOYMENT?

Turnover analysis gives insights into issues concerned with unemployment and the labour market in general that the conventional approach cannot provide. Some of the questions answered in this study are:

- (A) Do differences in unemployment rates between labour market groups (e.g. juniors and adults) arise from differences in the number of spells of unemployment or differences in completed duration? (Chapter Three)
- (B) Have changes over time in the level of unemployment been due to changes in inflows or changes in duration? (Chapter Three)
- (C) What economic influences cause changes in inflows and duration over time? (Chapter Five)
- (D) What is the effect of Benefit payments on the level of unemployment? (Chapter Six)
- (E) Why did the unemployment-vacancies relationship change in the early 1970s? (Chapter Six)
- (F) Why has the relative unemployment position of various groups changed over time? (Chapter Seven)
- (G) Why has the proportion of the unemployed receiving Benefits increased dramatically since the mid-1970s? (Chapter Eight)

HOW IS TURNOVER ANALYSIS OF UNEMPLOYMENT CARRIED OUT?

Inflows to unemployment and completed duration are longitudinal-type concepts. They refer to the labour force experience through time of individuals. These flow data, however, are not always available. Labour market analysts have typically thought in terms of stocks rather than flows, and published data naturally reflect this orientation. Thus our turnover analysis of unemployment involves estimating longitudinal-type data from stock data before the questions posed above can be addressed. Previous researchers have made a variety of conceptual errors in doing this. In Australia, however, we have appropriate data which allow us to avoid many of these problems, leaving us free to concentrate on the economic issues involved.

OUTLINE OF THE STUDY

The thesis consists of nine chapters grouped into three Parts. The broad format is to develop and apply the methodology of estimating turnover measures in Part I; examine structural change in the Australian labour market in Part II; and make some concluding remarks in Part III.

In Chapter One the problem of measuring unemployment-related flows from available data is considered. Overseas studies are reviewed and some methodology suitable for Australia developed. In Chapter Two this methodology is applied to Unemployment Benefit recipient data. Chapter Three involves an examination of why unemployment rates differ, both between labour market groups and over time, in terms of the inflow and duration aspects of unemployment. These three chapters make up Part I.

Chapters Four, Five, Six and Seven contain a study of structural change in the Australian labour market. In Chapter Four a theoretical model of the influence of cyclical and structural variables on the inflow and duration aspects of unemployment is developed. This is done in the context of the shifting unemployment-vacancies relationship observed earlier this

decade. The estimation of this model is documented in Chapter Five. These results are used in the following two chapters to estimate the contribution of cyclical and structural variables to changes in unemployment. Chapter Six involves estimating the influence of the variables on the unemployment inflows, duration and stock level of individual age-sex groups; while Chapter Seven involves considering the differential impact of these variables across the age-sex groups. Chapters Four through Seven are grouped to give Part II.

The empirical work in the first two Parts is concerned with a subset of total unemployment, UB recipients. In Chapter Eight, some of the findings for UB recipients are related to total unemployment. Finally, in Chapter Nine the progress made in this study is reviewed, and fruitful avenues for future research are considered. These last two chapters make up Part III.

PART I

TURNOVER ANALYSIS AND AUSTRALIAN UNEMPLOYMENT DATA

CHAPTER ONE

TURNOVER ANALYSIS OF UNEMPLOYMENT: METHODS AND EMPIRICAL RESULTS FROM
PREVIOUS STUDIES

In principle it would be desirable to consider all aspects of labour market turnover - flows between employment, unemployment and outside the labour force - as these are important for a wide range of issues. To do so, however, would require extensive longitudinal data (data on the labour force experience through time of individuals).

Some regular longitudinal data are available for the U.S. and Canada, and have been used in comprehensive turnover models of the labour market (e.g. Holt 1974 in the U.S. and Denton 1973 in Canada). But in general adequate longitudinal data are not available to do this.

However, it has proved fruitful to study turnover of unemployment on its own, without modelling turnover in the rest of the labour market. Some overseas researchers have used limited and/or irregular longitudinal data to do this (e.g. Hall 1972 in the U.S. and Disney 1979 in the U.K.), while others have estimated longitudinal-type data from snapshot observations on unemployment.

In Australia data suitable for carrying out turnover analysis of unemployment are not directly available, but can be estimated in a consistent manner over a reasonably long time period. The techniques used by others to estimate longitudinal data are reviewed in this chapter.

Estimating longitudinal-type data for Australia allows us to answer the labour market questions posed in the Introduction. To some extent these questions have also been addressed by others elsewhere, and where relevant their findings will be noted. To the best of our knowledge there has been only one previous attempt at turnover analysis in Australia (Khoo 1976), and the techniques and results of this study will be reviewed separately.

1.1 Estimating Turnover Data from Snapshot Data

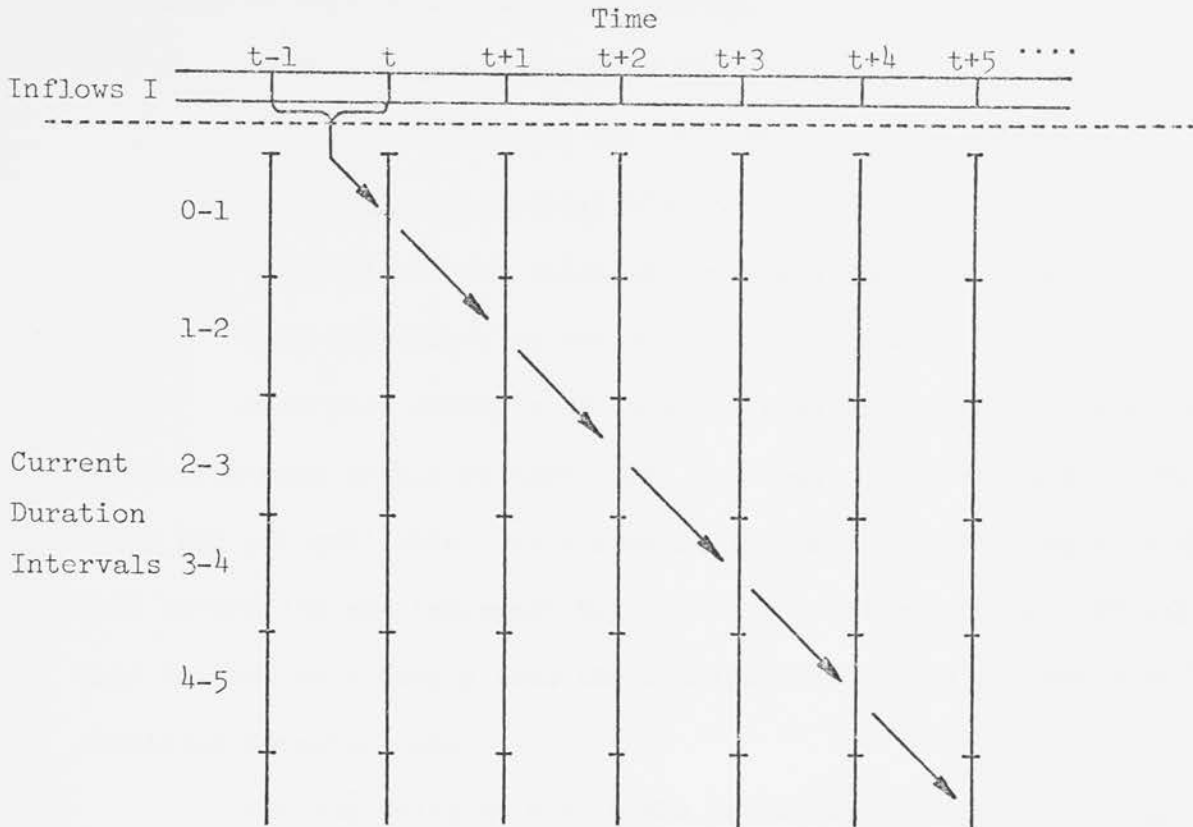
Turnover analysis of unemployment involves consideration of the inflow and completed duration aspects of unemployment. However, researchers usually only have snapshot data on current duration, giving a breakdown of the stock at a certain point in time into those unemployed for different lengths of time. These current duration data are not the same as completed duration, current duration being analogous to the age distribution of a living human population at a point in time, and completed duration analogous to the age at death. But under certain conditions, current duration data can be used to directly calculate completed duration information.

Current duration data distributes the stock of unemployment between different duration intervals, for example those unemployed less than 1 month, 1 to 2 months, 2 to 3 months etc. If we have regular snapshot observations on current duration with the width of the duration intervals equal to the length of the accounting period (the time between observations), and we know inflows each period, we can readily infer the completed duration experience of the unemployed. This is done by arranging the data in a grid with columns representing consecutive time periods and rows representing current duration intervals.

Thus in Figure 1 the vertical lines represent the points in time at which unemployment is observed, with the intervals marked along these lines representing the duration intervals. The number in the $(0-1, t)$ interval is the number unemployed less than 1 month at time t , the number in the $(1-2, t+1)$ interval is the number unemployed 1 to 2 months at time $t+1$, etc. The block above the main grid represents inflows over each period.

FIGURE 1

CURRENT DURATION DATA GRID



By moving diagonally through the grid (as shown by the arrows)

we can determine how many individuals leave after different lengths of unemployment. Thus the number in the (0-1, t) interval shows the number of the t^{th} period inflow group still unemployed at the end of the first period. The number in the (1-2, $t+1$) interval shows the number left one period later, the number in the (2-3, $t+2$) interval shows the number left yet another period later, and so on. In this way we are documenting the unemployment experience through time of the inflow group of period t .

The information obtained from this procedure can be expressed as duration-specific retention rates. These are the proportions of those unemployed a certain length of time at the end of one period who are still unemployed at the end of the next period (or in the first instance the proportion of the inflow over a period who are still unemployed at the end of that period). These retention rates describe the decay over time of the inflow groups and thus describe the completed duration behaviour of the

unemployed.

This simple approach to turnover analysis is fairly data-intensive. It cannot be implemented directly and completely if

- . no inflow data are available
- . regular and frequent snapshot observations on current duration are not available
- . the width of the duration intervals does not coincide with the length of the accounting period.

Most past attempts at turnover analysis of unemployment have been faced with some or all of these data problems. In particular, inflow data often are not available. As a result, the main thrust of work to date has been to develop and implement techniques to overcome these difficulties rather than to look very deeply into the implications of the estimated inflow and completed duration data.

For Australia we are in the fortunate position of having data that satisfactorily meet the stringent requirements of the approach outlined above. Inflow data are available. Current duration has been measured regularly and fairly frequently, with appropriate duration intervals. Thus to a large extent we escape the burden of serious data deficiencies, and are free to devote our time to investigating the implications of the turnover results that we can fairly readily obtain.

In the following section we review the methods used by others to overcome data deficiencies. It is found that in some cases serious conceptual errors have been made, throwing doubt on the validity of the empirical results.

1.2 The Methodology of Past Turnover Studies

The studies to be reviewed can be grouped under three broad headings:

- (i) those that estimate inflows and/or completed duration independently of each other;
- (ii) those that first estimate inflows then use this to estimate completed duration;
- (iii) those that estimate inflows and completed duration jointly.

Studies fall into these groups according to the data deficiencies they face and the degree of sophistication of the analysis. We review the various techniques of analysis under these headings, and then turn to a discussion of the results.

(i) Estimating Inflows and/or Completed Duration Independently of Each Other.

Two studies fall into this group, Flanagan (1973) and Maki (1977). Maki does not attempt to estimate inflows, only completed duration. Both studies are fairly simplistic, with duration estimated separately from inflows largely due to lack of analytical sophistication rather than lack of data.

In Flanagan's study inflows are calculated directly from snapshot data on the number unemployed less than one week at the end of each month. The number in this current duration interval is taken to be the weekly inflow level for that month.

Estimating inflows in this manner means that some of the high-turnover unemployed will be missed (those leaving unemployment in less than a week). True inflows will be understated. If both actual inflows and the proportion of these people remaining unemployed till the end of the week increases as the labour market slumps (as occurs in Australia), then although this measure will understate the level of inflows, it will overstate the

cyclical variability of this variable. Percentage increases and decreases in the number unemployed less than one week will be greater than for actual inflows, as the former variable is influenced by changes in the proportion remaining unemployed till the end of the week as well as changes in inflows itself.¹ These level understatement and variability overstatement effects may not be large in Flanagan's study as he uses the narrow interval of less than one week, but will be important in studies reviewed later which estimate inflows from a broader duration interval (e.g. those unemployed less than one month).

For sample survey measures of unemployment, additional problems exist in estimating inflows. Sampling error may be a problem if there are only a small number in the less than one week duration interval; and substantial underreporting of unemployment in the first few weeks has been reported in the U.S. (Kaitz 1972).

Turning now to estimating completed duration information, *both Flanagan and Maki treat observations on current duration as if they were completed duration data.* Flanagan takes the number unemployed longer than 13 weeks as an indicator of completed duration. Maki calculates the mean of the current duration distribution and uses this measure as if it were average completed duration.

Treating current duration observations as though they were completed duration data gives rise to a number of problems. The distribution of current duration will, in all likelihood, be negatively skewed relative to the distribution of completed spells, giving too few people in the short-term

-
1. If inflows are 100 per week and the proportion remaining till the end of the week is 0.80, then the number in the less than one week interval will be 80. If the labour market slumps and inflows rise to 200 and the proportion remaining rises to 0.90, the number in this interval then will be 180. Actual inflows rise by 100 per cent, but estimated inflows rise by 125 per cent.

duration intervals and too many in the longer-term duration intervals. This arises from retention rates typically rising with duration (see for example Fowler 1968, Kaitz 1970, Khoo 1976, and Chapter Two in this study). The high-turnover unemployed who leave the pool soon after entry will be under-represented in the snapshot current duration distributions - many of them will have been and gone between surveys - while the low-turnover unemployed will be over-represented. Thus the average duration measures calculated by Flanagan and Maki will probably overestimate the appropriate completed duration measures.

Average current duration of unemployment being greater than average completed duration may at first glance seem counter-intuitive. For human populations we observe an average age of those living that is less than the average age at death. However, this results from retention rates declining with age - people in the older age groups are on average more likely to die. For unemployment populations with retention rates rising with 'age', the ranking of average current and average completed durations is reversed. These ideas are developed in detail by Salant (1974).

In addition, the movement in current duration may not accurately reflect movement in completed duration, at least in the short term. In fact both the amplitude and timing of variations in current and completed duration may differ. This occurs because snapshot observations on current duration must be directly affected by inflows over the preceding periods in a way in which a correctly conceived measure of completed duration is not.

Take the case of a jump up to a higher level of inflows for just one or two periods. If the workers who become unemployed as a result of this have the same prospects of employment as the other unemployed, then completed duration for the inflow group they supplement will not change, but current duration will. With reference to Figure 1, if we imagine a larger-than-normal inflow group moving diagonally through the grid as shown by the

arrows, at first there will be a bulge in the short-term current duration intervals, then a bulge in the longer-term intervals. Current duration changes without completed duration changing. Of course in the real world inflows and the prospects of leaving unemployment (completed duration) will both be changing, but the same sort of effect will operate. Thus the Flanagan and Maki measures may be misleading when considered over time (as done by the authors).

Although the empirical importance of these conceptual and methodological problems in measuring inflows and duration can only be assessed by examining the data, their presence does throw doubt on the results obtained. Their actual importance in the Australian situation is considered in Chapter Two.

(ii) Estimating Completed Duration Using Estimated Inflows.

These studies take account of the conceptual difference between current and completed duration. Estimated inflows are combined with published current duration data to give estimates of completed duration.

Inflows have been estimated by the same technique as used by Flanagan. McAuley (1975) multiplies up weekly inflows as approximated by the number unemployed less than one week at the end of each quarter. Bowers and Harkness (1974) interpolate the same weekly inflow measure between 6-monthly observations using extraneous information on seasonal variation in inflows. Smith and Holt (1971) approximate monthly inflows by the number unemployed less than 5 weeks at the end of each month. Finally Denton (1973) uses the number unemployed this month who were not unemployed last month. The problems of level understatement and cyclical variability overstatement are obviously more serious for the latter two studies.

Once inflows are estimated, all but Bowers and Harkness estimate completed duration by proceeding through a current duration grid in the manner outlined above (Figure 1).

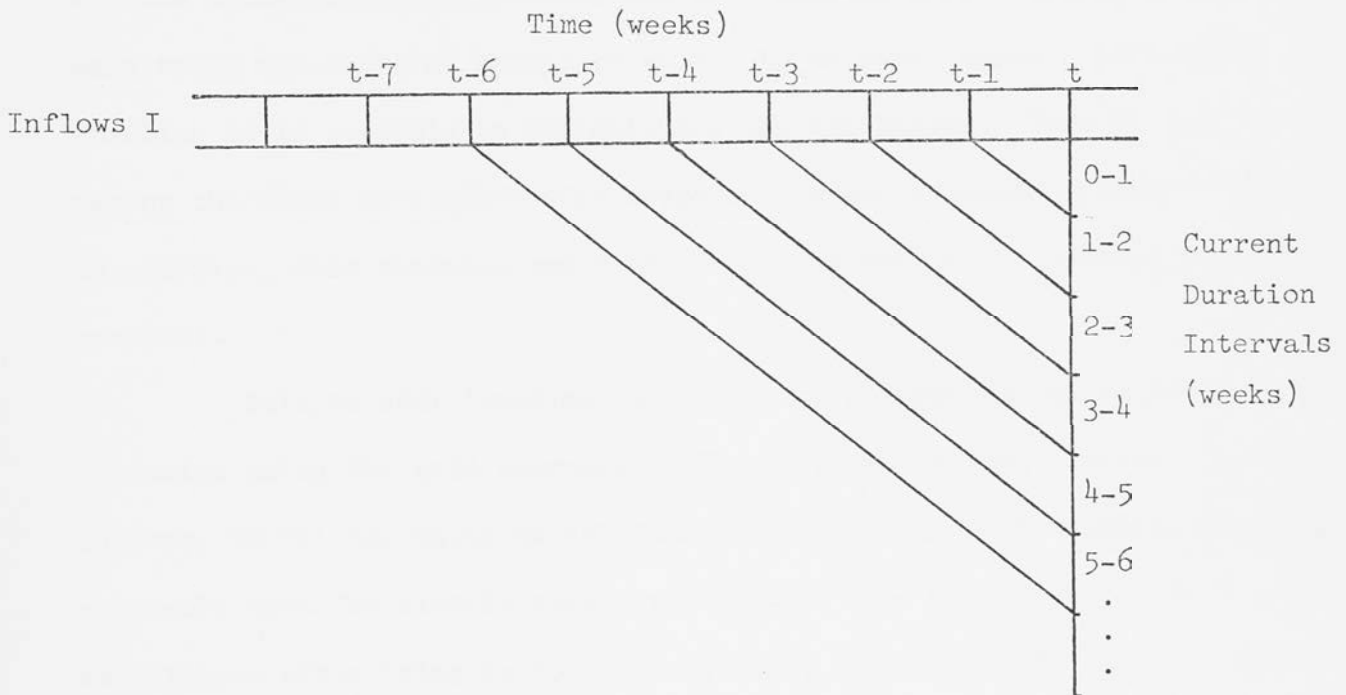
For Bowers and Harkness, the snapshot observations on current duration are 6 months apart. Hence to use the grid technique in the straightforward manner outlined above would involve working with 6-month current duration intervals, and thus the loss of much interesting information (i.e. behaviour within the 6 month intervals). To overcome this difficulty, the basic approach is modified. For each period Bowers and Harkness use estimated inflows and the current duration snapshot to model the experience through time of an hypothetical inflow group, with the duration behaviour of the group supposedly reflecting the underlying duration forces of that period. From this, completed duration measures for each period can be calculated.

This technique is illustrated in Figure 2. Across the top of the Figure we have weekly inflows, estimated in the manner described above. Down the side we have the published duration intervals of the 6-monthly current duration snapshot taken at time t . The numbers in the $(0-1, t)$ interval (i.e. the number employed less than one week at time t) is expressed as a proportion of inflows between times $t-1$ and t ; the number in the $(1-2, t)$ interval is expressed as a proportion of inflows between time $t-2$ and $t-1$; the number in the $(2-3, t)$ interval is expressed as a proportion of inflows between times $t-3$ and $t-2$; etc. *These proportions are then interpreted as if they all referred to the same inflow group, showing the proportions of this group still unemployed after different durations in the pool.* They describe the decay of the hypothetical inflow group over time. From these proportions summary measures of completed duration, such as average completed duration, can be estimated for each period.

In taking this approach, Bowers and Harkness overcome the problem of infrequent snapshots by assuming that duration forces (retention rates) are constant throughout the weeks and months preceding the published snapshot.¹ Under this assumption, the grid-type approach is used in a modified form. However, actual unemployment experiences are not estimated. What is measured is some sort of representative unemployment experience over the period.

FIGURE 2

BOWERS AND HARKNESS METHOD OF ESTIMATING
COMPLETED DURATION



To the extent that duration conditions are not steady over any particular period, the estimates of completed duration may be misleading. Smoothing of the decay over time of the hypothetical inflow groups removes short term erratic movement that might arise from seasonal and irregular influences, but longer term cyclical influences will remain.

1. The published current duration snapshots are treated as if they were generated under steady duration conditions. This is not the same as 'stationary state' analysis as described below, because inflows may vary over time. This procedure has a through-time dimension that is not present in true stationary state studies.

(iii) Estimating Inflows and Completed Duration Jointly.

These studies are based on the concept that, if the way in which an inflow group decays through time is specified, then the current duration data will imply a certain level of inflows. It will also imply a certain completed duration situation.

Fowler (1968) was the first to publish work using this approach. His method is as follows. First, the decay through time of an inflow group is expressed in terms of the total number of man-weeks of unemployment yet to be experienced by the group after x weeks in the pool. A functional form for the decay pattern is chosen, and this mathematical function fitted to show total man-weeks of unemployment yet to be experienced. With this function it is possible to estimate the initial inflow. This is done by taking the first derivative with respect to x and evaluating this at $x=0$. In addition, this function can also be used to estimate completed duration measures.

Data on additional man-weeks yet to be experienced could be estimated using the grid approach of Figure 1 (but without initial inflows). However, to fit the mathematical function accurately would require additional man-weeks data for closely spaced values of x e.g. man-weeks yet to be experienced after being in the pool 1, 2, 3, ... weeks. To estimate such data would require a fine classification of current durations, and snapshots taken very close together in time.

Fowler has only 6-monthly observations on current duration (the same data as Bowers and Harkness), so obviously a direct application of the grid approach cannot be used to estimate man-weeks of unemployment yet to be experienced. However, if the pool of unemployment is a stationary stock, these data problems are readily overcome. Accordingly, Fowler takes the approach of constructing and analysing a stationary stock of unemployment. Kaitz (1970) and Khoo (1976) have duplicated this approach.

STATIONARY STOCKS OF UNEMPLOYMENT

A stationary stock of unemployment is defined as the steady stock of unemployment that would evolve if inflows and retention rates remained steady indefinitely. A stationary stock lends itself to a number of easy and important manipulations.

- . With inflows and retention rates constant, looking down the columns of the grid in Figure 1 is identical to moving diagonally through the grid.
- . The number in the stock unemployed x or more weeks is equal to the product of the number unemployed exactly x weeks (the remainder of the weekly inflow group that entered the pool x weeks ago) and their average additional duration yet to be experienced. A special case of this is the well-known result that the steady stock level is equal to the product of the inflow level and average completed duration.¹
- . It follows from the previous point that the number unemployed x or more weeks is identical to the total number of man-weeks yet to be experienced by those left in the pool after x weeks.

The first two properties are pertinent to comparing unemployment between different time periods and different labour market groups. The last point indicates how the construction of a stationary stock gives the data required to carry out the method of turnover analysis currently being considered. If stationary stocks were constructed showing the numbers unemployed x or more periods, then curves could be fitted relating total man-weeks of unemployment yet to be experienced to the length of time the inflow group has been in the pool, and completed duration measures calculated.

1. This result has been used to estimate inflows or average completed duration under stationary conditions, given that one or the other is already available. Toikka (1974) calculates average completed duration by dividing stock level by inflows, while Barrett and Södersten (1975) use the same approach to calculate inflows.

A stationary stock of unemployment as defined above will never occur in the real world. Inflows and retention rates never stay steady long enough for a stationary stock to evolve. This raises two problems. First, how is a stationary stock to be calculated? Second, how useful is the concept in a real world context?

Fowler's approach to calculating a stationary stock is to average over time snapshots of current duration. This involves a number of difficulties. The estimate of the steady stock obtained may be misleading in that it could be different to the stock that would evolve if the underlying inflow and duration forces operated unchanged indefinitely. Changes in inflows will be reflected in current duration as the inflow groups move from one duration interval to the next, and it is not clear that these effects average out over time. For example, if inflows rose steadily throughout the time span, the averaged current duration numbers would not correctly reflect the underlying duration forces. The shorter duration intervals would be over-represented and the longer duration intervals under-represented. Fowler defends his method by pointing out that the 4-year data period over which he averages covers one complete labour market cycle, but even then it is not obvious that the effects of different sized inflow groups on the current duration data will average out.

The measures pertaining to the stationary stock that Fowler calculates are

- . weekly inflows
- . the number leaving after a spell of exactly x weeks
- . the probability after x weeks in the stock of unemployment of remaining unemployed for another week
- . the probability on entry of remaining in the stock for at least x weeks

- the expected additional duration to completion of those who have been unemployed x weeks (this being average completed duration when x is zero).

These results describe the underlying nature of unemployment. As such, they are of some use in a real world context. For example, an important result from Fowler's work is that on average the probability of leaving unemployment over the next week falls as duration in the pool increases.¹ Stationarity also provides some tidy results (such as stock equals inflows times average completed duration) which are useful in comparing different unemployment situations. The validity of any results, however, must finally rest on whether the stationary stock analysed reasonably represents the underlying inflow and duration forces.

Cripps and Tarling (1974), and Salant (1974), also construct and analyse stationary unemployment stocks to estimate inflows and completed duration, but use a different orientation to Fowler. The decay through time of an inflow group is expressed in terms of the probabilities of leaving unemployment attached to the individual members of the group. An 'inflow density function' showing the distribution of an inflow group over the probability of leaving unemployment is specified and estimated. The area under the density function gives the size of the inflow group, and the height of the density function at different probabilities of leaving unemployment is directly related to the distribution of completed duration.

It is assumed that under steady conditions the probability of any one individual leaving unemployment remains unchanged no matter how long they have been unemployed, but with this probability varying between individuals.

1. This result has since been confirmed by many others e.g. Kaitz (1970), Leicester (1974). In Chapter Two we find a qualified version of this result to be true for Australia.

The phenomenon of rising retention rates with duration in the pool is posited to occur through a 'sorting effect', whereby those with a low probability of leaving tend to congregate in the longer duration intervals. Under this assumption, the duration characteristics of a stationary stock can be specified in terms of the distribution of the inflow group over this probability of leaving. Conversely, a certain current duration structure of a stationary unemployment stock implies a corresponding distribution of inflows over the personal probability of leaving. By assuming a functional form for this density function, the parameters of the distribution can be estimated from the current duration structure of the stock.

Cripps and Tarling use the number in the first duration interval, and retention rates estimated from two contiguous snapshots, to construct a stationary stock. Thus they move down a column of retention rates calculated in Figure 1, rather than diagonally through the grid.

In doing this, each duration-specific retention rate used to construct a particular stationary stock arises from a different inflow group. Consequently an implicit assumption of this methodology is that the distribution of probabilities of leaving is identical across each of the relevant inflow groups. Thus the quarterly inflow group from 3 to 6 months ago from which the current 'less than 3 months - 3 to 6 months' retention rate is calculated (see Figure 1, taking the accounting period to be 3 months) is assumed to have the same probability-of-leaving distribution as the inflow group for the current quarter, and so on.

Frank (1978) has taken the work of Cripps and Tarling and Salant a step further. From stationary stock current duration data a density function in the length of completed spells for the whole of the labour force (rather than for unemployment inflows only) is estimated. This function embodies not only the probability of individuals leaving unemployment once in the pool, but also their probability of entering unemployment.

Not all studies estimating inflows and completed duration jointly use the methodology of constructing and analysing stationary stocks. Barron (1975) and Perry (1972) take the less rigorous approach of assuming published current duration snapshots are generated under steady conditions without any manipulations of the raw data to approximate this situation.

Barron assumes the probability of an individual leaving unemployment does not change with duration in the pool. Treating contiguous current duration snapshots as if they were generated under the same labour market conditions, he derives an expression for the probability of a representative worker leaving unemployment. Average completed duration is estimated as the inverse of this representative probability of leaving, as would be the case for a stationary stock.¹

Perry uses a similar approach to Barron, but works in terms of weekly retention rates rather than individual probabilities of leaving unemployment. Weekly retention rates are assumed to remain steady for the first four weeks the inflow group is in the pool, then change discretely by a set amount to a new higher level for all longer durations. Contiguous monthly snapshots on current duration are treated as if they were drawn from the same stationary stock. These assumptions allow a set of accounting identities to be developed, which are solved for the discretely-changing retention rate. Stationary state average completed duration and inflows are then calculated from the estimated retention rate.

The techniques of Barron and Perry allow the generation of time series of estimated inflows and completed duration. However, the approach of using published current duration snapshots as if they evolved under steady conditions would lead to misrepresentation of actual inflows and completed duration if labour market conditions were changing.

1. Inflows would be the stock level divided by average completed duration, but Barron does not calculate this measure.

An important characteristic of the studies by Cripps and Tarling, Salant, Frank, Barron and Perry is that the probability of leaving the unemployment pool is determined by the characteristics of the individual the day he enters the pool. Thus time in the unemployment pool itself does not affect the probability of being employed. What occurs is people with poor employment characteristics get left in the pool to be over-represented in the longer duration intervals.

Not all studies make this assumption. Weeden (1972) has taken the opposite stance. It is assumed that all individuals in a particular inflow group have the same probability of leaving unemployment. Retention rates then rise with duration because the probability of leaving for each individual declines with duration. That is, long periods of unemployment directly affect a persons employability. Under these assumptions, Weeden estimates time series of inflows and completed duration. The technique implemented is closely related to that used by Fowler, although it is applied under changing conditions.¹

It is not obvious, a priori, whether the polar assumption of heterogeneous individuals with constant probabilities of leaving (as used by Cripps and Tarling, Salant etc.), or the alternative assumption of homogeneous individuals with declining probabilities of leaving (Weeden), is the more appropriate in the real world. Obviously the true situation will lie somewhere between these poles, and not at one extreme or the other. We briefly touch on this issue for the Australian labour market in Chapter Two.

1. Monthly and quarterly current duration snapshots are arranged in a grid and, under the abovementioned assumptions, are used to estimate the actual number of man-weeks of unemployment yet to be experienced by weekly inflow groups after x weeks in the pool (i.e. inflow groups are followed through the grid in the manner of Figure 1). A smooth curve is fitted through these estimated data, and the first derivative of this function used to estimate inflows and completed duration.

All the studies reviewed above encounter some sort of data deficiency in estimating turnover measures, meaning the grid approach of Figure 1 cannot be applied directly. An attempt at estimating turnover data that does not encounter these problems, however, is documented in a study by Leicester (1974). Since 1967 inflows to unemployment for Great Britain have been available on a limited basis, and Leicester has coupled these data with quarterly observations on current duration to estimate time series of retention rates.

Retention rates, and the 'inflow rate', are related to variables representing job prospects and time required to search the market. It is found that retention rates are negatively related to the job prospects variable, with the impact of this variable apparently diminishing as duration lengthens. It is also found that the inflow rate is positively related to job opportunities.¹

This exhausts studies in which snapshot data on unemployment are used to estimate information on inflows and completed duration. In closing we flag some turnover analysis work that has been done using directly-available inflows into unemployment and completed duration data.

Gillion and Black (1966) and Cubbin and Foley (1977) analyse completed duration data apparently collected by noting the time since the commencement of unemployment of those leaving the unemployment register in Great Britain. McGregor (1978) and Disney (1979) use data on the length of completed spells obtained by actually following through time the unemployment experience of

1. A serious problem exists with the specification of the inflow rate variable. This variable is defined as inflows divided by the stock of unemployment, when a more appropriate specification is inflows divided by the labour force (the labour force being the relevant 'at risk' population). Thus the result that as job opportunities improve, the inflow rate increases, may reflect the specification of the inflow rate variable, rather than more people becoming unemployed as job prospects improve. In Australia inflows reduce with improvement in employment opportunities. Other studies (e.g. Gillion and Black 1966, Perry 1972, McAuley 1975) confirm this result.

special groups of workers. Finally Nickell (1978), Hall (1972), Barrett (1975), Barrett and Morgenstern (1974), and Barrett, Gerardi and Morgenstern (unpublished) analyse inflow and completed duration information obtained from retrospective surveys in which individuals relate their labour force experiences over the past twelve months.

1.3 Important Empirical Results from Overseas Studies

In this section the findings of the above studies are considered in the light of the questions posed in the Introduction. This gives an indication of the current state of knowledge on these issues. The main results are documented, but we do not attempt to relate them back to the merits of the methodology used. A brief account of our findings for Unemployment Benefit recipients on each of these questions is included.

(A) DO DIFFERENCES IN UNEMPLOYMENT RATES BETWEEN LABOUR MARKET GROUPS ARISE FROM DIFFERENCES IN INFLOWS OR DIFFERENCES IN DURATION?

The main labour market groups that have been compared are females and males, younger and older workers, and blacks and whites (U.S.).

FEMALES AND MALES

In the U.K., the male unemployment rate exceeds that for females. Gillion and Black (1966) and Fowler (1968) find that on average the completed duration for males is greater than for females. Gillion and Black show that the incidence of inflows (inflows expressed as a percentage of the labour force) is greater for males. Thus male unemployment exceeds female unemployment because both inflows and completed duration are greater for males.

In the U.S., the female unemployment rate is higher than the male rate. Thus the situation to be explained is the opposite to that in the U.K. All studies find the incidence of inflows into unemployment to be greater for females. However, conflicting results are obtained for duration. Toikka (1974), Perry (1972) and Hall (1972) find the duration for males is in general longer than for females. Barrett and Morgenstern (1974) and Barrett, Gerardi and Morgenstern (unpublished) find the opposite.

It is interesting to note that although the ranking of female-male unemployment rates is not the same in the U.K. and the U.S., *greater unemployment rates are associated with a greater incidence of inflows* in both cases. The situation regarding duration is not so clear.

The relative position of female and male UB recipients in Australia differs somewhat from both the U.K. and U.S. situations. In Australia, the UB recipient rate for males (the number of beneficiaries divided by the labour force) is greater than for females. This arises from the incidence of inflows being greater for males, outweighing the influence of slightly longer completed duration for females. Here also *greater unemployment rates are associated with a greater incidence of inflows*. The greater incidence of inflows for males reflects, in part at least, differences in access to Benefits for males and females.

Separate female-male comparisons for various age groups reveal that for young people (less than 21 years), the general situation just documented does not hold. For young people the incidence of inflows is greater for males and duration is longer for females (as for older age groups), but here the influence of the duration differences dominates. The longer duration of junior females relative to junior males results in a greater UB recipient rate for junior females.

JUNIORS AND ADULTS

In the U.K., U.S. and Australia the unemployment rate for juniors always exceeds that for adults by a significant amount. The differences across countries in comparisons of female and male unemployment do not exist for comparisons of juniors and adults.

All studies find that the incidence of inflows is much higher for juniors.¹ Studies of the U.K. labour market find completed duration of unemployment to be shorter for juniors. Perry (1972) gets this same result for the U.S., but Barrett (1975) finds duration of adults to be slightly shorter than for juniors.

Some studies sub-divide adults into a number of age groups (Gillion and Black 1966; Barrett 1975). Across adult age groups, a decline with age in the incidence of inflows is apparent. For duration, however, the picture is not so clear-cut.

In Australia, the relative junior-adult UB recipient situation is straightforward. Beneficiary rates increase with age (except perhaps for the very oldest group, 55 years and over). This results from a sharp decline with age in the incidence of inflows, outweighing a lengthening of duration for the older age groups. This coincides with overseas findings.

Thus in the U.K., U.S. and Australia unemployment rates are higher for juniors than adults because juniors have a higher incidence of inflows. *Again greater unemployment rates are associated with a greater incidence of inflows.*

BLACKS AND WHITES

Black-white comparisons relate only to the U.S. labour market, where the unemployment rate for blacks is much greater than for whites. Smith and Holt (1971), Toikka (1974), Hall (1972) and Barrett and Morgenstern (1974) all find that the higher unemployment rate for blacks is due to their greater incidence of inflows. Duration of unemployment is very similar for both

1. The junior-adult situation has been considered by Gillion and Black (1966), Fowler (1968), Bowers and Harkness (1974), Cripps and Tarling (1974) and Disney (1979) for the U.K.; and by Hall (1972), Perry (1972), Toikka (1974), Barrett and Morgenstern (1974), Barrett (1975) and Barrett, Gerardi and Morgenstern (unpublished) for the U.S.

rates. Once again *greater unemployment rates are associated with a greater incidence of inflows.*

(B) HAVE CHANGES OVER TIME IN THE LEVEL OF UNEMPLOYMENT BEEN DUE TO CHANGES IN INFLOWS OR CHANGES IN DURATION?

All studies find movements in inflows and duration to be positively related over the business cycle. However, a diversity of results exist on the question of the relative contribution of inflows and duration to changes in unemployment.

In the U.S. Perry (1972) finds changes in inflows to be the principal mechanism behind variations in the level of unemployment. Kaitz (1970), however, finds inflows to be the main contributor only when unemployment is increasing from a low level. At higher unemployment levels, duration becomes the more important vehicle for change in the size of the unemployment pool.

In the U.K. McAuley (1975), Weeden (1972) and Cripps and Tarling (1974) find changes in completed duration to be the main cause of fluctuations in unemployment levels. Fowler's results (1968) suggest the opposite. In between, Bowers and Harkness (1974) conclude duration dominates only for older workers - inflows dominate unemployment level changes for young people. Finally, Gillion and Black (1966) find the relative contribution of inflows and duration to cyclical change varies substantially from one recession to the next, and is different for men and women.

Our results for UB recipients in Australia show that for all age-sex groups, under all labour market conditions, inflows dominate duration in causing UB recipient rate changes. *Higher beneficiary rates through time are primarily associated with a higher incidence of inflows, and to a lesser extent longer durations.*

However, the domination of inflows is not so great for old beneficiaries (55 years and over), and is not so great when unemployment is high. The increased importance of duration in through-time differences in unemployment for old workers lends some support to Bowers and Harkness' finding for the U.K. The greater importance of duration when unemployment levels are high coincides with Kaitz's finding for the U.S.

(C) WHAT ECONOMIC INFLUENCES CAUSE CHANGES IN INFLOWS AND DURATION OVER TIME?

Most studies have considered the influence of different economic variables on the duration of unemployment only. Leicester (1974), Cubbin and Foley (1977) and Nickell (1979) for the U.K.; Chapin (1971) and Barron (1975) for the U.S.; and Maki (1977) for Canada have estimated the relationship between completed duration of unemployment and job opportunity indicators. All find that when job opportunities are plentiful, the duration of unemployment is shorter. Leicester claims that the influence of job opportunities diminishes with time in the unemployment pool - those unemployed longest are least affected by changes in job opportunities. Cubbin and Foley show that increases in the duration of unemployment are associated with increases in the level of wealth in the economy.

Only Leicester has considered inflows to unemployment in this context, and this has been done in an obscure way. Inflows to unemployment expressed as a proportion of the unemployment stock is related to job opportunities. Leicester finds that as job opportunities improve, this unemployment 'inflow rate' increases. Unfortunately this tells us nothing about the more interesting variable, the incidence of inflows.

Our study places particular emphasis on tracing the impact of various variables on both inflows and duration, and is very much richer in specification of economic influences than previous work. Only results

relating to job opportunities are noted here. *We find the duration of unemployment to be shorter, and the incidence of inflows lower, the more abundant are job opportunities.* The rate of change in job opportunities is also found to be important.

(D) WHAT IS THE EFFECT OF BENEFIT PAYMENTS ON THE LEVEL OF UNEMPLOYMENT?

Many researchers have considered this question, but here we consider only studies embodying turnover analysis.

A number of studies in a number of countries show increases in Unemployment Benefit payments to be associated with increases in the duration of unemployment (Chapin 1971 in the U.S.; Maki 1977 in Canada; and Nickell 1979 in the U.K.). Nickell finds that the influence of Benefit payments declines with time in the unemployment pool.

Cubbin and Foley (1977), however, find for the U.K. that if the influence of 'wealth' on the duration of unemployment is taken into account, changes in Benefit payments are not a significant influence.

To the best of our knowledge there have been no studies to date that relate the level of inflows to Unemployment Benefit payments.

Our study is unique in considering both unemployment inflow and duration responses to changes in Benefit payments. As with other studies, *we find duration lengthens as Benefit payments increase. We also find inflows increase when Benefit payments rise.*

Our study is also unique in that we explore the inflow and duration response to Benefits for different age-sex groups. These results can be found in Chapter Six.

(E) WHY HAS THE RELATIVE UNEMPLOYMENT POSITION OF VARIOUS GROUPS CHANGED OVER TIME?

Smith and Holt (1971), Weeden (1972), Perry (1972) and Bowers and Harkness (1974) have looked at this question simply in terms of changes in relative inflows and completed duration. Thus Perry, for example, finds that in the U.S. unemployment of young people has tended to rise relative to older people due to a relative increase in their incidence of inflows. In these studies no attempt has been made to quantitatively link these underlying inflow and duration changes to economic variables.

In this study we quantify the effects of several economic variables on the relative unemployment positions of different age-sex groups. We find, for example, that the increase in youth unemployment relative to adults in 1972 and 1973 is not due to the large increase in Benefit payments to juniors implemented at that time, but is due to the differential impact of changes in aggregate demand.

(F) WHY DID THE UNEMPLOYMENT-VACANCIES RELATIONSHIP CHANGE IN THE 1970s?

To the best of our knowledge this study is the only one to consider the shifting unemployment-vacancies relationship in terms of the underlying inflow-vacancies and duration-vacancies relations. We find that both the inflow-vacancies and duration-vacancies relationships change in the early part of the decade. These changes are explained in terms of several 'shift' variables (including the level of Benefit payments relative to earnings).

(G) WHY HAS THE PROPORTION OF THE UNEMPLOYED RECEIVING BENEFIT PAYMENTS INCREASED DRAMATICALLY SINCE THE MID-1970s?

This important question has not been addressed widely in Australia. Our turnover approach to studying unemployment allows us to discern that the increased proportion receiving Benefits has occurred for a number of reasons. More people are unemployed long enough to meet the duration-related requirements of Benefit receipt. More people apply for, and take up,

Benefit payments, apparently due to both an expectation of longer spells of unemployment than previously and higher levels of Benefit payments.

1.4 Turnover Analysis in Australia: Previous Work

In the above review the only previous Australian study, Khoo (1976), has been placed aside. We now give it special consideration.

Khoo (1976) has directly applied Fowler's techniques to Australian unemployment data. For the measure of unemployment used, however (those registered with the Commonwealth Employment Service), monthly inflow data are available for any period required.¹ Thus it is not necessary to employ the Fowler technique that estimates inflows as well as completed duration. In fact estimating completed duration without incorporating the available inflow data is inefficient.

The degree of this inefficiency can be measured by comparing Khoo's estimated inflows with actual data available. When this is done we find Khoo's estimates to be 20-25 per cent below actual inflows. Turnover of unemployment is understated and completed duration is overstated.

From analysing stationary stocks representing periods with different levels of unemployment, Khoo concludes that changes in unemployment have been due mainly to changes in duration rather than changes in inflows. This differs from our results for UB recipients. Khoo finds that not all the unemployed are affected in the same way. As the unemployment rate changes, the probability on entry of leaving within a month or so is relatively unaffected; but for those unemployed 4 to 24 weeks, the probability of leaving unemployment is reduced as the unemployment rate increases. This is a potentially important result. For UB recipients, we do not find this

1. Although unpublished, these data can be obtained readily from the Department of Employment and Youth Affairs.

difference in response for the short-term and longer-term unemployed - people of different durations in the pool are affected to much the same extent by changes in the unemployment rate.

Finally, Khoo duplicates Fowler's result of the probability of remaining unemployed for another week increasing with time already spent in the unemployment pool.

This completes the review of the methods and results of past studies. In the next chapter we present our methods of turnover analysis, and apply these to Australian unemployment data.

CHAPTER TWO

ESTIMATING TURNOVER MEASURES FOR UNEMPLOYMENT BENEFIT RECIPIENTS

To carry out turnover analysis of unemployment requires longitudinal-type data. Such data are not directly available in Australia. In this chapter we report on the development and implementation of a technique to estimate the required data.

In the preceding chapter the techniques used in previous studies to estimate inflows to unemployment and completed duration were reviewed. Many of these techniques were found to be unsatisfactory, due in part to data inadequacies but often also due to conceptual errors. Here we avoid many of these problems through the availability of a suitable data base, and the use of a simple direct approach that this data base allows.

We estimate the necessary longitudinal information and carry out turnover analysis for a subset of total unemployment, those receiving Unemployment Benefit payments.¹ In Chapter Eight we consider total unemployment.

UB recipients are chosen for analysis because they provide the best data base for estimating the longitudinal-type data necessary for carrying out turnover analysis. Inflow data, and regular and frequent snapshot observations on current duration, are available over a reasonably long period. These data allow the use of the grid approach introduced in Chapter One (Figure 1) without extensive data manipulations, extrapolations or interpolations.

The UB recipient data have another advantage over other measures of unemployment in that they are available for a wide range of age-sex groups.

1. The current eligibility requirements for UB receipt are documented in Appendix A.

2.1 UB Recipient Data

Inflows into the beneficiary pool (the number commencing spells of UB receipt) have been available on a monthly basis since the inception of Benefit payments in 1945.

Snapshot observations on the current duration of UB receipt have been made every three months - at the end of February, May, August and November - from 1967 through to the present.¹ These quarterly data allocate UB recipients into the following duration intervals

- . less than 2 weeks
- . 2 weeks and less than 1 month
- . 1 and less than 2 months
- . 2 and less than 3 months
- . 3 and less than 6 months
- . 6 months and over.

Some additional snapshot data on current duration are available for limited periods. These are considered later.

Current duration data are available for the age groups less than 21 years, 21 to 24 years, 25 to 44 years, 45 to 54 years and 55 years and over, for both males and females. Inflows are available for total males and females only, requiring allocation between the various age groups.²

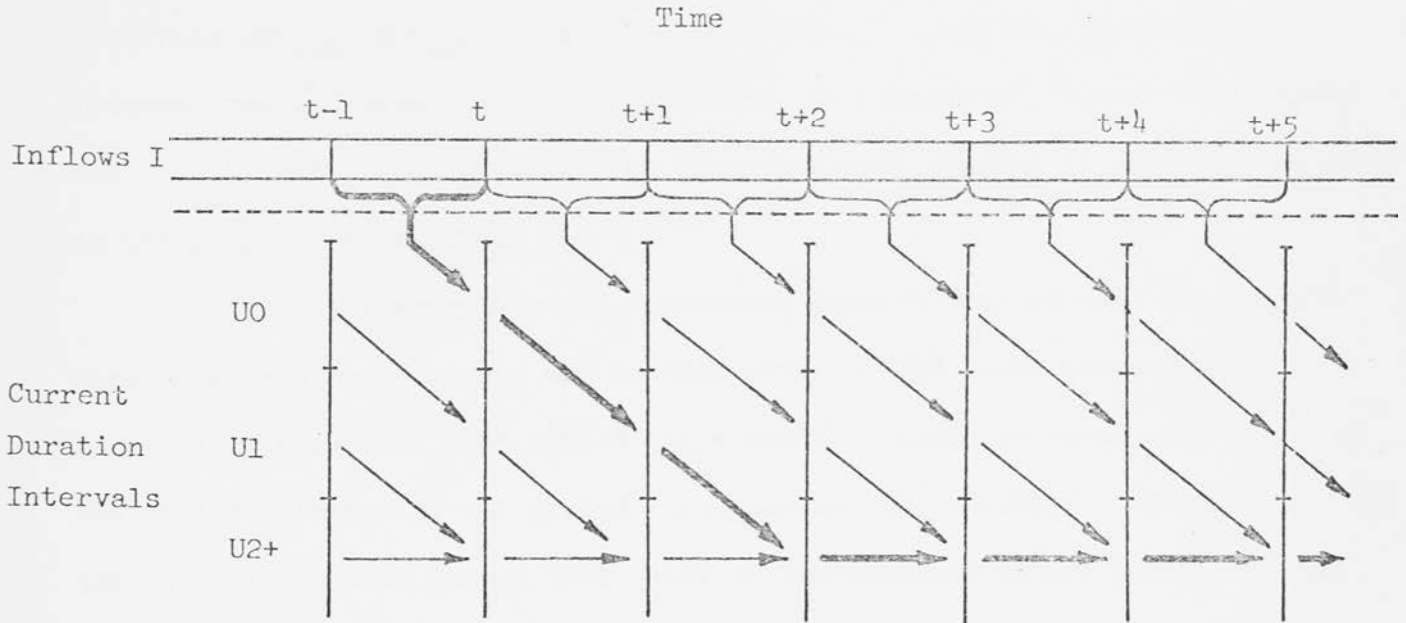
2.2 Estimation of Completed Duration Information

To estimate completed duration from inflows and current duration snapshots, the data were arranged in a grid as described in Chapter One. In this form, inflow groups can be followed through time to see when people leave the pool.

-
1. Inflow and current duration data were obtained directly from the Department of Social Security. Some of the quarterly observations on current duration were missing and needed to be estimated. See Appendix A.
 2. This was done on the basis of numbers in the less than 2 weeks current duration interval. See Appendix A.

The UB recipient data documented above allow the construction of a 3-month grid, with consecutive quarterly observations on the duration interval less than 3 months, 3 to 6 months and 6 months and over.¹ This is shown in Figure 3.

FIGURE 3

3-MONTH CURRENT DURATION DATA GRID^a

^aU0 - 0-3 month interval

U1 - 3-6 month interval

U2+ - 6 months and over interval

The accounting period used in the grid is one quarter (3 months), with the width of the duration intervals equal to the length of the accounting period. I represents 3-monthly inflows, U0 the number in the less than 3 months interval at the time of the snapshot, U1 the number in the 3 to 6 months interval, and U2+ the number in the 6 months and over interval.

1. The numbers in the short duration intervals were summed to give the number in the less than 3 months interval.

The arrows in the grid show the progress through time of the inflow groups. Consider the t^{th} period inflow group, whose movement through the grid is shown by the heavy arrows. I_t people enter the beneficiary pool in the 3 months preceding time t , and of these UO_t are still in the pool at time t . Another 3 months later at time $t+1$, $U1_{t+1}$ of the inflow group are still in the pool. Over following quarters, these $U1_{t+1}$ beneficiaries merge with beneficiaries from earlier inflow groups to be part of the open-ended duration intervals $U2^+_{t+2}$, $U2^+_{t+3}$... at time $t+2$, $t+3$ In the open-ended interval the t^{th} period inflow group cannot be identified, but we show later that, under certain conditions, its behaviour with respect to numbers remaining in the pool can be implied.

Take for example males commencing Benefit receipt over the 3-month period between end-February and end-May 1971. 27083 males entered the beneficiary pool over this period ($I_t = 27083$). 10644 of these were still in the pool at the end of the period i.e. end-May ($UO_t = 10644$). Another 3 months later, at the end of August 1971, 2477 of the original inflow group remained in the pool ($U1_{t+1} = 2477$). 3 months later again, this particular inflow group cannot be identified. From an accounting perspective, the remainder of the II.1971 (i.e. second quarter 1971) inflow group are merged with the remainder of those who entered the pool prior to February 1971 (1258 at the end of August - $U2^+_{t+1} = 1258$) to give the number 1778 in the open-ended duration interval at the end of November 1971 ($U2^+_{t+2} = 1778$).

The same exercise can be carried out for inflows over each 3-month period between 1967 and 1978, for each of the age-sex groups.

The observations on the progress of inflow groups through time can be used to estimate a distribution of completed spells. If I_t entered the pool over the t^{th} period, and UO_t of these were still there at the end of the period (time t), then

$$I_t - UO_t$$

must have left the pool in the same 3-month accounting period in which they entered. Thus these $I_t - UO_t$ people leave within 3 months of entry.

Similarly if there were $U1_{t+1}$ of the original inflow group remaining 3 months later again at time $t+1$, then

$$UO_t - U1_{t+1}$$

must have left over the $t+1^{\text{th}}$ period. As the t^{th} period inflow group enter any time between $t-1$ and t , these $UO_t - U1_{t+1}$ people leave between 0 and 6 months after entry.

The $U1_{t+1}$ beneficiaries remaining from the t^{th} period inflow group at time $t+1$ go on to leave the pool some time in the future. We cannot pinpoint when they leave - all that can be said is that they leave after a spell of Benefit receipt longer than 3 months.

Referring back to the 27083 males entering the beneficiary pool over II.1971, 16439 (27083 minus 10644) left during the same 3-month accounting period in which they entered. Another 8167 (10644 minus 2477) left over the following 3-month period of end-May to end-August 1971. The remaining 2477 beneficiaries left the pool some time after August 1971. Thus we have the overlapping distribution of completed durations of 16439 beneficiaries leaving within 3 months of entry, 8167 leaving between 0 and 6 months of entry, and 2477 leaving after a spell of Benefit receipt longer than 3 months.

In this form, the distribution of completed spells is not very useful. For our purposes, the experience through time of the inflow groups is better described by duration-specific retention rates. These show (a) the proportion of inflows over a quarterly accounting period who are still in the pool at the end of that period, and (b) the proportion of beneficiaries in a certain duration interval at the end of a period who remain in the pool to be captured by the snapshot at the end of the following period.

Define po_t as the retention rate showing the proportion of the t^{th} period inflow group that is still in the beneficiary pool at the end of the t^{th} period. Then

$$po_t = U0_t / I_t.$$

Similarly, if pl_{t+1} is the retention rate showing the proportion of those in the beneficiary pool less than 3 months at time t (the remainder of the t^{th} period inflow group) who remain Benefit recipients over the following quarter to still be in the pool at time $t+1$, then

$$pl_{t+1} = U1_{t+1} / U0_t.$$

Finally, if $p2^+_{t+2}$ is the proportion of all those in the pool longer than 3 months at time $t+1$ who are still there another three months later at time $t+2$, then

$$p2^+_{t+2} = U2^+_{t+2} / (U1_{t+1} + U2^+_{t+1}).$$

Note that this final duration-specific retention rate refers to not only the remainder of the t^{th} period inflow group still in the pool at time $t+1$, but also the remainder of those who entered before the t^{th} period. It gives the average propensity to leave of those in the pool between 3 and 6 months, and 6 months and over, at time $t+1$.

For the II.1971 male inflow group, the quarterly retention rates are

$$\begin{aligned} po_t &= 0.39 && (10644/27083) \\ pl_{t+1} &= 0.23 && (2477/10644) \\ p2^+_{t+2} &= 0.48 && (1778/[2477 + 1258]) \end{aligned}$$

Thus of the 27083 males entering the UB recipient pool over the second quarter of 1971, 39 per cent were still there at the end of this period (end-May). Of these still in the pool at the end of May 1971, 23 per cent remained over the following quarter. Finally, for all those who entered the pool over

II.1971 or earlier and were still in the pool at the end of August 1971, 48 per cent remained for yet another 3-month period. Alternatively, at the end of May 1971 39 per cent of the inflow group remained; at the end of August 1971 9 per cent ($0.39 \text{ times } 0.23$) of the inflow group remained; and at the end of November 1971 only 4 per cent ($0.39 \text{ times } 0.23 \text{ times } 0.48$) remained (assuming that those in the pool between 3 and 6 months at end-August 1971 had the same propensity to leave over the following 3 months as those in the pool over 6 months at August 1971).

Quarterly duration-specific retention rates have been calculated for each 3-month inflow group over the 1967-78 period, for the 10 age-sex groups. These are used in later analysis to estimate average completed duration. In the following section, however, we consider the characteristics of the retention rates themselves.

2.3 Duration-Specific Retention Rates

Two aspects of retention rates are considered in this section:

- . how they change with duration in the beneficiary pool
- . how they have varied through time.

CHANGE WITH DURATION IN THE POOL

Overseas studies have found that duration-specific retention rates typically rise with time in the unemployment pool (see Chapter One). The longer people have been in the unemployment pool, the less likelihood they have on average of leaving.

The quarterly retention rates for the various age-sex groups reveal the same phenomenon occurring for beneficiaries in Australia. This is shown in Table 1, which presents duration-specific retention rates for junior and adult males and females¹ averaged over the two time spans 1968-74 and

1. Juniors are those less than 21 years, and adults those 21 years and over. The individual adult groups are aggregated to save space in presentation.

1975-78¹. The proportion of those unemployed 3 months or more who remain in the pool one more quarter, p2+, is typically greater than the proportion remaining for those unemployed less than 3 months, p1. It is not meaningful to compare p0 (the proportion of inflows remaining at the end of the accounting period) to p1 and p2+. In the calculation of p1 and p2+ all those in the initial 'at risk' group have 3 months in which to leave the pool. In the calculation of p0, however, some people may have as little as one day to leave before the end of the accounting period, as inflows occur throughout the period. Thus p0 refers to a different amount of labour market exposure than do p1 and p2+.

TABLE 1

QUARTERLY DURATION-SPECIFIC RETENTION RATES:

AVERAGE 1968-74 AND 1975-78^a

		1968-74			1975-78		
		p0	p1	p2+	p0	p1	p2+
MALE	<21	0.29	0.16	0.33	0.50	0.40	0.49
MALE	21+	0.35	0.27	0.45	0.52	0.48	0.62
FEMALE	<21	0.39	0.24	0.39	0.53	0.46	0.54
FEMALE	21+	0.44	0.31	0.49	0.56	0.50	0.62

- a
- p0 - retention rate for inflows
 - p1 - retention rate for 0-3 month group
 - p2+ - retention rate 3 months and over group

1. Unemployment in general increased rapidly to high levels over late 1974 and early 1975. Thus the 1968-74 and 1975-78 time spans are periods of low and high unemployment respectively.

Take junior males over 1968-74 as an example. On average 16 per cent of those in the pool less than 3 months at a particular point in time were still in the pool 3 months later - 84 per cent left over this period. On the other hand, 33 per cent of those in the pool longer than 3 months remained for one more quarter -- only 67 per cent left. Similarly for adult females over 1975-78, 50 per cent of the less than 3 months group remained in the pool over the following 3 months, while 62 per cent of the 3 months or more group remained.

More detail on how retention rates change with time in the pool can be obtained by looking at some additional snapshot data. As many beneficiaries leave within the same 3-month accounting period in which they entered, it would be interesting to consider leaving behaviour in the first few months after entry. It would also be interesting to consider the leaving patterns of the long term Benefit recipients. For limited periods, we are able to consider both these things.

For the period 1967-70, monthly snapshots of UB recipient current duration have been made. The monthly snapshots allocate beneficiaries into the same duration intervals as the quarterly observations. These data allow us to construct a monthly grid, with consecutive monthly snapshots showing the numbers in the pool less than 1 month, 1 and less than 2 months, 2 and less than 3 months, and 3 months and over.¹ From this four 1-monthly duration-specific retention rates can be estimated. These are the proportion of monthly inflows remaining till the end of the accounting month; and the proportions of those in the pool less than 1 month, 1 and less than 2 months, and 2 months and over, who remain in receipt of Benefits for 1 more month.

1. Recall that the grid approach requires the width of the duration intervals to be equal to the length of the accounting period, here one month. Thus we cannot use the information on those in the pool 3 to 6 months, as this duration interval is 3 months wide.

The monthly retention rates have been calculated for each age-sex group over the 1967-70 period. Average values over this period for junior and adult males and females are presented in Table 2. $p1^m$ is the proportion of those in the pool less than 1 month who stay for 1 more month, and $p2^m$ and $p3^m$ the equivalent proportion for those in the pool 1 to 2 months and 2 months and over respectively. The 'm' superscript indicates 1-monthly retention rates.

TABLE 2
MONTHLY DURATION-SPECIFIC RETENTION RATES:
AVERAGE 1967-70^a

		$p1^m$	$p2^m$	$p3^m$
MALE	<21	0.50	0.50	0.60
MALE	21+	0.61	0.59	0.70
FEMALE	<21	0.67	0.58	0.66
FEMALE	21+	0.72	0.64	0.74

- a $p1^m$ - retention rate for 0-1 month group
 $p2^m$ - retention rate for 1-2 month group
 $p3^m$ - retention rate for 2 months and over group

Comparison of these monthly retention rates reveals that, over the first few months in the beneficiary pool, retention rates apparently do not rise with time in the pool. For males, $p1^m$ is virtually equal to $p2^m$. For females $p1^m$ is greater than $p2^m$. The retention rates for those in the pool longer than two months, $p3^m$, is greater than $p2^m$ for all groups, coinciding with the usual result of rising retention rates with time in the pool.¹

1. With respect to quarterly retention rates, the experience over 1967-70 is qualitatively the same as indicated for 1968-74 in Table 1.

This finding of falling (or at least not rising) retention rates with duration in the pool over the first few months holds interesting implications for search theory of unemployment.¹ In other studies, the phenomenon of rising retention rates has been explained in two different ways. One explanation has been that the personal probability of remaining in the pool facing the individuals in each inflow group rises with duration, so the average probability of remaining (the retention rate) rises (e.g. Weeden 1972). Alternatively, it has been postulated that the personal probability of leaving facing individuals does not change with time in the pool, but a 'sorting effect' occurs whereby individuals with low probabilities of leaving congregate in the longer duration intervals (e.g. Cripps and Tarling 1974, Salant 1974). For UB recipients, in the early months in the pool the personal probability of remaining in the pool must fall with duration - the probability of leaving rises. Search theory suggests that the probability of leaving will rise with duration as reservation wages fall,² with this perhaps offset by an increasing reluctance of employers to hire people as their duration of unemployment increases. Thus the implication is that for Benefit recipients the effect of reductions in reservation wages dominates in the early months (or perhaps employer discrimination against those unemployed longer does not even operate over the first few months of unemployment). Finally, if a sorting effect is operating (as it must be to some extent), then in the first few months it is outweighed by changes in personal probabilities of leaving.

-
1. A review of the search theory of unemployment literature is presented in Appendix E.
 2. The reservation wage is a generic term used to embrace all the characteristics of the job, so that a fall in the reservation wage means that an unemployed person would accept an increasing range of jobs.

Over the 1975-78 period, many more people than earlier remained in the pool for longer periods. The Department of Social Security responded to this by incorporating some longer duration intervals in the current duration snapshots. From 1977 onwards the open-ended duration interval 6 months and over has been sub-divided into

- . 6 and less than 12 months
- . 12 and less than 18 months
- . 18 and less than 24 months
- . 24 months and over.

Using the same grid approach as above, 6-monthly retention rates can be calculated.

Average 6-monthly retention rates over 1977-78 are presented in Table 3. $p1^{6m}$ is the proportion of those in the pool less than 6 months who remain for another 6-month period; $p2^{6m}$ the proportion remaining for those in the pool 6 to 12 months; . . .; and $p4+^{6m}$ the proportion in the pool over 18 months who remain for another 6 months. The '6m' superscript indicates 6-monthly retention rates.

TABLE 3

6-MONTHLY DURATION-SPECIFIC RETENTION RATES:

AVERAGE 1977-78^a

		$p1^{6m}$	$p2^{6m}$	$p3^{6m}$	$p4+^{6m}$
MALE	<21	0.23	0.34	0.42	0.54
MALE	21+	0.35	0.52	0.62	0.71
FEMALE	<21	0.27	0.37	0.47	0.54
FEMALE	21+	0.37	0.52	0.65	0.75

a	$p1^{6m}$	- retention rate for 0-6 month group
	$p2^{6m}$	- retention rate for 6-12 month group
	$p3^{6m}$	- retention rate for 12-18 month group
	$p4+^{6m}$	- retention rate for 18 months and over group

For all groups these 6-monthly retention rates rise steadily with time in the pool. For those in the beneficiary pool for more than 18 months, chances of leaving become fairly slim. For example, over a 6 month period on average only 25 per cent of adult females who have been unemployed more than 18 months leave the beneficiary pool - 75 per cent stay.

VARIATION IN RETENTION RATES OVER TIME

Retention rates vary through time with changes in economic conditions. In Table 1, average quarterly retention rates are always higher for the 1975-78 period when unemployment is high than for the 1967-74 period.

This can also be seen by regressing the duration-specific retention rates for the various age-sex groups on UB recipient rates (UB recipient numbers expressed as a proportion of the labour force). When this is done for the 1967-78 period, a significant positive relationship is found in all cases. Increases in the number of Benefit recipients are accompanied by increases in the proportions remaining in the pool for yet another period.

This suggests that increasing duration of unemployment is associated with rising unemployment levels. This point is developed in Chapter Three.

2.4 Average Completed Duration

Duration-specific retention rates can be used to estimate average completed duration. This is done using quarterly retention rates so that time series on average completed duration can be calculated over the 1967-78 period. These completed duration time series are used extensively in later chapters.

To estimate average completed duration, we start with some stationary state results and adapt these to the real world situation. Two alternative concepts of average completed duration are developed, actual average completed duration and expected average completed duration. Each measure has its own particular advantages, and both are calculated.

In Chapter One we documented the finding from life-table theory that under stationary conditions, the total man-weeks of unemployment experienced by a weekly inflow group is given by the steady stock level (the number in the pool at any particular time). From this comes the well-known stationary state result that average completed duration equals the stock level divided by inflows.

That is

$$D = \frac{U}{I}$$

where D is average completed duration, U the stationary stock level and I inflows. Note that time subscripts are not needed with the stationary state as all variables are steady through time. With weekly inflows, average completed duration is measured in weeks. Alternatively with quarterly inflows, as we have for UB recipients, duration would be measured in quarters.

The total stock level is the sum of the numbers in the various current duration intervals. With the quarterly duration intervals we have for UB recipients,

$$U = U_0 + U_1 + U_{2+}$$

where U_0 , U_1 and U_{2+} are the number in the pool less than 3 months, 3 to 6 months and 6 months and over respectively. Now from the definition $p_0 = U_0/I$ given earlier

$$U_0 = I.p_0.$$

Similarly as $p_1 = U_1/U_0$

$$U_1 = U_0.p_1 = I.p_0.p_1.$$

Finally as $p_{2+} = U_{2+}/(U_1 + U_{2+})$

$$U_{2+} = U_1 \frac{p_{2+}}{1-p_{2+}} = I.p_0.p_1 \frac{p_{2+}}{1-p_{2+}}.$$

$$\text{Thus } U = I.p_0 + I.p_0.p_1 + I.p_0.p_1 \frac{p_{2+}}{1-p_{2+}}$$

where I is inflows and p_0 , p_1 and p_{2+} are duration-specific retention rates. This equation shows that in a steady state when inflows and retention rates are constant, the level of unemployment can be expressed as the sum of elements calculated by multiplying the steady inflow level by combinations of the proportions remaining in the pool (retention rates).

Dividing this stock level equation by inflows

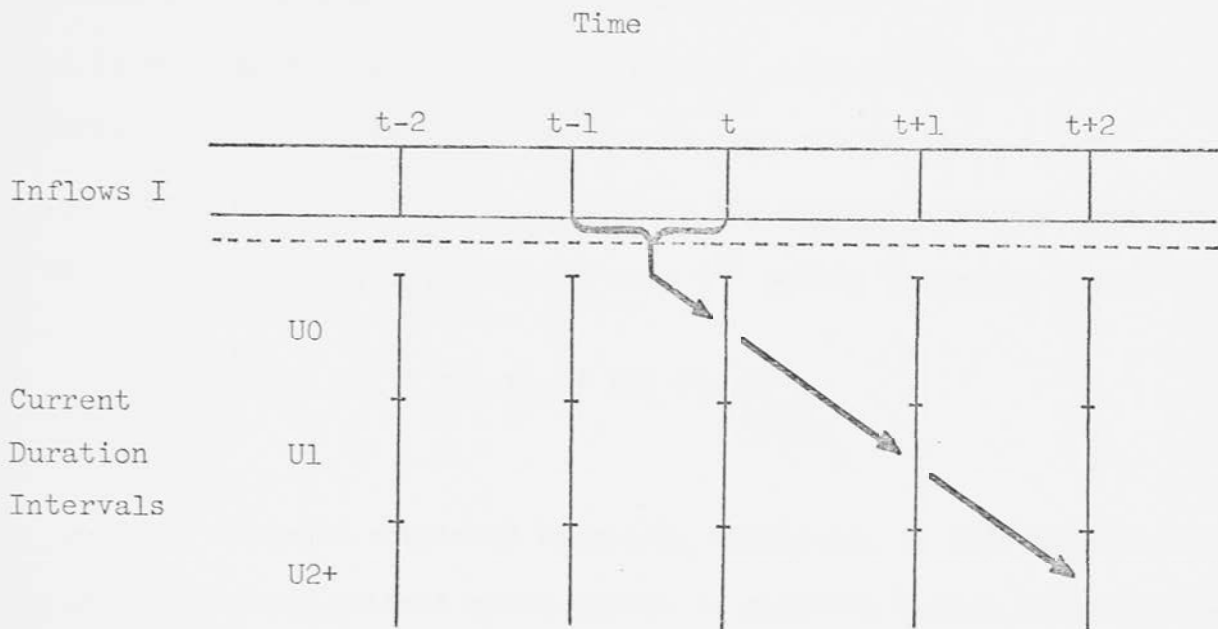
$$\frac{U}{I} = D = p_0 + p_0.p_1 + p_0.p_1 \frac{p_{2+}}{1-p_{2+}}.$$

Thus we have an expression for average completed duration under stationary conditions in terms of retention rates.

In the real world, the stationary state does not prevail. However, average duration expressions very similar to that above, but appropriate to changing conditions, can be derived. These are actual average completed duration and expected average completed duration.

Actual average completed duration, D_t^A , is an estimate of the average length of time actually spent in the unemployment pool by the t^{th} period inflow group. This measure involves using retention rates appropriate to moving diagonally through the grid as shown in Figure 4.

FIGURE 4

ACTUAL AVERAGE COMPLETED DURATION^a

- a
- U0 - 0-3 month interval
 - U1 - 3-6 month interval
 - U2+ - 6 months and over interval

By making certain simplifying assumptions, an expression for actual average completed duration is obtained:

$$D_t^A = p_{0t} + p_{0t} \cdot p_{1t+1} + p_{0t} \cdot p_{1t+1} \cdot \frac{p_{2t+2}^+}{1 - p_{2t+2}^+}$$

The derivation of this expression is presented in Appendix B. This formula is identical to the stationary state duration expression above, except time subscripts have been added. Retention rates for different time periods now become relevant.

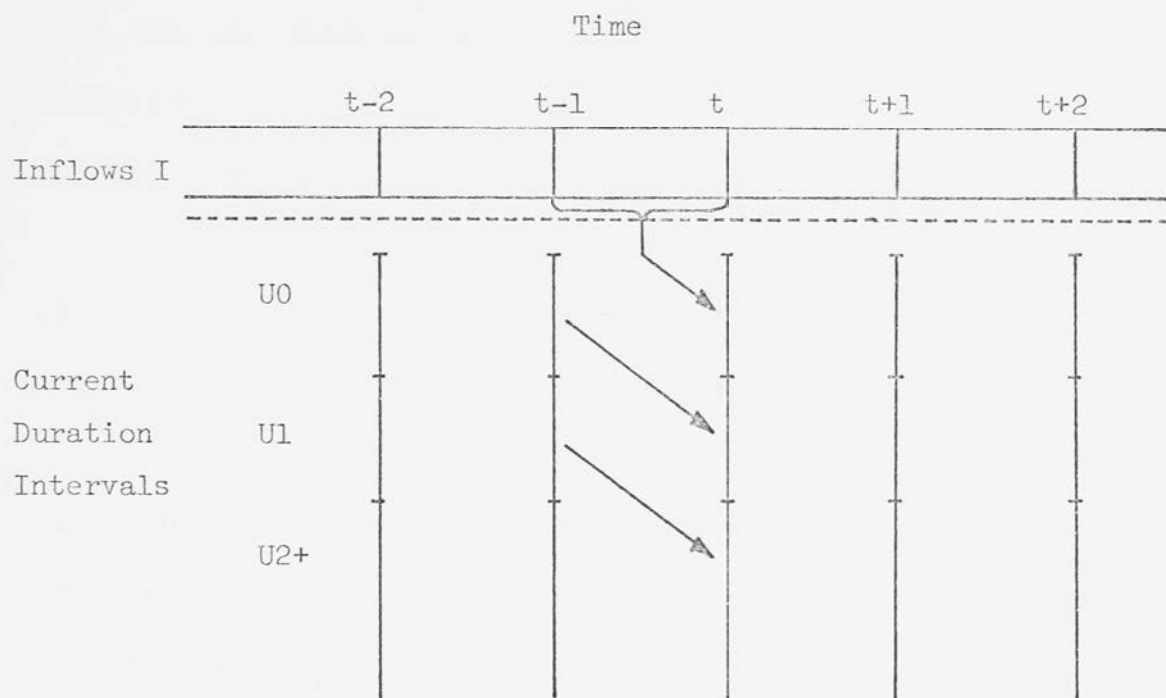
The actual average completed duration of an inflow group will be affected by labour market conditions over a number of periods. In our derivation we have arbitrarily allowed conditions over three periods (t , $t+1$ and $t+2$) to influence duration (See Appendix B). For later analysis (the analysis of the Australian labour market in Part II in particular), however, it is more appropriate to have an average completed duration measure that reflects labour market conditions over only one period. Accordingly we adapt the actual duration formula to measure the expected average completed duration for the t^{th} period, D_t^E , by using only t^{th} period retention rates:¹

$$D_t^E = p_{0t} + p_{0t} \cdot p_{1t} + p_{0t} \cdot p_{1t} \cdot \frac{p_{2t}}{1-p_{2t}}$$

Expected completed duration, therefore, is the duration in the pool a representative entrant would expect to complete before leaving given that labour market conditions generating current retention rates were not to change. Thus this measure involves using retention rates appropriate to proceeding vertically through the grid, rather than diagonally. This is demonstrated in Figure 5.

1. In combining retention rates for different inflow groups to calculate expected duration, we are implicitly assuming that the distribution of personal probabilities of leaving is identical across each of the inflow groups. Cripps and Tarling (1974) have made the same assumption (see Chapter One).

FIGURE 5

EXPECTED AVERAGE COMPLETED DURATION^a

a	U0	- 0-3 month interval
	U1	- 3-6 month interval
	U2+	- 6 months and over interval

Under stationary conditions, moving vertically down the grid would be equivalent to following inflow groups diagonally through the grid, as retention rates are constant from period to period. Expected duration would equal actual duration.

Again under stationary conditions, an exact relationship exists between inflows, average completed duration and the unemployment (beneficiary) level. By definition, the unemployment stock level equals the product of inflows over each accounting period and average completed duration. Under changing real-world conditions, however, no such tidy relationship exists.

Although the unemployment level at any point in time depends on inflows over past periods and the proportions of these inflow groups that stay in the pool, and our measures of average completed duration are a function of retention rates, there is no simple relationship between inflows, duration and the unemployment level under changing conditions.

Both actual and expected average completed duration have been calculated for the various beneficiary age-sex groups over the 1967-78 period. These are presented in Appendix B.

As mentioned earlier, each measure has its own particular advantages. Conceptually, actual average completed duration has the advantage of estimating what actually happened, while expected average completed duration has the advantage of encapsulating only t^{th} period labour market forces. In practice, however, these measures prove to be very little different. This is demonstrated for total male and female UB recipients in Table 4 and Figure 6.

Table 4 shows that for both males and females, averaged over the time spans 1968-74 and 1975-78, actual and expected average completed duration are of very similar lengths. For the first period (1968-74), actual average duration slightly exceeds expected duration; while for the latter period (1975-78) expected average duration is a little longer.

TABLE 4
ACTUAL AND EXPECTED AVERAGE COMPLETED
DURATION: 1968-74 and 1975-78^a

	1968-74		1975-78	
	D ^A	D ^E	D ^A	D ^E
	wks	wks	wks	wks
MALE	6.6	6.3	13.7	14.4
FEMALE	8.0	7.8	14.6	15.2

a D^A - actual average completed duration

D^E - expected average completed duration

The same story holds for the individual age groups. In particular, the ranking of the various age groups according to duration is unaffected by the measure of average completed duration used.

Turning to Figure 6, it can be seen that actual average completed duration 'leads' expected duration.¹ This is as one would expect - actual completed duration 'looks forward' from the t^{th} period while expected duration takes account of the t^{th} period situation only. On the other hand, expected average completed duration is more volatile than actual duration. This can be seen in Figure 6, and is even more marked for original (unsmoothed) observations. Again this is as we would expect - changes in labour market conditions in the t^{th} period are reflected fully in expected duration D_t^E , but not in actual duration D_t^A . The effects of t^{th} period changes are spread over a number of periods for actual duration. However, despite these short-term differences, broad movements in actual average duration and expected duration are very closely related.

Because expected average completed duration and actual duration are very similar in mean level and broad movements, we find there is never any advantage in using these measures separately in our analysis. Thus we always use expected average completed duration. This is the measure referred to as average completed duration throughout the remainder of the study.

EXPECTED ADDITIONAL DURATION AFTER VARIOUS LENGTHS IN THE POOL

The expected average completed duration measure developed above, D_t^E , shows the expected weeks in the pool on entry for the t^{th} period inflow group. It is also possible to estimate the expected additional weeks in the pool for those unemployed less than 3 months at time t , $D_t^{<3}$, and for those unemployed 3 months and over, D_t^{3+} . Based on the same reasoning as used above, the formulas for these measures are

1. Series smoothed using a 4-quarter moving average.

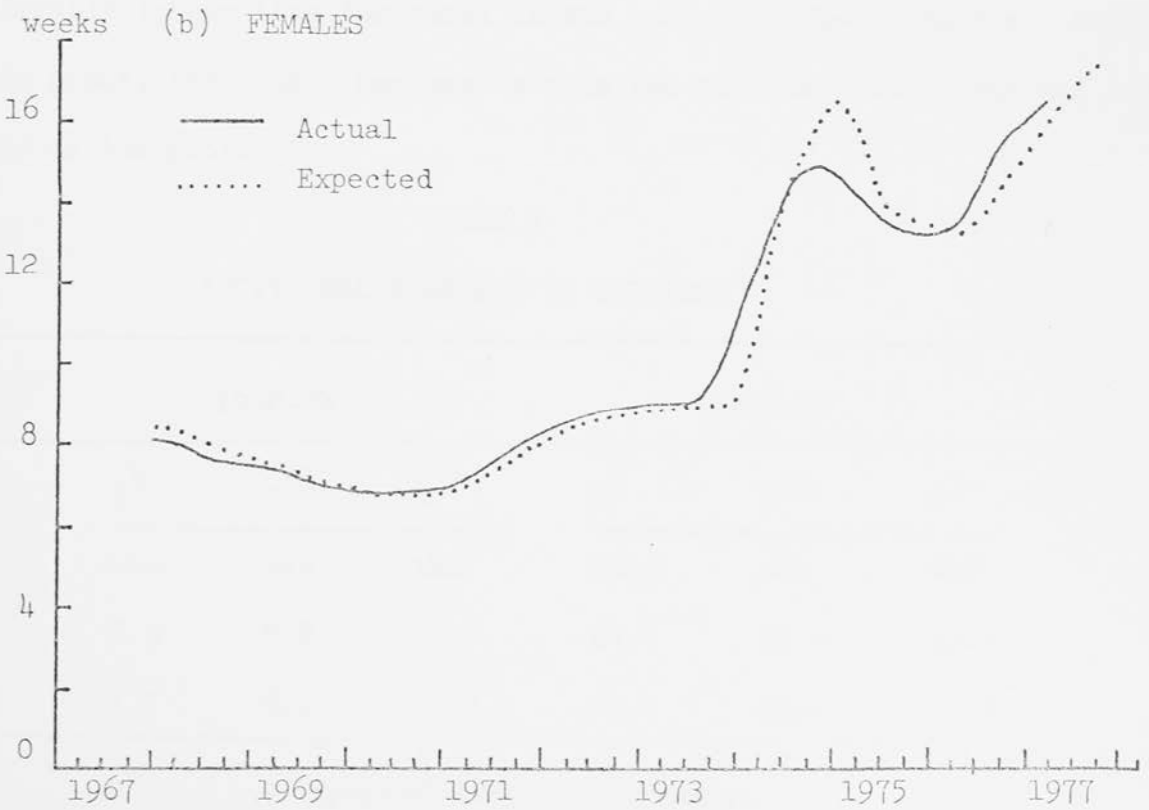
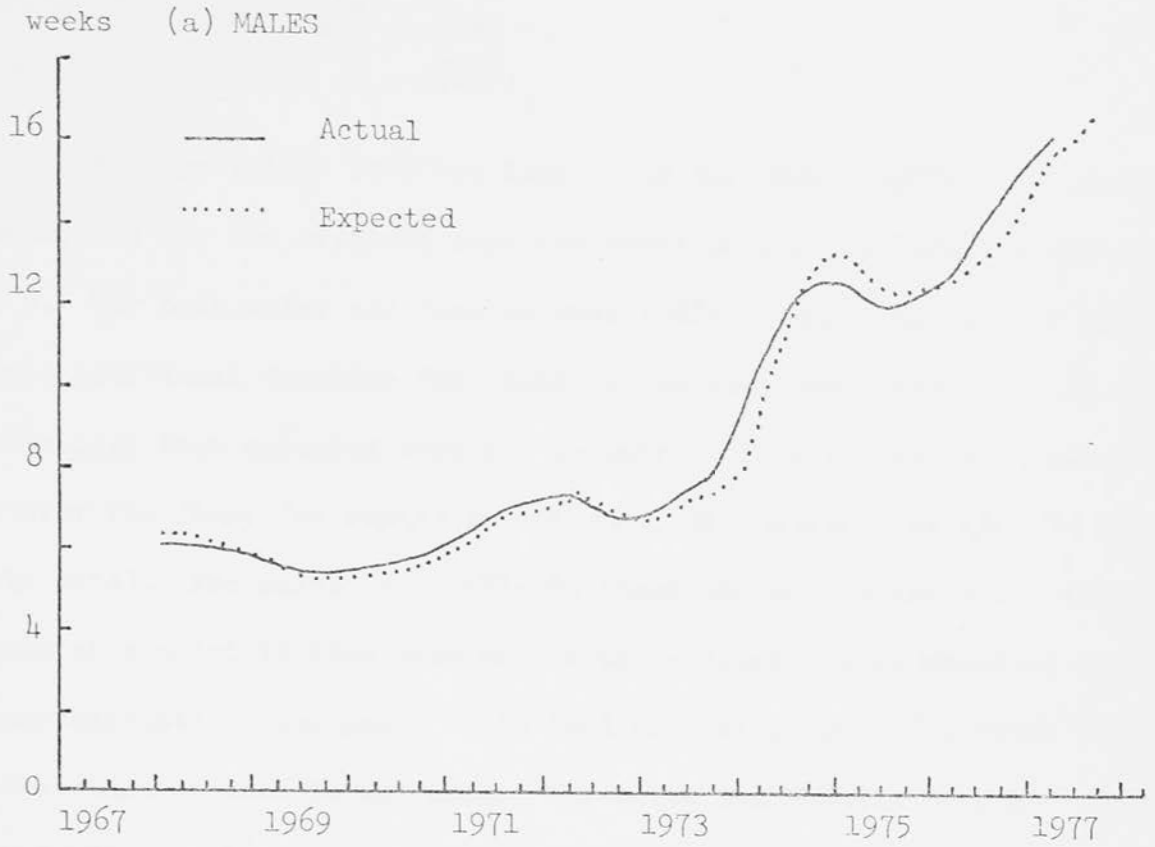


FIGURE 6

ACTUAL AND EXPECTED AVERAGE COMPLETED DURATION

$$D_t^{<3} = p1_t + p1_t \cdot \frac{p2^+_t}{1-p2^+_t}$$

$$D_t^{3+} = \frac{p2^+_t}{1-p2^+_t}$$

Average values over two time spans for these 'additional duration' measures, and for the original expected duration measure, are presented in Table 5. For both males and females over 1968-74, and females over 1975-78, expected additional duration for those in the pool less than 3 months is slightly less than expected duration on entry. This implies falling retention rates over the first few months in the pool (as observed for 1967-70 using monthly data). For males over 1975-78, those who are in the pool less than 3 months at a point in time have on average a longer spell ahead of them than new entrants to the pool. This implies rising retention rates right from the start of time in the pool. For males and females over both periods, expected additional stay of those in the pool 3 months and over is considerably longer than for those in the pool less than 3 months. After a certain point, the longer one has been in the pool the longer one can expect to stay in the pool.

TABLE 5
ADDITIONAL DURATION IN THE POOL^a

	1968-74			1975-78		
	D ^E	D ^{<3}	D ³⁺	D ^E	D ^{<3}	D ³⁺
	wks	wks	wks	wks	wks	wks
MALE	6.3	5.8	10.4	14.4	15.0	19.5
FEMALE	7.7	6.1	10.1	15.2	14.9	17.8

- a
- D^E - expected duration on entry
 - D^{<3} - expected additional stay for 0-3 month group
 - D³⁺ - expected additional stay for 3 months and over group

To see how these different expected additional duration measures vary with the UB recipient rate (number of beneficiaries divided by the labour force), each measure (D^E , $D^{<3}$ and D^{3+}) has been regressed on the beneficiary rate (and seasonal dummies) over the 1967-78 period. This has been done for each age-sex group, using as the independent variable the beneficiary rate for the group in question. The results for total males and females only are presented in Table 6.

TABLE 6
ADDITIONAL EXPECTED DURATION REGRESSIONS: 1967-78^a

INDEP. VAR.	MALES			FEMALES		
	U	\bar{R}^2	D.W.	U	\bar{R}^2	D.W.
D^E	2.3 (13.57)	0.81	1.70	2.9 (9.30)	0.68	1.78
$D^{<3}$	2.7 (12.04)	0.79	1.62	3.4 (8.74)	0.64	1.82
D^{3+}	2.8 (5.78)	0.46	1.57	3.2 (4.12)	0.27	1.85

a U - coefficient on beneficiary rate variable

\bar{R}^2 - coefficient of determination, adjusted for degrees of freedom

D.W. - Durbin-Watson statistic

Bracketed figures are 't' statistics

The coefficients on the beneficiary rate variable show the change in duration (in weeks) from a one percentage point change in the UB recipient rate. Thus these results indicate that a one percentage point increase in the male UB recipient rate has been associated with an increase of 2.3 weeks in expected duration on entry, and an increase of 2.8 weeks in expected additional stay for those in the beneficiary pool 3 months and over. Looking

down the beneficiary rate coefficient columns, it can be seen that the size of these coefficients is very similar for new entrants, those in the pool less than 3 months, and those in the pool 3 months and over. This implies that duration rises by about the same absolute amount for the short term unemployed and the longer term unemployed when unemployment increases.

2.5 Current and Completed Duration Compared

Current and completed duration of unemployment are conceptually different measures. For turnover analysis of unemployment, the correct concept of the duration of unemployment is completed duration - inflows and completed duration determine the level of unemployment. Accordingly, in this chapter we have gone to some lengths to estimate completed duration data.

However, even though current and completed duration are conceptually different measures, in an empirical sense the difference between them may not be very great. In particular, using current duration data as if they were completed duration data, or at least using current duration measures as a proxy for completed duration, may not be misleading to an important extent. If this is the case, it implies future researchers need not expend the effort involved in estimating completed duration. Thus in this section we compare current and completed duration. We find that there are substantial empirical differences between these two concepts of the duration of unemployment.

Current and completed duration are compared on the basis of the mean and the shape of the distribution of durations. We consider how closely current duration measures approximate completed duration at a point in time, and how well movements in current duration measures indicate or proxy movements in completed duration through time.

AVERAGE CURRENT DURATION AND AVERAGE COMPLETED DURATION

Average completed duration for UB recipients has been calculated from quarterly data over the 1967-78 period. No average current duration data for UB recipients are directly available, so this measure needs to be estimated from current duration snapshots. In principal this is done by taking the mid-point of each current duration interval and weighting this by the number in that interval.

However, in estimating average current duration over the full 1967-78 period, problems arise with the limited number of duration intervals. In particular, the open-ended duration interval 6 months and over causes problems. To use these data, some arbitrary assumption has to be made as to the mean current duration of those in this interval, as a midpoint cannot be calculated. After 1974 this assumption will be important in determining overall average current duration, as during this period many more of the inflow than previously stay in the pool for at least 6 months. As well, the true mean current duration of those in the 6 months and over interval will increase between pre-1974 and post-1974, but we do not know by how much.

Accordingly, estimates of average current duration over the full 1967-78 period are not made. Instead, we calculate average current duration over 1977-78, a period for which the open-ended 6 months and over duration interval is further subdivided into 6-monthly intervals up to 24 months. As less than 5 per cent of adults, and 1 per cent of juniors, stay longer than 24 months, these data allow a reasonable estimate of average current duration to be made. The mean of the 24 months and over open-ended interval is taken to be 30 months.

Average current duration and average completed duration for 1977-78 are presented in Table 7. This shows average current duration is greater than average completed duration in all cases, the difference ranging from 42

per cent of average completed duration for adult females to 53 per cent for adult males.

TABLE 7

AVERAGE CURRENT AND AVERAGE COMPLETED DURATION:

1977-78

	AV. CURRENT DURATION	AV. COMPLETED DURATION
	wks	wks
MALE <21	19.5	13.5
MALE 21+	28.8	18.8
FEMALE <21	23.0	15.7
FEMALE 21+	30.0	21.2

The qualitative result of average current duration exceeding average completed duration is as expected. In Chapter One it was noted that if retention rates rise with time in the pool, average current duration will exceed average completed duration. Here we have a practical example of this effect operating. (For UB recipients, retention rates appear to begin to rise after the first few months in the pool). Thus *if average current duration as we have calculated it here was used as an estimate of average completed duration, average completed duration would be substantially underestimated.* Even if average current duration had been calculated using lower bounds of the duration intervals rather than mid-points, average current duration would still have exceeded average completed duration. It is interesting to note, however, that comparisons of duration between age-sex groups using average current duration give a close approximation to the results obtained using average completed duration.

CURRENT AND COMPLETED DURATION DISTRIBUTIONS

Current and completed duration distributions are calculated for 1977-78. The 6-monthly duration intervals through to 24 months allow the long-duration tail of the distributions to be considered.

The current duration distribution gives the proportions of the total beneficiary stock in the various duration intervals. Current duration snapshots are averaged over the 1977-78 period, and the proportions in the less than 6 months, 6 to 12 months, . . . , 24 months and over intervals calculated.

The completed duration distribution measures the proportions of total inflows who leave the pool after different durations. This is calculated from 6-monthly retention rates averaged over the 1977-78 period. Multiplying together these retention rates gives the (untidy) completed duration distribution showing the proportions leaving after being in the beneficiary pool less than 6 months, 0 to 12 months, 6 to 18 months, 12 to 24 months and 18 months and over (see Section 2.2 for an explanation of why these intervals overlap).

In this form, the completed duration distribution is not directly comparable with the current duration distribution - an estimate of the completed duration proportions in the non-intersecting duration intervals less than 6 months, 6 to 12 months, . . . , 24 months and over is required. This is obtained by allocating half those in the 'original' 0 to 12 months interval to the 'new' less than 6 months interval (supplementing those in the original less than 6 months interval); allocating half those in the original 0 to 12 months interval, and half those in the original 6 to 18 months interval, to the new 6 to 12 months interval; etc. With retention rates declining as time in the pool lengthens (as occurs for beneficiaries after the first few months), this procedure will tend to underestimate the proportion leaving after shorter spells, and overestimate the proportion leaving after longer spells.

The current and completed duration distributions for adult males are plotted together in Figure 7. It can be seen that the estimated completed duration distribution has a greater proportion in the shorter duration interval, and lesser proportions in the longer duration intervals, than the current duration distribution (despite the under-estimation problem mentioned in the previous paragraph). This indicates that *interpreting the current duration distribution as if it were the completed duration distribution would indicate more people experiencing longer spells of Benefit receipt than actually occurred*. However, the difference in the distributions is not great, both exhibiting the same general shape. A similar situation exists for each of the various age-sex groups, although the difference in the distributions is more marked for older beneficiaries than for the younger groups.

MOVEMENTS THROUGH TIME IN CURRENT AND COMPLETED DURATION

It would be desirable to compare movements through time in average current duration and average completed duration. As mentioned earlier, however, there are problems in estimating average current duration over the whole 1967-78 period. Instead, we compare movements in the proportion of the beneficiary stock in the pool 3 months or more at the time of the snapshot, and the proportion of inflows who do not leave within the same 3-month accounting period in which they enter but leave in later periods.¹

These time series for total males are plotted together in Figure 8. The dashed line is the current duration measure, the unbroken line the completed duration measure, and the dotted line the ratio of the two (current: completed). The completed duration measure is fairly steady up to 1974, rising after this point. The current duration measure, on the other hand,

1. These variables may be considered as measures of current and completed duration in their own right, or as proxies for average current and average completed duration.

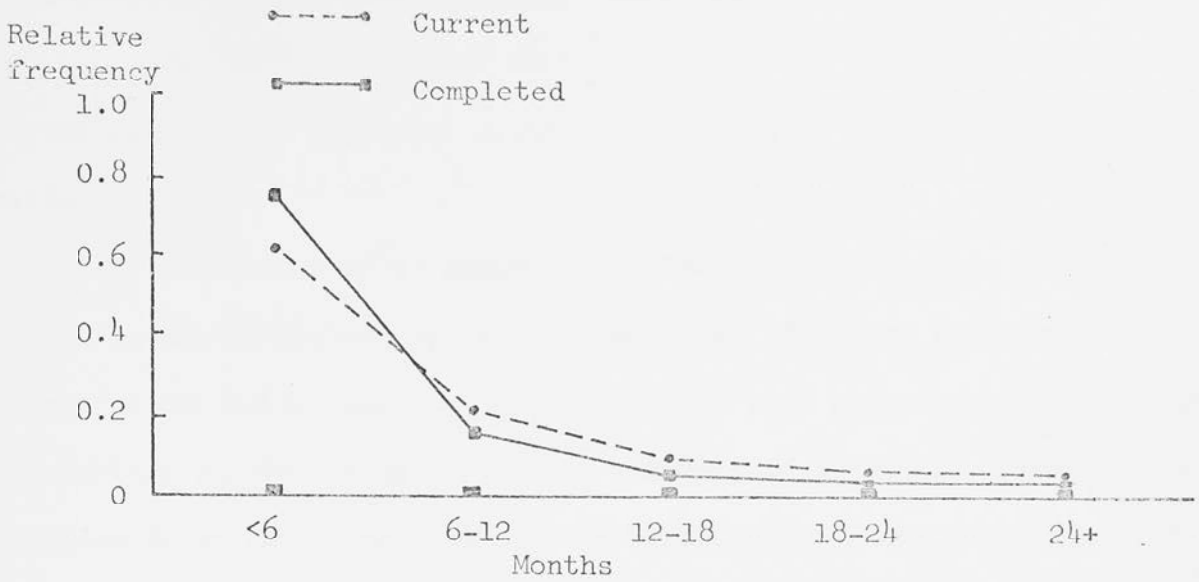


FIGURE 7

CURRENT AND COMPLETED DURATION DISTRIBUTIONS:
ADULT MALES

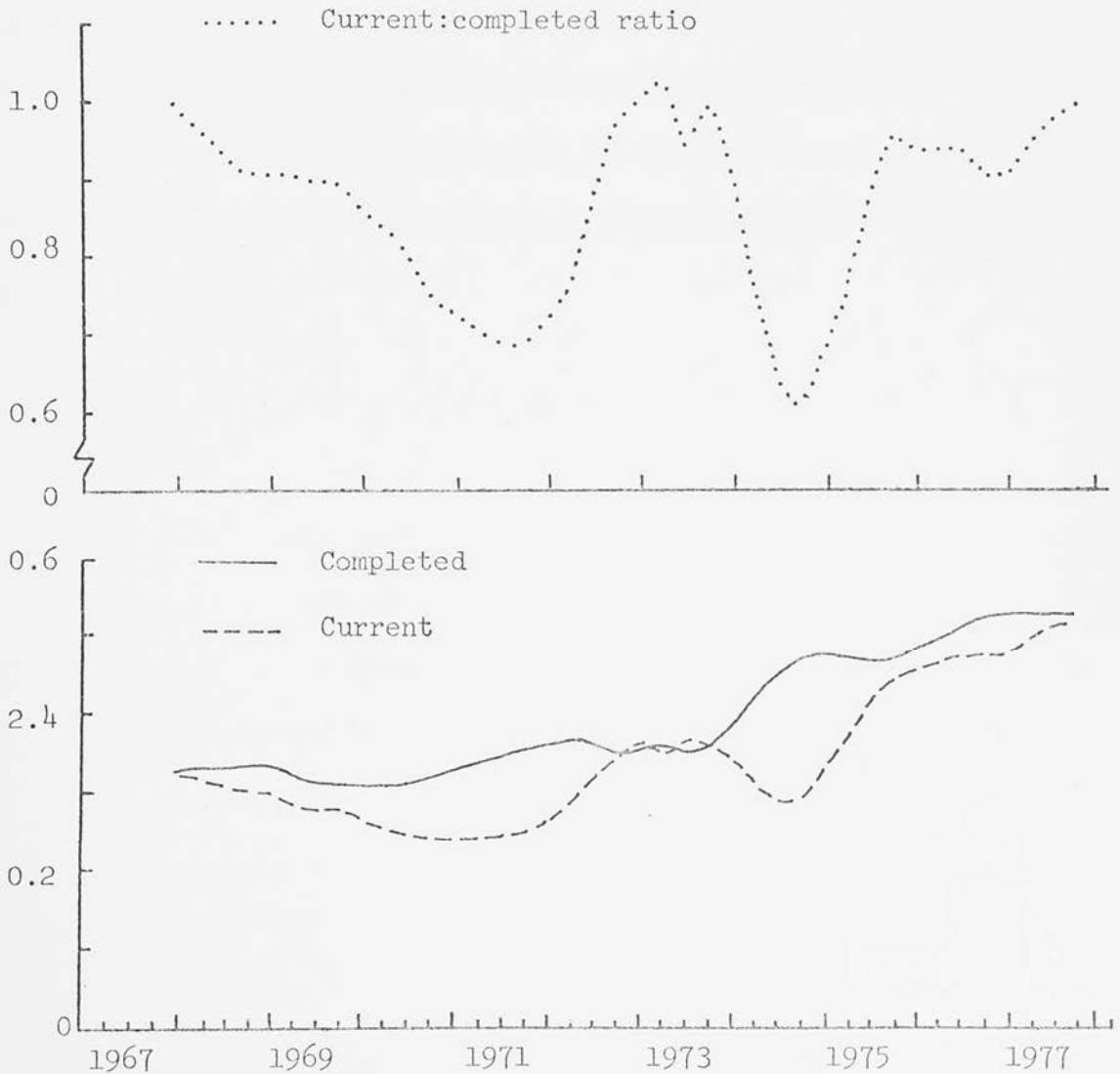


FIGURE 8

CURRENT AND COMPLETED DURATION: PROPORTIONS

UNEMPLOYED LESS THAN 3 MONTHS: MALES

behaves in a very different manner. This variable increases up to 1973, declines over 1974, then rises from 1975 onwards. The differing behaviour of the current and completed measures is reflected in the widely-varying ratio.

As alluded to in Chapter One, the current duration measure reflects the influence of inflows as well as duration. Thus the fall over 1974 is a result of the large increase in inflows over this period, giving a 'young' beneficiary population until the new entrants flow through to the longer duration intervals. The completed duration measure does not reflect the influence of inflows in this manner. It is expected that comparing movement over time in average current duration and average completed duration would reveal similar relative behaviour. *In terms of movement over time, current duration is not a close approximation to completed duration.*

This completes our estimation of turnover measures for UB recipients. In the following chapter we use these estimates to compare different unemployment situations.

CHAPTER THREE

WHY DIFFERENCES IN UB RECIPIENT RATES OCCUR

In this chapter we consider variations in the proportion of the labour force in receipt of Unemployment Benefit payments, the UB recipient rate. In particular, we consider:

- (i) why differences in UB recipient rates exist between labour market groups
- (ii) how changes over time in individual UB recipient rates have come about
- (iii) how variations over time in relative UB recipient rates have occurred.

Differences in UB recipient rates between labour market groups are explained in terms of the incidence of inflows (inflows per quarter divided by the labour force) and average completed duration (average number of weeks in receipt of Benefit payments per person). Changes over time in both absolute and relative beneficiary rates are examined to determine the relative contributions to these variations of inflows and duration.

Beneficiaries as a proportion of the total unemployed has changed over time, and is different between labour market groups. Consequently, the results obtained in this chapter need not carry over to total unemployment. The general applicability of the results to other measures of unemployment is discussed in Chapter Eight.

3.1 Why UB Recipient Rates Differ Between Labour Market Groups

In this section we examine differences in UB recipient rates between the 10 age-sex groups documented in Chapter Two. This is done in two parts, differences between the age groups and differences between the sexes.

Under changing conditions, no exact relationship exists between the level of unemployment and the underlying inflow and completed duration variables. However, it is sufficient to know that the higher the incidence of inflows, or

the longer the average completed duration, the higher will be the unemployment rate. Thus if the incidence of inflows is greater for one group than another, this will influence upwards the relative unemployment rate of this group. Similarly, if average completed duration is longer for one group, again upward influence on the relative unemployment rate will result.

DIFFERENCES BETWEEN AGE GROUPS

UB recipient rates are highest for the less than 21 years group, and lowest for the middle- and old-age groups. Table 8 gives average UB recipient rates for males and females in the various age groups, over two different time spans.¹ It can be seen that the decline in the UB recipient rate with age occurs for both males and females, and under very different labour market conditions.²

TABLE 8

UB RECIPIENT RATES BY AGE

	AV. 1968-74	AV. 1975-78		AV. 1968-74	AV. 1975-78
	%	%		%	%
MALE <21	0.8	9.0	FEMALE <21	1.3	9.7
MALE 21-24	0.5	6.1	FEMALE 21-24	0.4	3.4
MALE 25-44	0.3	2.9	FEMALE 25-44	0.2	1.1
MALE 45-54	0.4	2.5	FEMALE 45-54	0.2	1.0
MALE 55+	0.5	2.9	FEMALE 55+	0.2	0.8

1. ABS labour force data are available for 15 to 19 years and 20 to 24 years age groups. To obtain labour force age groups roughly consistent with UB recipient data (16 to 20 years and 21 to 24 years), the numbers for the 15 to 19 years and 20 to 24 years groups are multiplied by 1.25 and 0.80 respectively.
2. There does, however, appear to be a slight increase in the UB recipient rate for males 55 years and over.

Table 9 presents the incidence of inflows and average completed duration for the different groups. These move in opposite directions with age - the incidence of inflows declines with increasing age while average completed duration rises. Here also the result holds for both males and females, and under different labour market conditions.

The differences between the groups are quite striking. During the 1975-78 period, for males less than 21 years on average each 3 months a number equivalent to 10 per cent of the labour force commenced a spell of UB receipt.¹ On a 12 month basis, the proportion is 40 per cent. For males 55 years and over, however, the proportion is 1.5 per cent each 3 months, or 6 per cent a year. The differences between age groups in the incidence of inflows are even greater for females. The average proportion entering Benefit receipt each 3 months is about 9 per cent for the less than 21 years age group, but less than 0.5 per cent for the 55 years and over group.²

The differences in average completed duration are not so marked. The average completed duration for males less than 21 years is 12 weeks and for males 55 years and over is 29 weeks. Similar differences exist for females.

The average 1975-78 inflow, duration and beneficiary rate situation for the different age groups is shown diagrammatically in Figure 9. These results show that the relatively high UB recipient rates of younger workers are due to the higher incidence of inflows for these people outweighing their shorter completed durations.

-
1. This does not necessarily mean that 10 per cent of the individuals in the labour force actually entered the beneficiary pool. Some people may have experienced more than one spell of Benefit receipt over the period.
 2. This greater difference for females reflects differences in access to Benefits. Married women, who obviously have a greater representation in the older age groups than in the less than 21 years group, are often excluded from Benefit payments. Married women are ineligible for Benefit payments if their spouse is earning more than the maximum weekly Benefit payment, or is drawing Benefit himself (if both partners are unemployed the husband always draws Benefit on behalf of the couple).

TABLE 9

UB RECIPIENT INCIDENCE OF INFLOWS AND AVERAGE COMPLETED

DURATION BY AGE

(a) Incidence of inflows (per quarter)

		AV. 1968-74	AV. 1975-78			AV. 1968-74	AV. 1975-78
		%	%			%	%
MALE	<21	2.3	10.5	FEMALE	<21	2.3	9.4
MALE	21-24	1.4	6.9	FEMALE	21-24	0.7	3.2
MALE	25-44	0.7	2.8	FEMALE	25-44	0.2	0.9
MALE	45-54	0.6	1.8	FEMALE	45-54	0.2	0.6
MALE	55+	0.6	1.5	FEMALE	55+	0.1	0.3

(b) Average Completed Duration

		AV. 1968-74	AV. 1975-78			AV. 1968-74	AV. 1975-78
		wks	wks			wks	wks
MALE	<21	4.7	11.7	FEMALE	<21	7.1	14.0
MALE	21-24	5.0	12.4	FEMALE	21-24	8.0	15.2
MALE	25-44	6.2	14.8	FEMALE	25-44	9.0	17.0
MALE	45-54	8.4	20.0	FEMALE	45-54	12.0	25.4
MALE	55+	11.3	29.3	FEMALE	55+	17.7	36.4

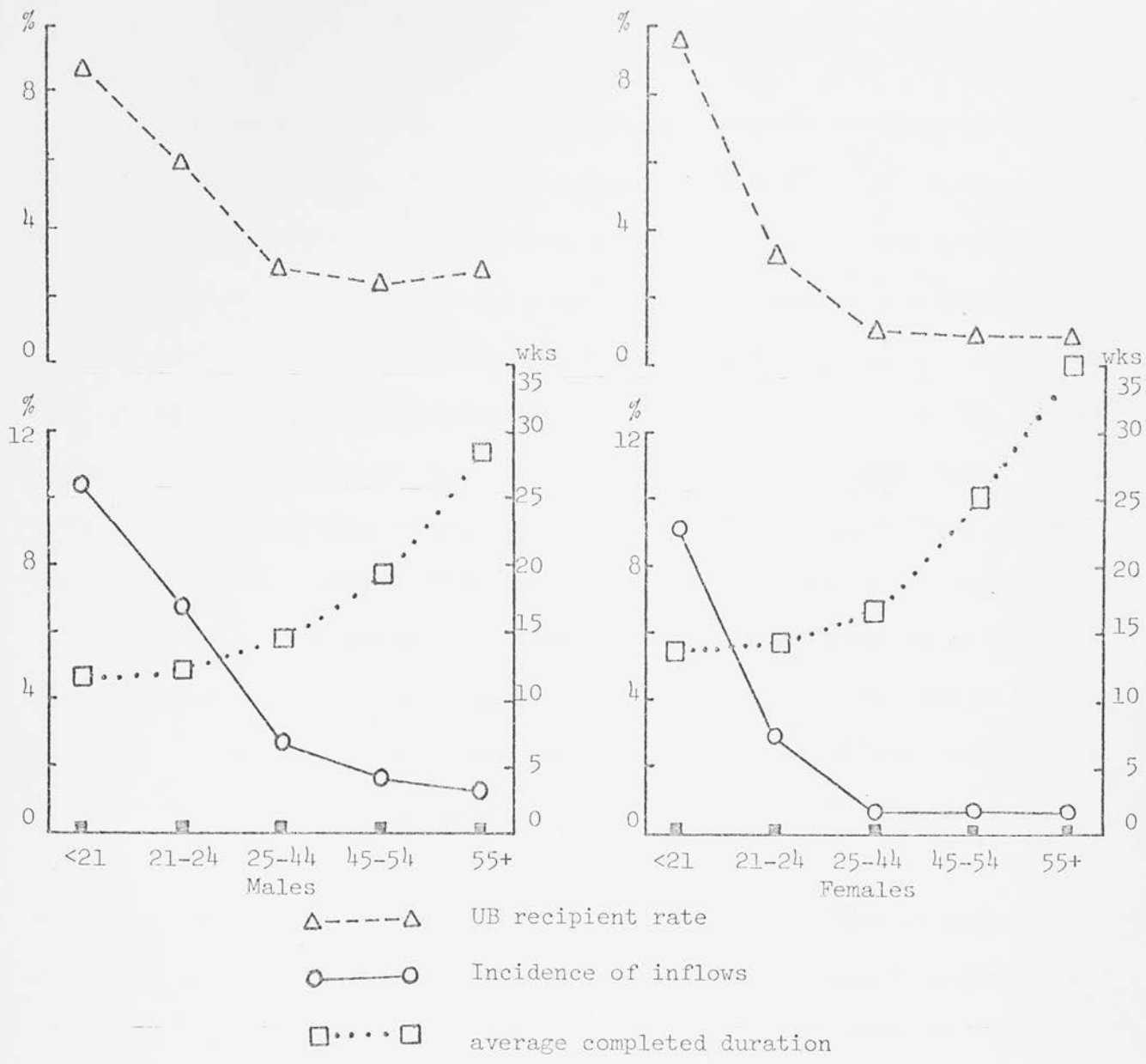


FIGURE 9

UB RECIPIENT RATE DIFFERENCES BY AGE: AV. 1975-78

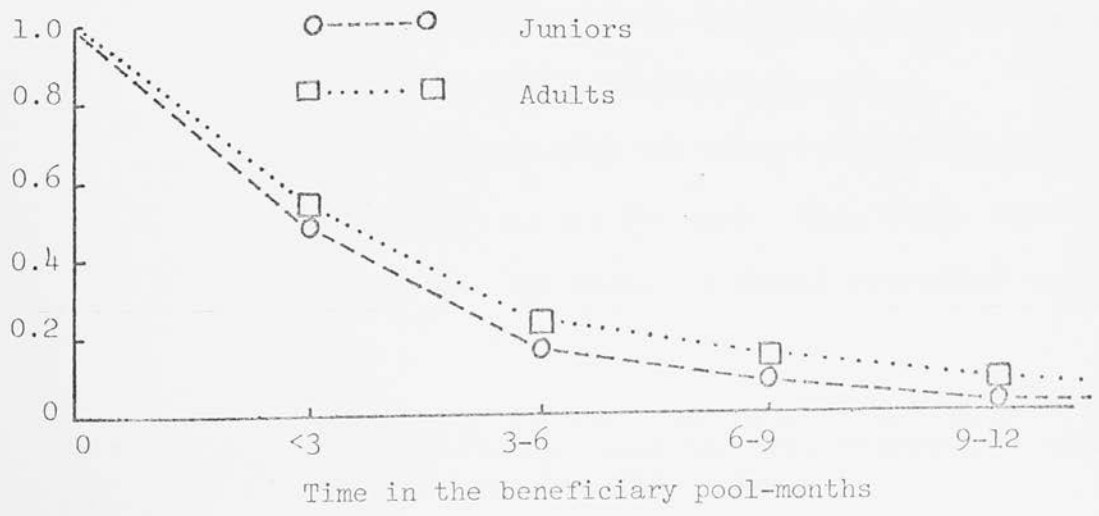


FIGURE 10

PROPORTION OF MALES REMAINING IN THE UB RECIPIENT STOCK: AV. 1975-78

If the shape of the distribution of completed durations is very dissimilar across age groups, then a comparison of mean durations will not tell the whole story of their differences. For example, if one group had a high proportion of inflows leaving very quickly but with the remainder leaving only slowly, while another group had a steady flow out of unemployment, then a comparison of average completed durations for these two groups would leave much of the story of their differences untold. The individual unemployment experiences underlying the means would be very different, even if the means were similar. This does not, however, appear to be the case.

This is demonstrated in Figure 10. The proportions of an inflow group remaining after certain lengths of time since entry into the beneficiary pool are contrasted for junior and adult males over the 1975-78 period.¹ It can be seen that the junior and adult groups erode in a similar manner with time in the pool, although of course the proportion left in the pool falls away more rapidly for juniors than adults (giving the difference in mean completed duration). These particular curves are calculated from quarterly retention rates, but monthly or 6-monthly retention rates give the same result. A similar finding can be demonstrated for the 1968-74 time period, and for females as well as males.

DIFFERENCES BETWEEN FEMALES AND MALES

Table 10 presents information for comparing female and male UB recipients. These data are for the 1975-78 period only.

The average UB recipient rate for males is greater than for females - 3.9 per cent compared to 3.1 per cent. This arises because the incidence of inflows is greater for males. A number equivalent to 3.8 per

1. Juniors are those less than 21 years, and adults those 21 years and over. Average completed duration over the 1975-78 period is 12 weeks for junior males and 16 weeks for adult males.

cent of the male labour force enter the beneficiary pool every 3 months, compared to 2.9 per cent for females. The greater incidence of inflows for males is not offset by the longer average completed duration experienced by females - 15.2 weeks for females and 14.4 weeks for males.

For males and females in the various age groups, the same inverse relationship between inflows and duration exists - the incidence of inflows is greater for males and average completed duration is longer for females. For adult males and females, the greater incidence of inflows dominates. Thus the UB recipient rate for adult males is greater than for females (3.2 per cent relative to 1.4 per cent).¹ For juniors, however, it is the longer average duration of females that dominates, giving them the higher beneficiary rate (9.7 per cent for females and 9.0 per cent for males).

TABLE 10

UB RECIPIENT RATE, INCIDENCE OF INFLOWS AND AVERAGE
COMPLETED DURATION BY SEX: AVERAGE 1975-78

	TOTAL			JUNIOR			ADULT		
	UB RECIP. RATE	INC. OF INFLOWS (QTER)	AV. COMP. DUR.	UB RECIP. RATE	INC. OF INFLOWS (QTER)	AV. COMP. DUR.	UB RECIP. RATE	INC. OF INFLOWS (QTER)	AV. COMP. DUR.
	%	%	wks	%	%	wks	%	%	wks
MALES	3.9	3.8	14.4	9.0	10.5	11.7	3.2	2.9	15.8
FEMALES	3.1	2.9	15.2	9.7	9.4	14.0	1.4	1.2	17.5

The large differences in the UB recipient rate between males and females arise from differences in the incidence of inflows. This in turn reflects the differences in access to Benefits mentioned earlier. Once in

1. The female-male results for the aggregated 'adult' group are representative of the female-male situation for the individual age groups.

receipt of Benefits, the experience of males and females is very similar. Mean completed durations are only slightly longer for females. Although these similar means could come from different shaped distributions, contrasting the proportions of male and female inflow groups left in the pool after different lengths (as done for juniors and adults in Figure 10) indicates that this is not the case.

3.2 How Individual UB Recipient Rates Change Through Time

For all age-sex groups, UB recipient rates have increased greatly between 1967 and 1978. Moderate rises and falls occurred through to 1974. These rates then rose very rapidly over late 1974 and early 1975, before settling to a slower (and somewhat erratic) rate of increase over the remainder of the period.

Up to mid-1974, most of the change in UB recipient rates was due to changes in inflows. This can be shown in a number of ways.

A simple way to gauge the relative contributions of inflows and duration is to plot together over time the UB recipient rate, the incidence of inflows and average completed duration. Doing so for the various age-sex groups shows that, prior to 1974, inflows moved in close coincidence with the beneficiary rate. Average completed duration, on the other hand, did not experience much variation. Figure 11 demonstrates this for total males and females.¹ The same broad picture holds for the individual age groups.² This indicates that prior to 1974, variation in completed duration did not contribute much to the moderate change in UB recipient rates - changes were driven by inflows.

1. The series have been smoothed using moving averages.

2. For the oldest age group (55 years and over), inflows changed less and duration changed more than for the other groups.

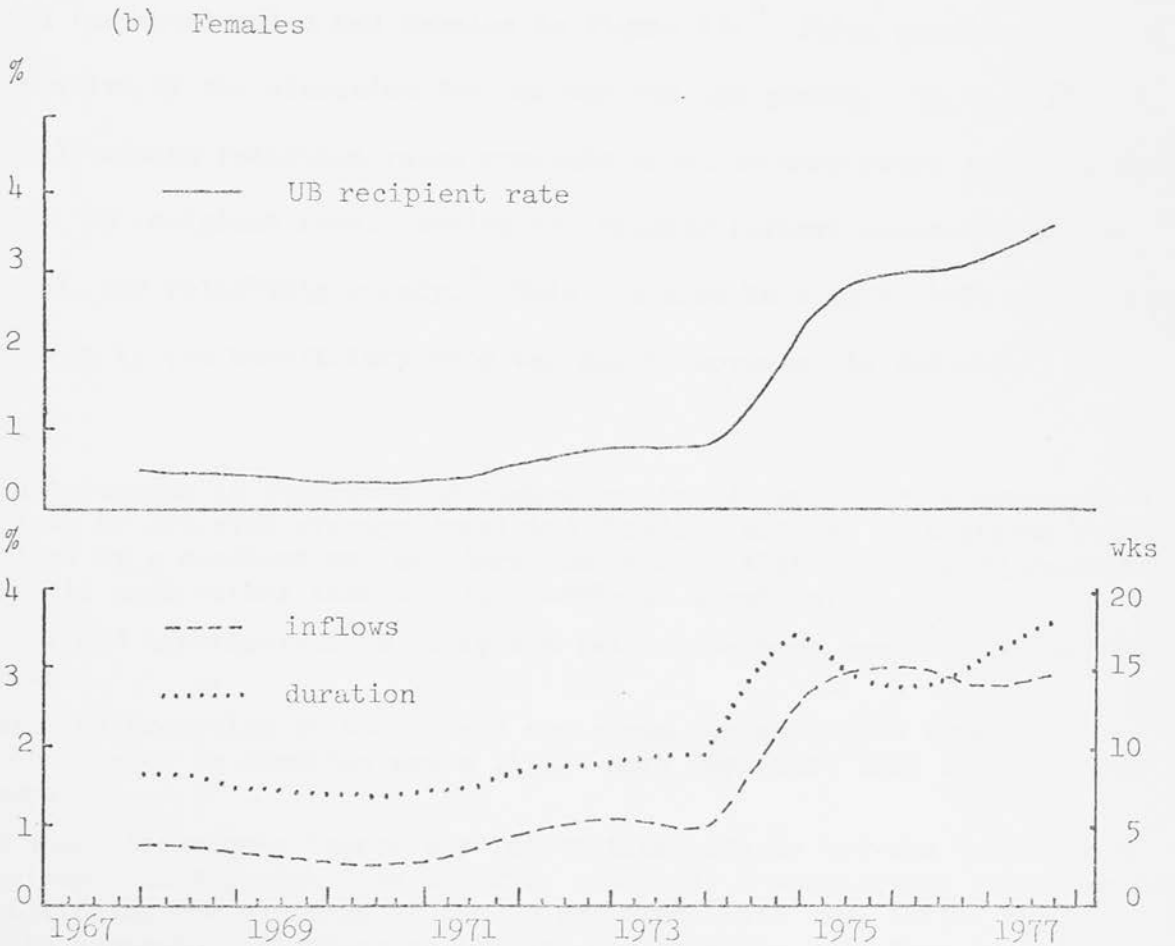
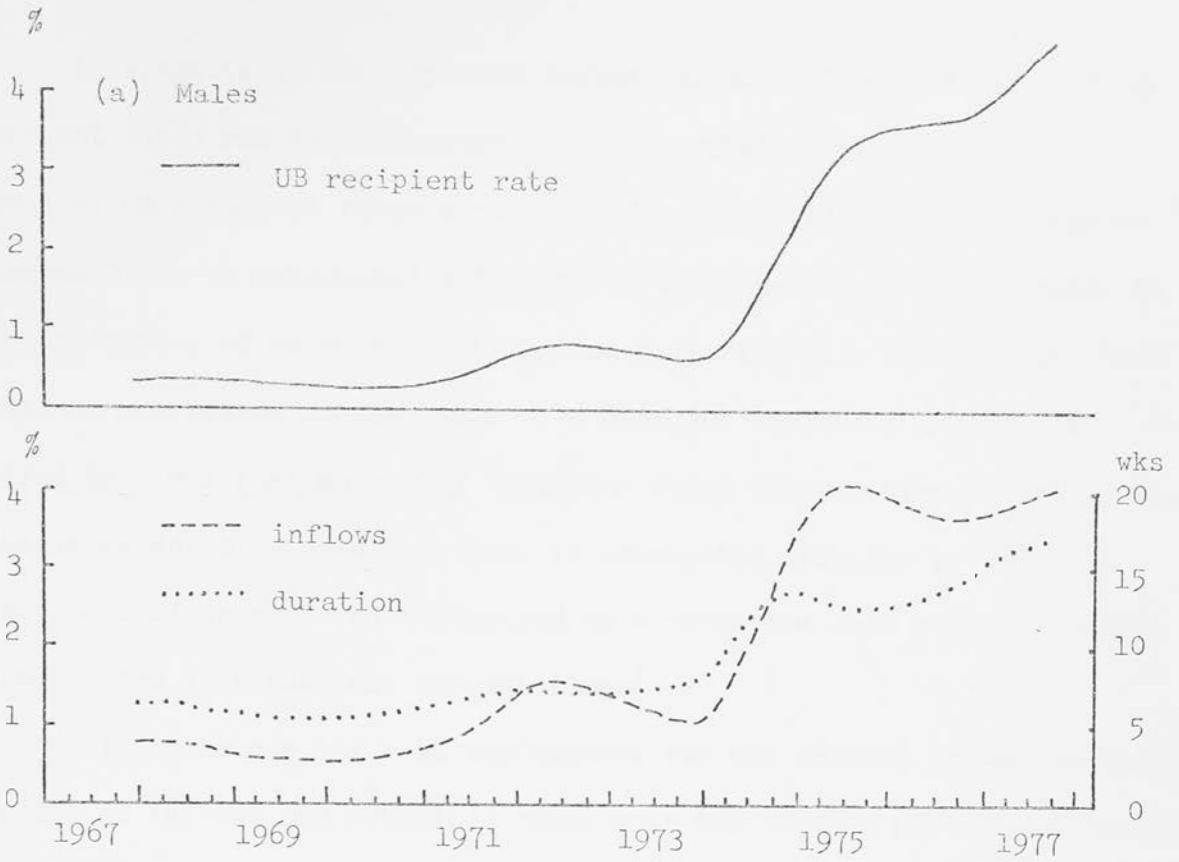


FIGURE 11

UB RECIPIENT RATE, INCIDENCE OF INFLOWS
AND AVERAGE COMPLETED DURATION

Alternatively, the separate influences of inflows and duration on UB recipient rates can be determined using a simulation technique. Hypothetical UB recipient rates with (A) inflows and (B) completed duration held constant can be calculated and compared to actual UB recipient rates to give an indication of relative contributions. Series (A), with inflows held constant, is calculated on the basis of a constant incidence of inflows multiplied by the actual matrix of retention rates through time. Series (B), with completed duration held constant, is calculated from the actual incidence of inflows observed multiplied by a retention rate matrix in which the elements are kept constant through time.¹

This technique has been implemented for the various age-sex groups. Mean values of inflows and retention rates over the 1967-78 period were used. Plots of series (A) and (B) along with the actual beneficiary rate are presented for total males and females in Figure 12.² These graphs are representative of the situation for the various age groups. Up to 1974, series (B) holding retention rates constant moved in very close sympathy with the actual UB recipient rate. Series (A) holding inflows constant, on the other hand, was relatively steady.³ This confirms that up to 1974 almost all the movement in the beneficiary rate was due to movement in inflows.⁴

-
1. This technique is conceptually equivalent to (A) multiplying constant inflows by observed average completed duration and (B) multiplying actual inflows by a constant average duration, except that a matrix of retention rates is used rather than average completed duration.
 2. Actual and hypothetical UB recipient rates have been smoothed using moving averages.
 3. Again the exception is the oldest age group for males and females, for which changes in duration are a little more important than for the other groups.
 4. The above techniques ignore any interaction effects between inflows and duration. In Appendix C we describe and apply a statistical technique for partitioning the variance of the UB recipient rate time series into that due to the separate influences of inflows and duration, and that due to their interaction. The results obtained accord with judgements based on Figures 11 and 12.

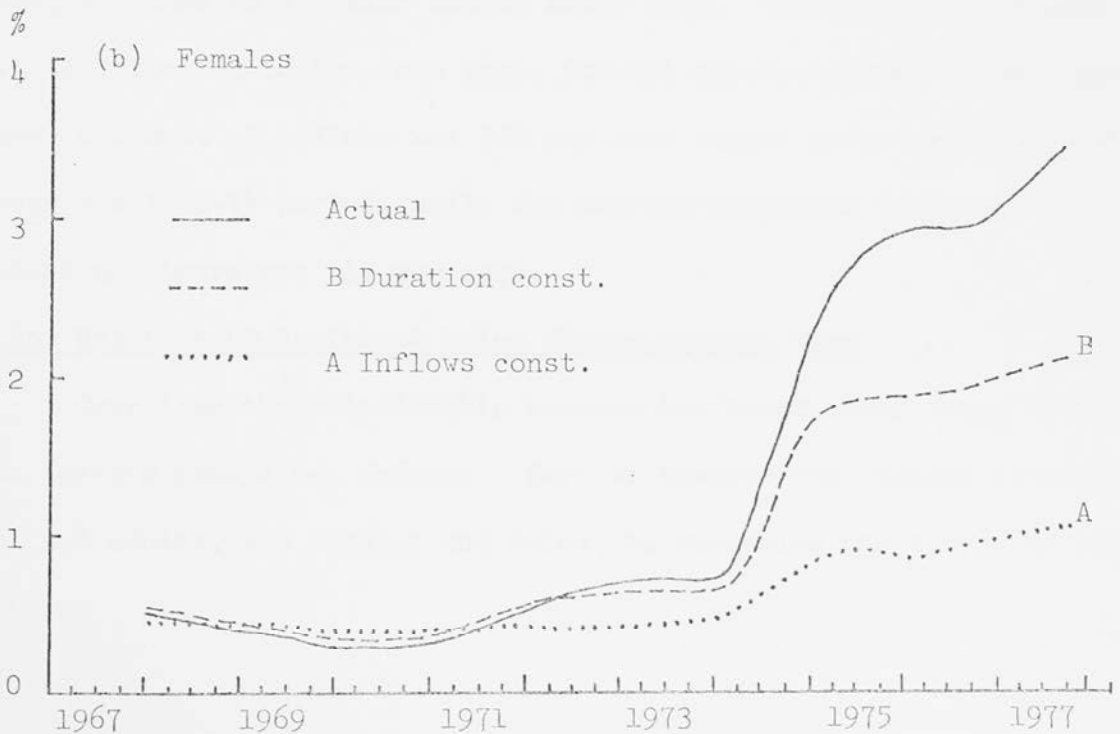
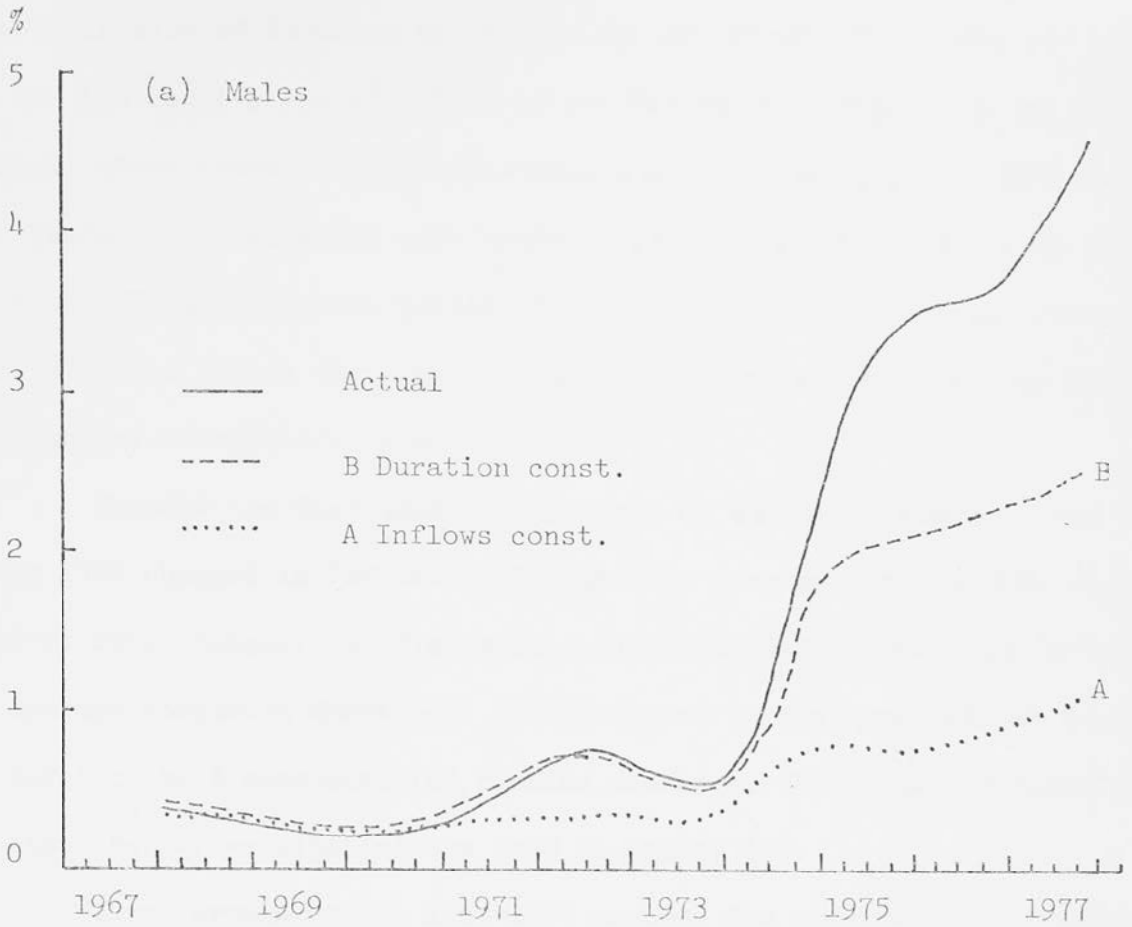


FIGURE 12

UB RECIPIENT RATE: ACTUAL, INFLOWS CONSTANT
AND DURATION CONSTANT

The same analysis for the period from 1974 onwards reveals that the contribution of duration to changes in the UB recipient rate was higher than for the earlier period. This is evident in both Figure 11 and Figure 12. Figure 11 shows average completed duration rising strongly over 1974 and later years for total males and females, and the same holds for each individual age group. Figure 12 shows series (A) with inflows held constant increasing after 1974, and series (B) with duration held constant not matching the rises in the actual beneficiary rate.

Despite the increased significance of duration, however, over 1974 through 1978 changes in inflows still make the greater contribution to UB recipient rate changes. In Figure 11 inflows increase faster and further than average completed duration; and in Figure 12 the hypothetical series with duration held constant, (B), remains closer to the actual UB recipient rate than the series with inflows held constant, (A).

Thus throughout the 1967-1978 period, the contribution of inflows to variation in the UB recipient rate was greater than the contribution of duration, although to a lesser extent after 1974. The greater influence of inflows is reflected in the fact that, for all age-sex groups taken together, the mean incidence of inflows was 304 per cent higher over the 1975-78 period than over the 1968-74 period, while for average completed duration the corresponding figure was 117 per cent.

3.3. How Relative UB Recipient Rates Change Through Time

Over time the relationship between the beneficiary rates of the various age-sex groups has changed. Here we examine the changes between juniors and adults, and females and males, to determine the source of the variation.

JUNIORS AND ADULTS

Over the 1967-78 period the UB recipient rate for those less than 21 years increased relative to the adult groups, with considerable deviation around this rising trend. At the beginning of the period the UB recipient rate for junior males was about 25 per cent greater than for adult males. By the end of the period the ratio was almost 3 to 1. For females, the ratio of juniors to adults was about 5 to 1 at the beginning of the period and 7 to 1 at the end.

In Figure 13 the ratios of junior to adult UB recipient rates are plotted over time for males and females (unbroken line)¹. For males the relative rise in junior rates was fairly steady up to 1971, then commenced to fluctuate around a rising trend through to 1974. No further rises in the ratio took place after the end of 1974. For females the UB recipient rate of juniors relative to adults rose slowly and fairly steadily up to 1972, with some large fluctuations but not much trend movement from 1973 onwards.

A particularly interesting feature of the junior-adult situation is that the relative deterioration of youth unemployment occurred before the current recession. During the recession there has been no further deterioration. This behaviour is explained in Chapter Seven.

Figure 13 also presents junior/adult ratios of the incidence of inflows (dashed line) and average completed duration (dotted line). These plots indicate that for males the overall rise over time in the UB recipient rate of juniors relative to adults came about from an overall rise in the relative incidence of inflows for juniors (Figure 13(a)). The ratio of junior to adult inflows rose from less than 2 to 1 at the start of the period to well over 3 to 1 at the end. The ratio of completed durations was virtually the

1. The time series used to form the ratios plotted in Figure 13 have been smoothed using a moving average technique.

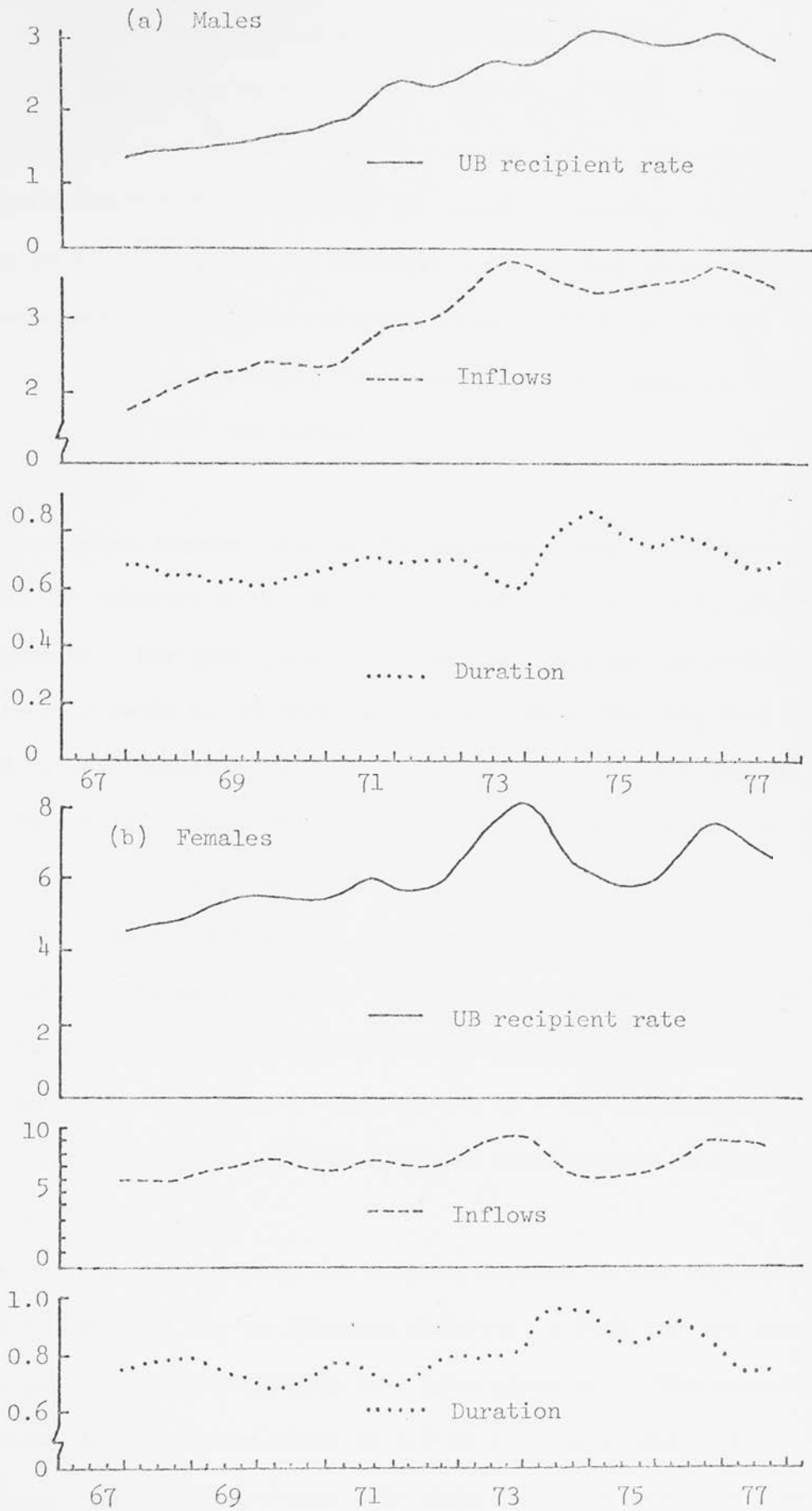


FIGURE 13

UB RECIPIENT RATE, INCIDENCE OF INFLOWS AND AVERAGE COMPLETED DURATION: JUNIOR/ADULT RATIOS.

same at the end of the data period as at the start, so change in relative duration did not contribute to the trend. However, change in relative duration did contribute to short term fluctuations. For females the behaviour of relative junior and adult UB recipient rates arose from strong fluctuations on a rising trend for relative inflows, and sharp rises and falls with no apparent trend for relative duration (Figure 13(b)). For junior females relative to adults, the ratio of the incidence of inflows rose from 6 to 1 to 9 to 1 over the period.

FEMALES AND MALES

The changes through time in UB recipient rates of females relative to males, and the underlying changes in relative inflows and duration, are shown in Figure 14. For both juniors and adults there was an overall fall in the female-male ratio of UB recipient rates. This fall was from over 2 to 1 in 1968 to near equality 10 years later for juniors, and from 0.7 to 1 to 0.4 to 1 for adults. These declines were not smooth, with a rise in the female-male ratio for both groups over 1972 and 1973.

In the case of adults, the overall decline in UB recipient rates for females relative to males was due to similar relative declines in both inflows and duration. Both the inflow and duration female-male ratios fell by about 20 per cent, from a base value of 0.5 to 1 for inflows and 1.5 to 1 for duration. The rise over 1972 and 1973 was attributable to changing relative inflows.

In the case of juniors, the overall decline in the female/male UB recipient ratio was also due to relative declines in both inflows and duration, but here changes in relative inflows were more important. The male-female ratio of inflows declined from close to 1.5 to 1 to less than 1 to 1. The ratio of average completed durations fell from a similar starting level (1.5 to 1) to 1.2 to 1. Changes in both relative inflows and relative duration gave the rise in female UB recipient rates relative to males over 1972 and 1973.

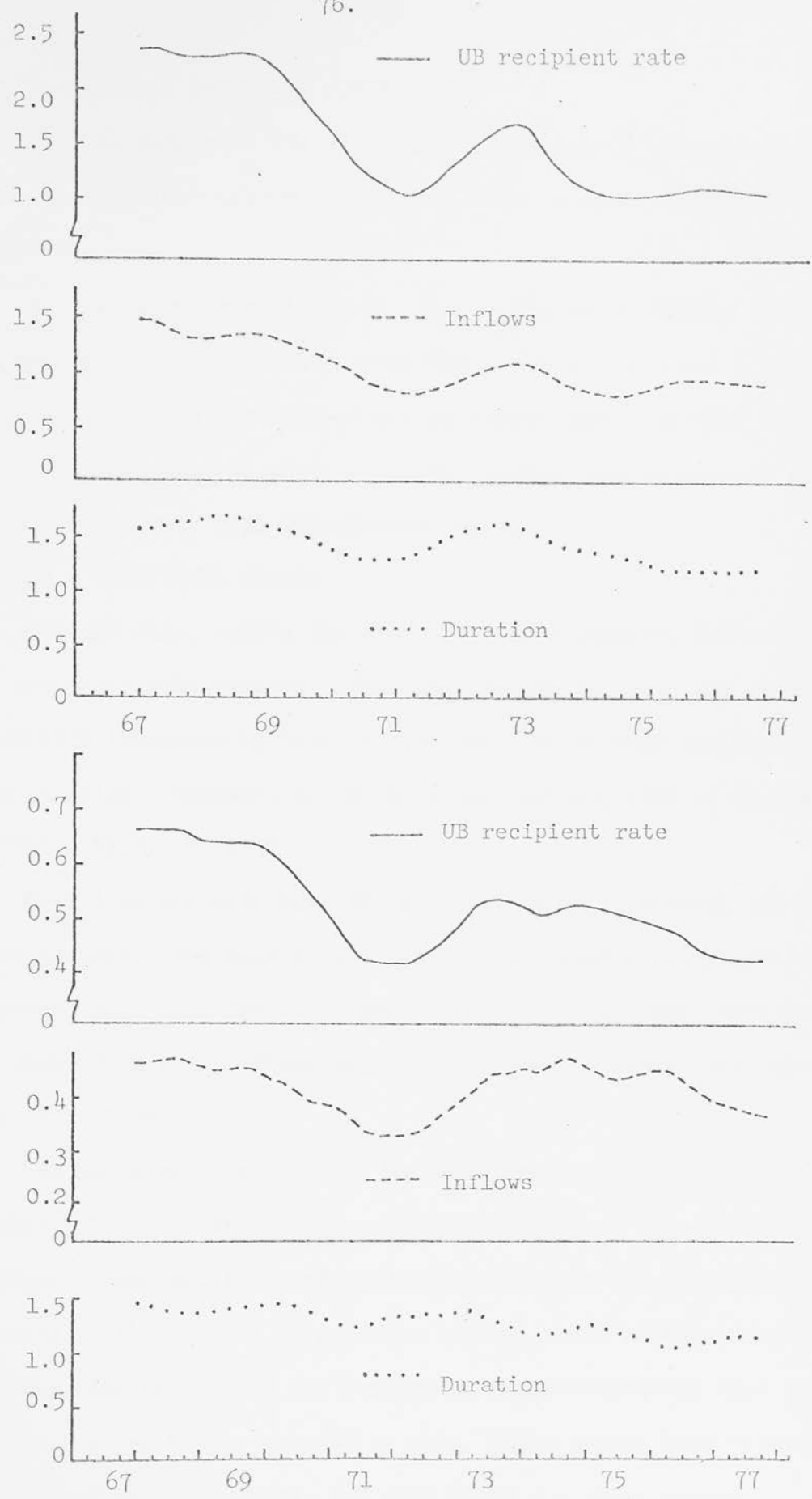


FIGURE 14

UB RECIPIENT RATE, INCIDENCE OF INFLOWS AND AVERAGE COMPLETED DURATION: FEMALE/MALE RATIO

3.4 Key Findings and Important Issues

Here we summarise the significant findings of this chapter, and delineate the important issues to be considered in later chapters.

ACROSS GROUPS

Across labour market groups, the incidence of inflows and completed duration are negatively related. Accordingly, it is not clear a priori how Benefit receipt will be distributed across labour market groups. In fact, however, inflows in general dominate. Thus groups with relatively high inflows have relatively high beneficiary rates.

THROUGH TIME - INDIVIDUAL GROUPS

Through time, unlike the cross-section situation, inflows and duration are positively related. Increases in the UB recipient rate are associated with increases in both the incidence of inflows and average completed duration. However, as in the cross-section, inflows dominate.

THROUGH TIME - RELATIVE RATES

Over time not only have UB recipient rates increased, but relative rates have changed. The beneficiary rates of the higher unemployment groups have increased more than for other groups, accentuating their position. This has come about from both inflows and duration, but primarily through relative increases in inflows.

The above results refer to UB recipients rather than total unemployment. Their relationship to total unemployment is considered in Chapter Eight. However, it is of interest to compare the behaviour of beneficiaries to the results of overseas studies based on total unemployment.

Our results confirm the finding of previous studies that inflows and duration are negatively related by age. Young people have relatively high inflows and short duration, and vice versa for older people.

With respect to differences between males and females, there exists a diversity of results, depending to some extent on the conception of unemployment being used. Our result of males having higher inflows than females coincides with the U.K. situation. The result of females experiencing longer completed durations finds some support in U.S. studies.

Concerning variation through time, all other studies find inflows and duration positively related. There is no clear consensus on the relative importance of inflows and duration. As mentioned above, we find inflows dominate.

The next four chapters of the thesis (Part II) examine in detail the reasons for the variation in inflows and completed duration through time, for each group separately and for the unemployment relativities between the groups. To the best of our knowledge, at the time of writing there are no published studies that systematically address these questions.

PART II

STRUCTURAL CHANGE IN THE AUSTRALIAN LABOUR MARKET:

AN APPLICATION OF TURNOVER ANALYSIS

CHAPTER FOUR

STRUCTURAL CHANGE IN THE AUSTRALIAN LABOUR MARKET:

THE MODEL AND THE ISSUES

Variations in the relative unemployment situation of different groups - males, females, adults and juniors - are a manifestation of structural change in the labour market. Another well-known manifestation is the shifting unemployment-vacancies relationship. This shift in Australia has been considered by Hughes (1975), Gruen (1976) and others.

In this chapter we develop a model explaining movement over time in inflows to unemployment and average completed duration. The model is developed in the framework of the unemployment-vacancies relationship, and reflects the influences causing shifts in this relationship. In later chapters this model is estimated for UB recipients and used to explain variations in the absolute and relative unemployment (beneficiary) situations of the various age-sex groups.

4.1 The Shifting Unemployment-Vacancies Relationship

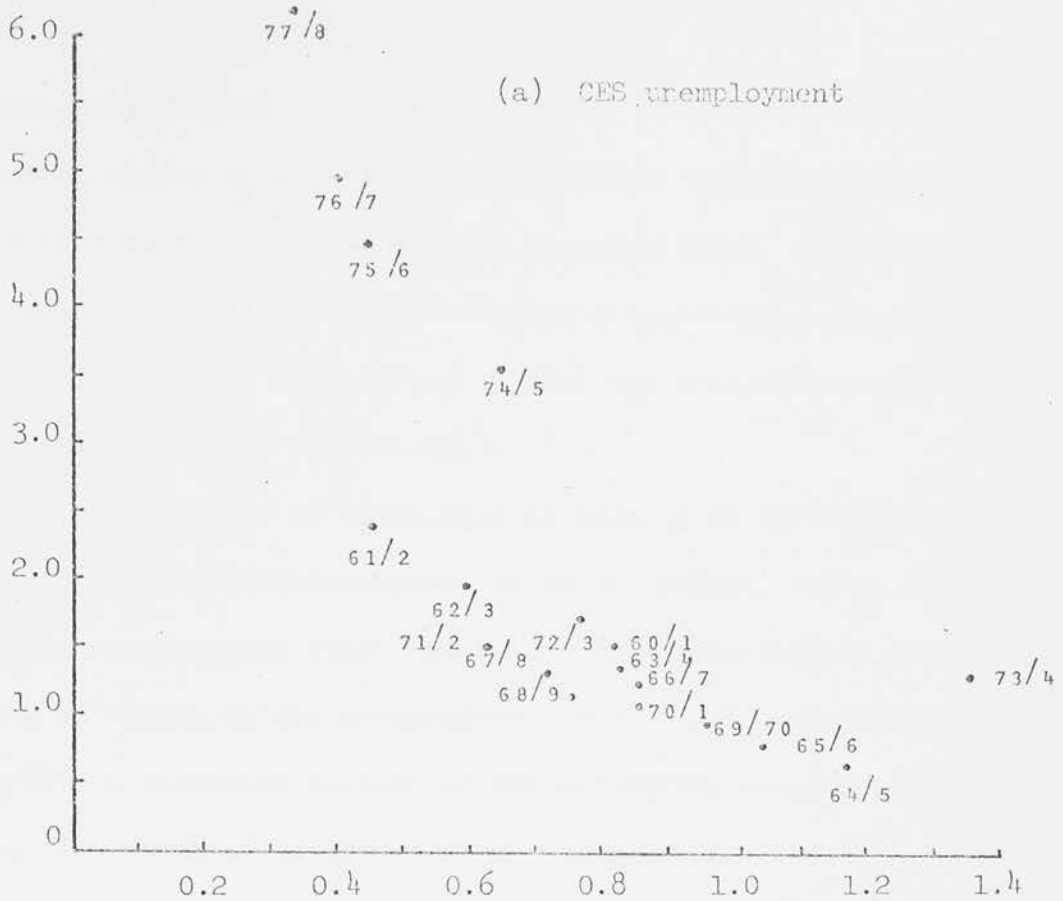
Historically, a strong inverse relationship between the number unemployed and the number of vacancies has been observed. However, in the early 1970s this relationship began to shift outwards. This is demonstrated in Figure 15(a) by plotting total CES unemployment against total CES vacancies. The same sort of shift has occurred for UB recipients. This is shown in Figure 15(b), where total UB recipients are plotted against total vacancies.¹

The observed outwards shift in the unemployment-vacancies curve is not a uniquely Australian phenomenon (Gruen 1977). Many researchers in different countries (U.K., Germany, France, Sweden and the Netherlands) have observed similar shifts. Some of these studies are referred to later.

1. Unemployment and vacancies as measured by the ABS also reveal a shifting relationship (Hughes 1975).

CES
unemp.
rate %

79a



UB
recip.
rate %

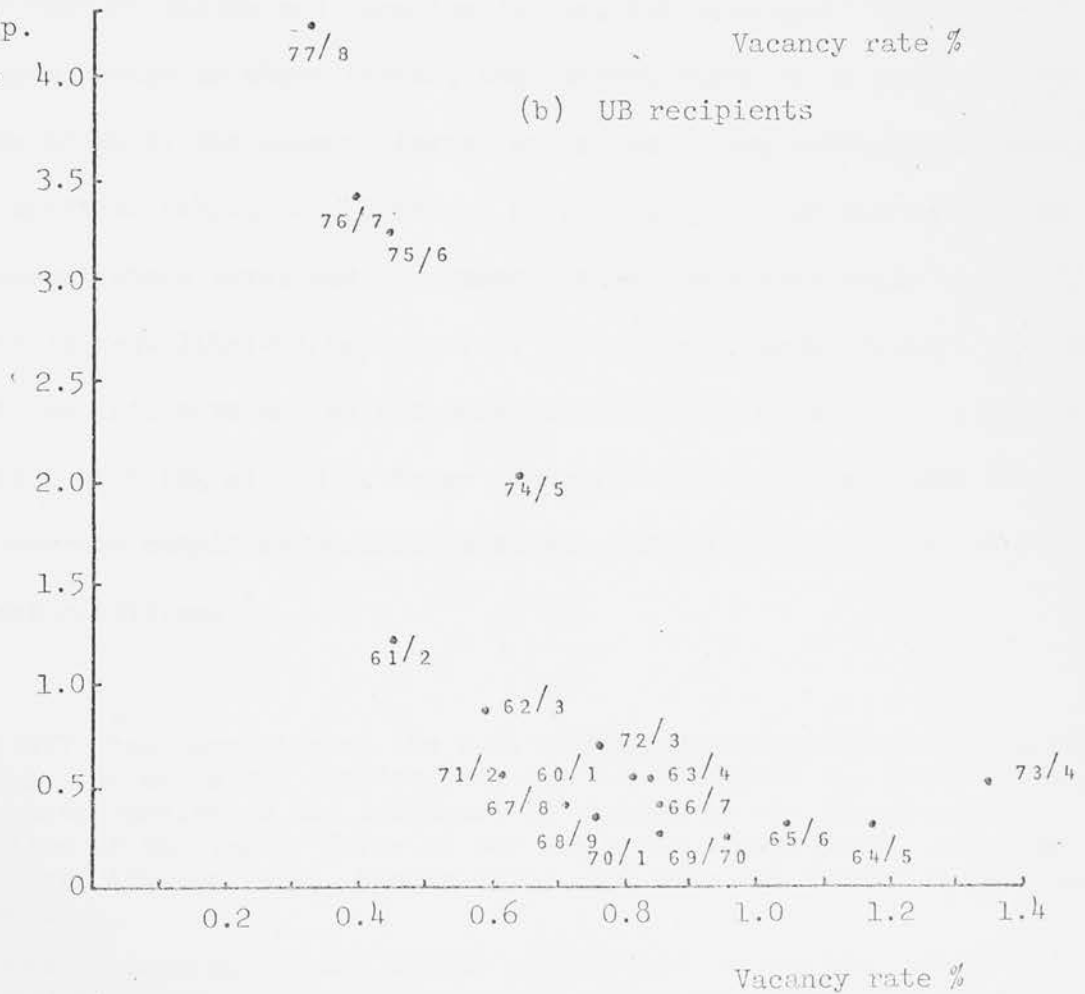


FIGURE 15

UNEMPLOYMENT-VACANCIES RELATIONSHIPS

This study differs from previous work, both in Australia and overseas, in that shifts in the UB recipient inflow-vacancies and average completed duration-vacancies relationships are considered. Other studies look at the unemployment stock level-vacancies relationship. To the best of our knowledge this study is also unique in that the analysis is carried out for different age-sex groups separately.¹

There are a number of advantages in looking at shifts over time in the inflow-vacancies and duration-vacancies relationships, rather than looking at shifts in the unemployment stock level-vacancies relationship directly. First, looking at shifts in the unemployment stock level-vacancies relationship directly may give a distorted picture of the underlying changes actually taking place. The stock of unemployment at any point in time is the result of not only current inflow and duration forces, but also past forces. In times of rapid change in these forces, the current stock of unemployment may reflect only slightly the current forces operating, being dominated by past inflow and duration behaviour. Observed shifts in the relationship between the unemployment stock level and the number of job vacancies could be due in part to this 'disequilibrium' behaviour of the stock of unemployment. Looking directly at the inflow-vacancies and duration-vacancies relationships avoids the possibility of being misled by these disequilibrium effects. Both the inflow and average completed duration measures reflect present, and not past, labour market conditions.²

-
1. Evans (1977) has investigated the U.K. unemployment-vacancies relationship separately for males and females, but not for different age groups. Some studies have considered the influence of changes in the demographic composition of the labour force on the aggregate unemployment-vacancies relationship (Foster 1974; Hughes 1975), but have not investigated separate relationships.
 2. By the same reasoning, it may appear appropriate to consider the underlying inflow and duration forces for vacancies. Data availability precludes doing this directly. Lagged vacancies are included in the analysis, however, which take account of the influence of past conditions on the current level of vacancies.

Second, the response of inflows to the various economic and institutional stimuli behind the unemployment-vacancies shift may be different to the response of duration. If this were the case, directly considering the response of the stock level alone to these influences could lead to misspecification of the true relationships involved, and give a distorted picture of the effects operating.

Third, this analysis will integrate better with search theories of unemployment (Appendix E), which talk in terms of flows into and out of unemployment.

Fourth, the welfare implications of an increase in the stock of unemployment are different depending on whether the change is founded in an increase in inflows or an increase in duration. It may be argued that a certain rise in the level of unemployment caused by an increase in inflows would result in less hardship in the community than a similar rise caused by an increase in duration. There is a suggestion that the burden of unemployment would be spread more thinly for the case of increased inflows, although we cannot be certain of this as it could conceivably be the same individuals experiencing unemployment more often. But even if this were so, it seems that for those individuals, more shorter spells of unemployment would cause less hardship than fewer longer spells (for the same total time unemployed).

Finally, the separate consideration of duration is relevant in the sphere of policy on Unemployment Benefit payments. Australian policy-makers have experimented with restricting the receipt of Benefits at the start of the spell of unemployment - the 6 weeks of unemployment requirement for those quitting their previous job introduced in January 1976. But most overseas schemes restrict the receipt of Benefits at the other end of the unemployment spell by specifying a maximum period for which Benefits may be received. The architects of microeconomic labour market policy in Australia may wish to consider the implications of introducing such features here. Knowledge on the relationship between unemployment duration and vacancies, and the factors

involved in shifts in this relationship, would be relevant to their considerations.

4.2 Theoretical Underpinnings of the Unemployment-Vacancies Relationship

If there was no mismatching of workers and vacancies, and the labour market operated frictionlessly with all workers and firms having complete information, then unemployment and job vacancies would not co-exist. At any point in time, either a situation of some unemployment and no vacancies, or a situation of no unemployment and some vacancies would be observed, but never unemployment and vacancies occurring at the same time. However, because mismatching does occur and labour market frictions are present, in the real world unemployment and vacancies co-exist but exhibit a strong inverse empirical relationship.

The empirical literature on the unemployment-vacancies relationship has been largely ad hoc (e.g. Taylor 1972; Hughes 1975; Evans 1977). However, over the last decade a number of theoretical papers that relate unemployment and vacancies have been written, generally appearing as part of the search theory literature. (This literature is reviewed in Appendix E). We adopt and adapt one of these models (Holt 1970) to provide an underlying basis for our empirical work on shifts in the unemployment-vacancies relationship.

Holt begins with a labour market in which there is no compartmentalisation - every unemployed worker is a potential candidate for every job (after initial development, the assumption of no compartmentalisation is dropped). Friction in the labour market exists in the form of imperfect labour market information by workers and firms.

Let T_s be the average time that would be required for an unemployed worker to encounter vacancies and schedule an interview - the average time it takes to cover the whole market. Without market compartmentalisation, the worker will be eligible for any vacancy. Let P_{oa} be the average probability that an interview will result in an offer that is accepted by the worker. Let U and V be the steady state stocks of unemployment and vacancies respectively. Finally, let F be the flow of hires per period resulting from the interviews.

Assume steady state conditions prevail. In this labour market there will be a total of UV potential interview encounters. Dividing UV by T_s gives interviews per period of time, and multiplying by P_{oa} gives the flow F of hires per period that are expected to result from the interviews. In symbols

$$F = UV \cdot T_s^{-1} \cdot P_{oa}$$

and by rearranging

$$UV = F \cdot T_s \cdot P_{oa}^{-1} .$$

If compartmentalisation is allowed for (on the basis of regions, occupations, sex, age, etc.), then for a given set of exogenous variables, both unemployment and vacancies will be increased. With market compartmentalisation, any particular worker will not be eligible for some of the vacancies encountered during job search. Accordingly, the overall flow of hires will be lower than if there was no compartmentalisation, implying both unemployment and vacancies will be higher. In fact the introduction of compartmentalisation leads to two effects: the 'pure' effect of compartmentalisation and the imbalance effect of differences in unemployment-vacancy ratios across the compartments.

The 'pure' compartmentalisation effect refers to the greater unemployment and vacancy levels from compartmentalisation (relative to a no-barrier situation) when the proportion of total vacancies in any

particular compartment is the same as the proportion of total unemployment in that compartment.

The imbalance effect occurs when the unemployment-vacancy proportion is not the same in each compartment. Under these circumstances, the flow of hires would be even lower, as the possibilities of matching workers and jobs would be further reduced.

Representing the pure compartmentalisation effect and the imbalance effect as C_o and I_m respectively (with $C_o, I_m \geq 1$ and C_o and I_m increasing with increased pure compartmentalisation and increased imbalance), then

$$UV = F \cdot T_s \cdot P_{oa}^{-1} \cdot C_o \cdot I_m \quad .$$

Dividing through by vacancies V gives

$$U = (F \cdot T_s \cdot P_{oa}^{-1} \cdot C_o \cdot I_m) V^{-1}.$$

This equation describes an inverse relationship between unemployment and vacancies which shifts in the U-V space as the elements in the brackets take on different values.

However, we are interested in the unemployment inflow-vacancies and duration-vacancies relationships rather than the unemployment stock level-vacancies relationship. Dividing the above equation through by the number of hires per period, F (which in Holt's steady state situation equals inflows to unemployment) gives the more relevant expression

$$D = (T_s \cdot P_{oa}^{-1} \cdot C_o \cdot I_m) V^{-1}$$

where D is the steady state average completed duration (stock level divided by inflows).

This equation gives an unemployment duration-vacancies relationship, with shifts in this relationship dependent on shifts in T_s , P_{oa} , C_o and I_m . T_s is the mean time taken to search the labour market, P_{oa} is the mean probability that an interview will result in an offer, C_o is the pure compartmentalisation effect, and I_m the imbalance effect. Factors that shift the relationship will operate through changes in these elements, with duration

changing relative to vacancies according to

$$\partial D / \partial T_s, \partial D / \partial C_o, \partial D / \partial I_m > 0$$

$$\partial D / \partial P_{oa} < 0.$$

The completed duration variable derived in this theoretical model does not correspond exactly with the duration measures we have calculated in earlier chapters - Holt assumes there are no movements into or out of the labour force, and that the labour market is in steady state equilibrium. However, neither of these assumptions pose any real difficulty in applying the theoretical developments to our empirical work. Movements from unemployment to out of the labour force should be related to vacancies through the same elements T_s , P_{oa} , C_o and I_m , and should not seriously affect the qualitative effects documents above. Movements into unemployment from out of the labour force are taken into account when inflows are considered below. With respect to the steady state equilibrium assumption, the estimated duration measure we use (expected average completed duration) has already gone some way towards taking account of this, and lags in the empirical analysis should complete the process.¹

As Holt assumes a steady state, inflows to unemployment are a constant rather than a variable. Since we wish to investigate actual inflows and completed duration, this assumption needs to be modified.

1. Expected average completed duration is in some ways a 'steady state equilibrium' measure in that it is the length of time a representative worker entering unemployment could be expected to remain unemployed if the forces determining the duration of unemployment maintained their current level indefinitely. The disequilibrium nature of the vacancy measure is allowed for by including lagged values of this variable in the empirical inflow-vacancies and duration-vacancies equations.

Inflows are specified by the identity

$$I = I_f + I_q + I_e$$

where

I is total inflows

I_f inflows from firings

I_q inflows from quits

I_e inflows from labour force entrance.

Each component is allowed to vary over time.

Inflows from firings can be specified as the product of the total number fired and the proportion fired who experience some unemployment.¹

The number fired is assumed to be inversely related to vacancies, fewer being fired in tight labour markets when labour is difficult to hire.

The proportion of those fired who experience some unemployment is assumed to be directly related to duration. The shorter the expected duration of unemployment, the smaller will be the proportion of those fired who experience unemployment, as more people will have terminated their unemployment spell before matching the empirical definition of unemployment. Since duration is inversely related to vacancies, it follows that the proportion of those fired who experience some unemployment will also be inversely related to vacancies, with this relationship depending on T_s , P_{oa} , C_o and I_m .

Then

$$I_f = (T_s, P_{oa}, C_o, I_m) V_f^{\beta_f}$$

where

$$\beta_f < 0$$

$$\partial I_f / \partial T_s, \partial I_f / \partial C_o, \partial I_f / \partial I_m > 0$$

$$\partial I_f / \partial P_{oa} < 0$$

1. For empirical measures of unemployment, not all those who are fired will be recorded as experiencing unemployment. Some will find jobs (or drop out) before becoming 'officially' unemployed.

Inflows to unemployment from quits are assumed to be positively related to vacancies, as workers should be increasingly prepared to quit as job alternatives become increasingly easier to find. It would seem reasonable to assume that the same elements that determine the duration-vacancies relationship (T_s, P_{oa}, C_o, I_m) should determine the quit inflow-vacancies relationship, but with the opposite sign for most elements. Thus factors that increase duration relative to vacancies through increasing T_s , C_o or I_m will tend to reduce quit inflows relative to vacancies. However, factors that increase duration relative to vacancies through decreasing P_{oa} will increase quit inflows relative to vacancies, as these factors represent a decreased willingness to work.

Thus

$$I_q = (T_s, P_{oa}, C_o, I_m) V^{\beta_q}$$

where

$$\beta_q > 0$$

$$\partial I_q / \partial T_s, \partial I_q / \partial C_o, \partial I_q / \partial I_m, \partial I_q / \partial P_{oa} < 0$$

Finally, inflows from labour force entrance can be split into those that are discretionary (secondary workers) and those that are more-or-less non-discretionary (primary workers). For our purposes the same remarks as made for quit inflows apply to inflows from discretionary entrances; while the same remarks as made for inflows from firings apply to inflows from non-discretionary entrance.¹

1. Demographic factors will also affect these inflows, but are not considered here.

Taking all these effects into account, for inflows as a whole

$$I = (T_s, P_{oa}, C_o, I_m) V^{\beta_I}$$

where

$$\begin{aligned} \beta_I & \quad ? \\ \partial I / \partial T_s, \partial I / \partial C_o, \partial I / \partial I_m & \quad ? \\ \partial I / \partial P_{oa} & < 0 \end{aligned}$$

with '?' indicating the sign is indeterminant.

The only definitive comment we can make is that total inflows and duration are related to P_{oa} in the same qualitative way.

Thus the empirical relationships to be investigated are

$$\begin{aligned} I_t & = \alpha_I V_t^{\beta_I} \\ D_t & = \alpha_D V_t^{\beta_D} \end{aligned}$$

where I_t is inflows into unemployment, D_t is average completed duration and V_t is the stock of vacancies.¹ α_I and α_D are functions of T_s , P_{oa} , C_o and I_m .

Influences that might shift these relationships over time - i.e. might change α_I and α_D via changes in the mean time taken to search the labour market T_s , the mean probability that an interview will result in an offer P_{oa} , the pure effect of compartmentalisation C_o , and the imbalance effect of compartmentalisation I_m - are now considered.

1. For the empirical analysis, I_t and V_t are divided by the number in the labour force to give the incidence of inflows and the vacancy rate.

4.3 Possible Causes of Shifts in the Unemployment-Vacancies Relationship

Many explanations of observed shifts in the unemployment-vacancies relationship have been put forward. For Britain, Gujarati (1972) and Evans (1977) have argued the observed shift has been brought about by increases in the rate of Unemployment Benefit payments. Taylor (1972) claims a 'shake-out' of hoarded labour has occurred. Bowers et al. (1972) suggests a change in the vacancies recording procedure. For Australia Hughes (1975) has suggested that sharp cuts in the migration intake have been an important cause of the shift. Other suggestions include a poor work ethic among today's young people, an influx of women into the labour force and a changed industrial structure of the economy.

Each of these hypotheses (and more) are considered in turn. This is done with a view to specifying equations explaining the variation through time of UB recipient inflows and average completed duration in terms of vacancies and shift variables. The shift variables cause the unemployment-vacancies relationship to change through changes in the elements T_s , P_{oa} , C_o and I_m discussed above.

CHANGES IN UNEMPLOYMENT BENEFIT PAYMENTS

An increase in the level of Unemployment Benefit payments relative to earnings reduces the 'cost' of being unemployed. This will affect the unemployment-vacancies relationship by reducing P_{oa} (the probability that a job offer would be accepted), reflecting the greater willingness of people to be unemployed. This implies an increase in both inflows and duration relative to vacancies.

To test for this, variables measuring the level of Unemployment Benefit payments relative to earnings are included in equations relating UB recipient inflows and duration to vacancies for the various age-sex groups.

SHAKE-OUT OF HOARDED LABOUR

It is possible that part of the observed shift in the unemployment-vacancies relationship is due to a temporary change in personnel management policy by firms in response to changing economic circumstances. During the mid 1970s the Australian economy experienced a transient explosion in real wages, which over this period may have induced firms to change their policies regarding retention of workers when demand for their product falls. With real wages rising faster than productivity, firms may have been less willing than before to maintain employment when the economy slumped, as the cost of holding workers in employment rose relative to recruiting costs and firm-specific human capital investment costs. This 'shake-out of hoarded labour' is viewed independently of any changes in the capital to labour ratio induced by the increase in the relative price of labour. Any such substitution effects should not manifest themselves in shifts in the unemployment-vacancies relationship, as they should not change any of the parameters T_s , P_{oa} , C_o , I_m .¹

A transient shake-out would mean that as the labour market slumps, firings would be greater than otherwise.² This implies that inflows to unemployment, and perhaps duration, would increase relative to vacancies.

Variables measuring the deviation of real wages from trend are constructed and included in the inflow and duration equations to test for the existence of the shake-out effect.

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1. Substitution effects will result in a movement along the unemployment-vacancies curve rather than shifts in this curve. It may be felt that P_{oa} would increase from an increase in real wages, but what is relevant to P_{oa} is earnings relative to Benefit payments, and this effect will be captured elsewhere.
 2. Thus the firings-vacancies relationship must shift. Such a shift has not been allowed for in our theoretical model, but it can be handled satisfactorily in an ad hoc manner.

CHANGES IN CES RECORDING PROCEDURES

It has been suggested that changes in CES unemployment and vacancy recording procedures could have shifted the observed unemployment-vacancies relationship. Hughes (1975) has dismissed this possibility by showing that shifts in the relationship between non-CES unemployment and vacancies measures occur at the same time as shifts between the CES measures. We accept this conclusion and do not investigate further.

CHANGE IN ELIGIBILITY REQUIREMENTS FOR UNEMPLOYMENT BENEFIT RECEIPT

Prior to January 1976 the general eligibility requirement of being unemployed at least one week (and registered with the CES) applied to all prospective UB recipients. However, since January 1976 those quitting their previous job have been required to wait 6 weeks before being eligible for Benefit receipt. This change could reduce inflows into Unemployment Benefit receipt through two mechanisms. First, people will be less willing to quit their job if they have to wait 6 weeks to commence Benefit receipt as the 'cost' of being unemployed has increased. Second, some of those who do quit will find a job before the required 6 week period elapses, and thus will not commence Unemployment Benefit receipt.

The average length of spell of UB receipt (duration) might also change from the change in eligibility requirements. If the chance on average of an unemployed worker finding a job and leaving unemployment declines with increased time in the pool, then those unemployed 6 weeks would take longer additional time to find a job than those unemployed only one week. UB recipient average duration would be increased by the new eligibility requirements. If on the other hand, however, the chance of leaving the pool does not fall over the first 6 weeks (as appears to be the case - see Chapter Two), duration will be unaffected by the eligibility requirement change.

This is an example where the qualitative effect on inflows may be different to that on duration, making it advantageous to consider inflows and duration separately. Inflows might be reduced by the change, while duration remains unaffected or is even increased.

Dummy variables are included in the inflow-vacancies and duration-vacancies equations to capture the effects of the change in eligibility requirements.

CUTS IN THE MIGRATION INTAKE

Hughes (1975) has suggested that a sharply reduced migration intake led to the 1972-74 upward displacement of the unemployment-vacancies pattern. It is argued that a reduction in migration intake will hinder the efficiency of labour market operations in three ways. First, substantial migration cuts will interfere with the traditional recruitment activity of firms that usually employ large amounts of migrant labour, and until recruitment policies are adjusted their vacancies could be expected to remain unfilled for longer periods. Second, new immigrants are geographically mobile and will tend to move to the areas where jobs are plentiful. When the migration stream is cut, these mobile workers are no longer injected into the economy and average worker mobility falls. Third, migrants as a whole have a greater willingness to take the less 'socially acceptable' jobs than native Australians, so a cut in their flow into the economy will cause personnel problems in firms offering such jobs.

The reasoning behind these three points is clarified by reference to our model. The interference with traditional recruitment policy of some firms will be reflected (at least till the firms adjust) in a rise in T_s , the average time it takes to search the market. Cutting off the supply of geographically mobile workers who move to areas where jobs are plentiful will increase the imbalance term I_m , through increased regional imbalance. Similarly,

cutting off the supply of workers willing to undertake a certain class of work (less socially acceptable jobs) will also increase I_m , this time through increased occupational or industry imbalance. From the results of the previous section, increases in both T_s and I_m will have an indeterminate effect on inflows relative to vacancies, and will increase duration relative to vacancies.

To allow for this migration intake effect, settler arrival series are included in the inflow and duration equations.

POOR WORK ETHIC AMONG YOUNG PEOPLE

An opinion prevails that today's young people feel less urgency to get a job and have a greater willingness to remain unemployed than their counterparts of previous generations. It is often suggested that young people devote less effort to job search, and are more discriminating in the job offers they accept.

In our theoretical model these changed attitudes of young people would be reflected in an increase in T_s (average time required to search the market), and a decrease in P_{oa} (average probability that a job offer will be accepted). The increase in T_s will have an indeterminate effect on inflows relative to vacancies and will increase duration relative to vacancies, while the decrease in P_{oa} will increase both inflows and duration relative to vacancies. Overall, the changed attitudes of young people could be expected to increase at least their duration of unemployment relative to vacancies, and perhaps also their inflow level.

The inability to quantify 'work ethic' makes it impossible to test directly for the presence of this effect. However, having data disaggregated by age allows us to compare the estimated inflow-vacancies and duration-vacancies relationships for young people with those for adults for indications of a reduced work ethic effect operating.

INFLUX OF WOMEN INTO THE LABOUR FORCE

It could be argued that the rapid increase over the 1970s in the number of women in the labour force has shifted the aggregate unemployment-vacancies relationship by pure compartmentalisation and imbalance effects as described earlier. Separate analysis is carried out for males and females to determine the effect of the changing sex composition of the labour force.

CHANGED INDUSTRIAL STRUCTURE

Over 1974-75 the proportion of civilian wage and salary earners employed in the manufacturing sector contracted sharply. At the same time large changes have taken place in the share of manufacturing employment accounted for by certain industries, for example footwear, clothing and textiles. These large and rapid changes are likely to worsen the match between unemployment and vacancies across non-interacting occupational, regional etc. compartments in the economy and thus push up I_m . This implies an increase in duration relative to vacancies and an indeterminate effect on inflows relative to vacancies.

To capture this imbalance effect, variables which measure the proportion of male and female wage and salary earners employed in manufacturing are included in the inflow and duration equations.

This concludes our discussion of the influences we consider in our empirical investigations of the unemployment-vacancies relationship. We now move on to the estimation of inflow-vacancies and duration-vacancies relationships for UB recipients in Chapter Five.

CHAPTER FIVE

STRUCTURAL CHANGE IN THE AUSTRALIAN LABOUR MARKET: THE EMPIRICAL RESULTS

Our empirical analysis of structural change in the Australian labour market involves investigating the shifting inflow-vacancies and duration-vacancies relationships for UB recipients. Regression models of these relationships are estimated, first without, and then including, the shift variables discussed in the previous chapter. From these estimates, the impact of the various structural change influences can be assessed.

The analysis is carried out for each of the 10 UB recipient age-sex groups,¹ using quarterly observations over the period II.1967-II.1978. Our focus on UB recipients does not preclude us from contributing to a better understanding of the general unemployment-vacancies situation. Figure 15 shows that the UB recipient-vacancies relationship and the CES unemployment-vacancies relationship have shifted in a very similar fashion over time, implying that much the same underlying causes are operating.

5.1 The Shifting Inflow-Vacancies and Duration-Vacancies Relationships

The outward displacement of the UB recipient stock level-vacancies relationship earlier this decade (Figure 15(b)) reflects underlying shifts in both the inflow-vacancies and duration-vacancies relationships. This is demonstrated in Figure 16. To commence our analysis of these shifting relationships, simple inflow-vacancies and duration-vacancies models without the shift variables included are estimated, and the parameter estimates obtained shown to be statistically unstable over time. In the following sections, it is demonstrated that inclusion of the shift variables in the model results in stable parameter estimates.

1. Males and females less than 21 years, 21 to 24 years, 25 to 44 years, 45 to 54 years and 55 years and over.

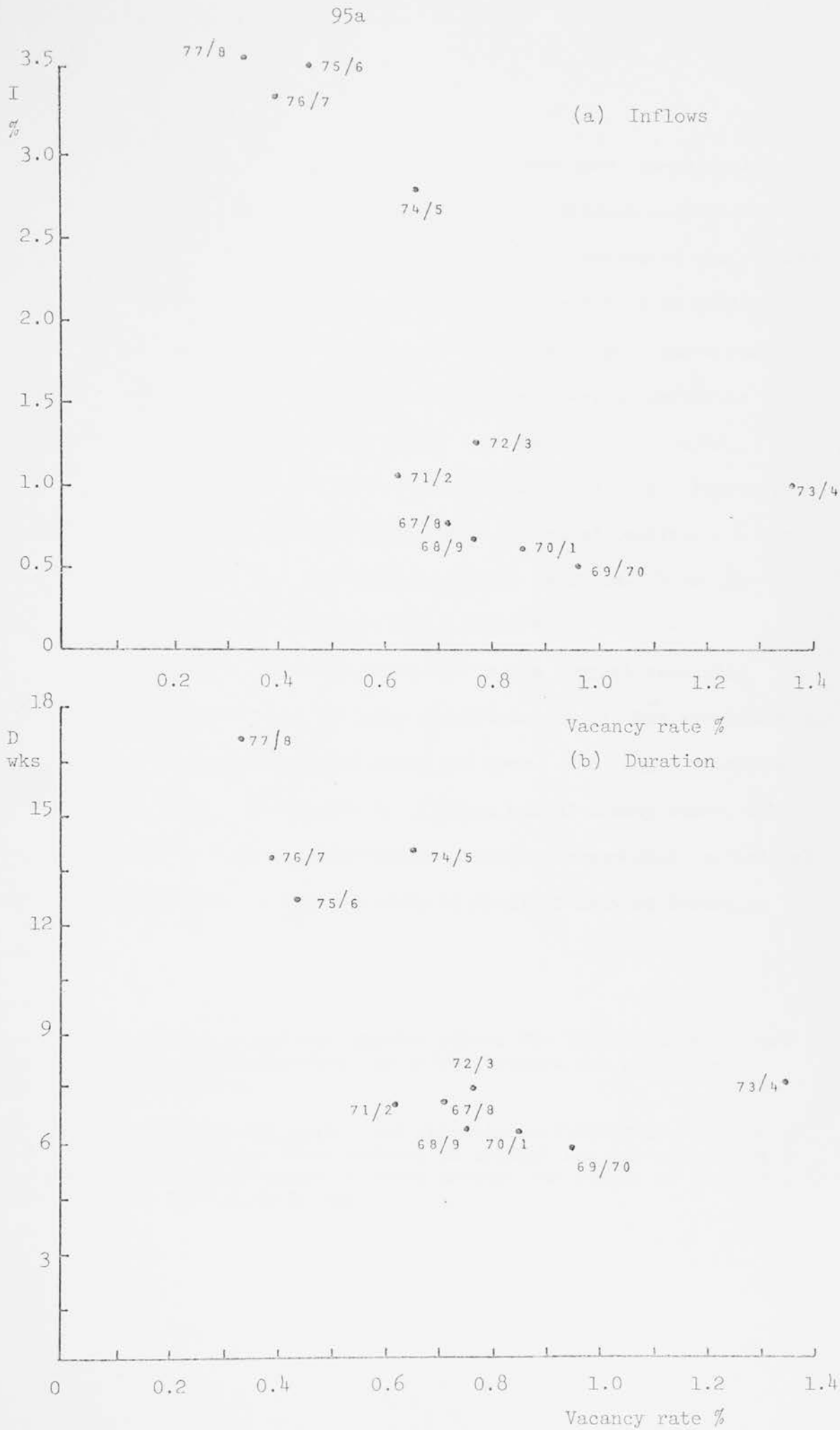


FIGURE 16

To estimate the simple inflow-vacancies and duration-vacancies relationships, UB recipient incidence of inflows and average completed duration variables are regressed on current and lagged values of the vacancy rate, and seasonal dummies.^{1,2} These estimates are presented in Table 11.

Vacancies series are available for junior and adult males and females. For the age group less than 21 years the number of vacancies for juniors is used, and for the rest the number of vacancies for adults.

All equations are estimated in double logarithm form. Regression coefficients are therefore 'elasticities'. The estimated coefficients for the constant term and the seasonal dummies are not reported. V is the vacancies variable. Bracketed figures are t statistics.

The estimated coefficients attached to the current vacancies variables are negative and statistically significant in all but one instance, the duration equation for females 55 years and over. The lagged vacancies variables have positive coefficients in eighteen out of twenty cases, with nine of these eighteen positive coefficients being of reasonable statistical significance. Thus there is some evidence of cyclical upswing-downswing effects.

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1. Including vacancies lagged one quarter allows the inflow-vacancies and duration-vacancies relationships to differ between the upswing and downswing of the cycle.
 2. The age- and sex-specific inflow and vacancies variables are divided by the corresponding labour force numbers to account for outward shifts in the unemployment level-vacancies level pattern due simply to increases in the size of the labour market.

TABLE 11

SIMPLE INFLOW AND DURATION EQUATIONS^(a*)

(a) INFLOW EQUATIONS

	V	V ₋₁	\bar{R}^2	D.W.		V	V ₋₁	\bar{R}^2	D.W.
MALE <21	-1.34 (-3.39)	-0.14 (-0.35)	0.63	0.26	FEMALE <21	-1.47 (-3.71)	0.34 (0.85)	0.70	0.23
MALE 21-24	-2.37 (-2.60)	1.01 (1.06)	0.27	0.13	FEMALE 21-24	-2.22 (-3.94)	1.01 (1.71)	0.67	0.32
MALE 25-44	-2.11 (-3.03)	0.91 (1.25)	0.36	0.16	FEMALE 25-44	-2.01 (-4.43)	0.86 (1.82)	0.73	0.36
MALE 45-54	-1.57 (-2.95)	0.72 (1.29)	0.35	0.29	FEMALE 45-54	-1.78 (-4.63)	0.78 (1.95)	0.74	0.62
MALE 55+	-1.14 (-2.63)	0.42 (0.93)	0.37	0.33	FEMALE 55+	-1.39 (-3.41)	0.65 (1.52)	0.60	0.72

(b) DURATION EQUATIONS

	V	V ₋₁	\bar{R}^2	D.W.		V	V ₋₁	\bar{R}^2	D.W.
MALE <21	-0.89 (-3.75)	0.20 (0.84)	0.50	0.73	FEMALE <21	-1.03 (-4.37)	0.54 (2.27)	0.58	0.89
MALE 21-24	-1.38 (-2.95)	0.84 (1.71)	0.22	0.57	FEMALE 21-24	-0.92 (-3.66)	0.38 (1.44)	0.70	1.64
MALE 25-44	-1.34 (-3.09)	0.86 (1.89)	0.22	0.51	FEMALE 25-44	-1.11 (-4.35)	0.62 (2.33)	0.67	1.40
MALE 45-54	-1.38 (-3.16)	0.86 (1.88)	0.27	0.50	FEMALE 45-54	-1.32 (-4.27)	0.76 (2.34)	0.63	1.03
MALE 55+	-1.35 (-2.71)	0.76 (1.45)	0.24	0.32	FEMALE 55+	-0.31 (-0.64)	-0.38 (-0.75)	0.39	1.43

- (a*) V - vacancy rate
 \bar{R}^2 - coefficient of determination adjusted for degrees of freedom
D.W. - Durbin-Watson statistic
Bracketed figures are t statistics

The coefficients of determination are in general low, particularly for males (0.50 or less in nine out of ten cases for males, and 0.70 or less in eight out of ten cases for females). Positive serial correlation is obviously present in the residuals of each equation, again particularly for males. This suggests the influence of unspecified variables in the simple inflow-vacancies and duration-vacancies relationships, or changes in the structure of the relationships.

It is possible to show that the estimated inflow-vacancies and duration-vacancies relationships are statistically unstable. Brown, Durbin and Evans (1975) have developed techniques for testing the constancy of regression relationships over time. These tests involve the calculation of recursive Ordinary Least Squares estimates of the coefficients of an equation, and the examination of the cumulative sum (cusum) and the cumulative sum of squares (cusum of squares) of the resultant recursive residuals.

Figure 17 displays typical cusum and cusum of squares plots for the inflow and duration equations. The confidence limits represent a 5 per cent level of confidence, and if the cusum and cusum of squares measures go outside these limits, then this is taken as evidence of coefficient instability over time. There is no doubt as to the instability of the estimated relationships.

5.2 The Estimation of Stable Inflow-Vacancies Relationships

Variables representing the different explanations of the unemployment-vacancies shift (discussed in Chapter Four) are now added to the basic inflow-vacancies equations. The same is done for the duration-vacancies equations in the next section. The quantitative importance of these shift variables is considered in Chapter Six.

The shift variables are:

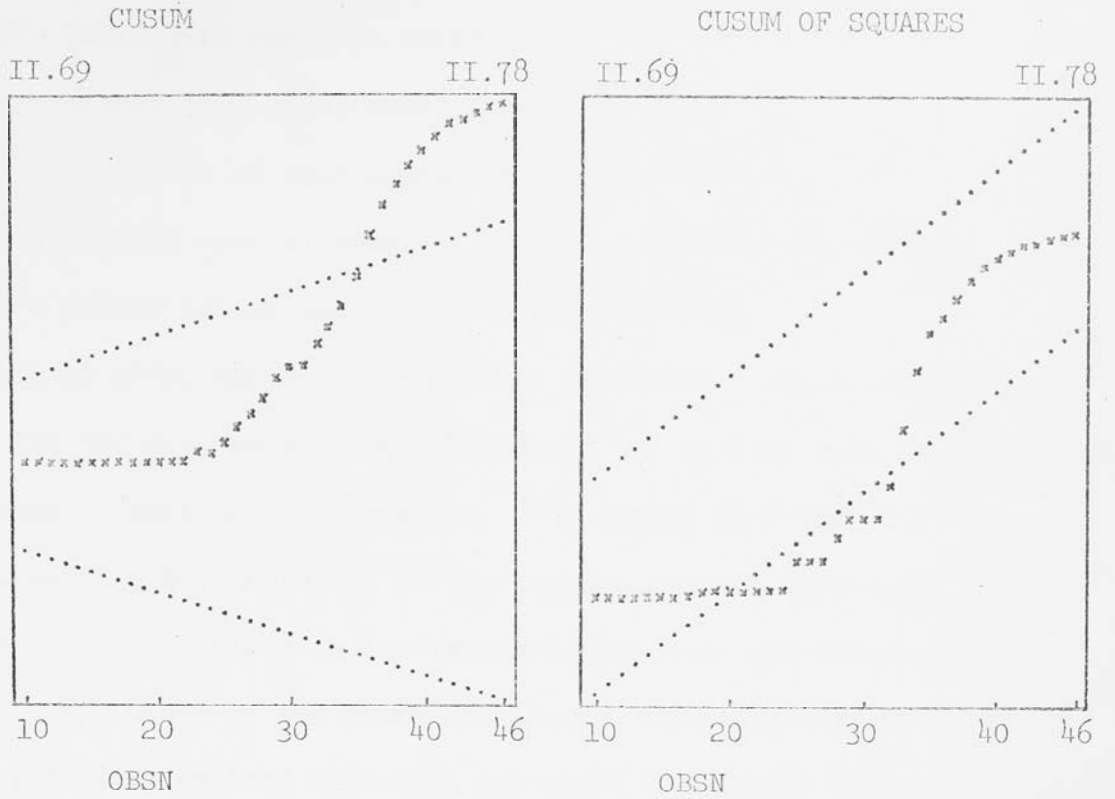


FIGURE 17
STABILITY TESTS ON INFLOW-VACANCIES AND DURATION-VACANCIES
RELATIONSHIPS

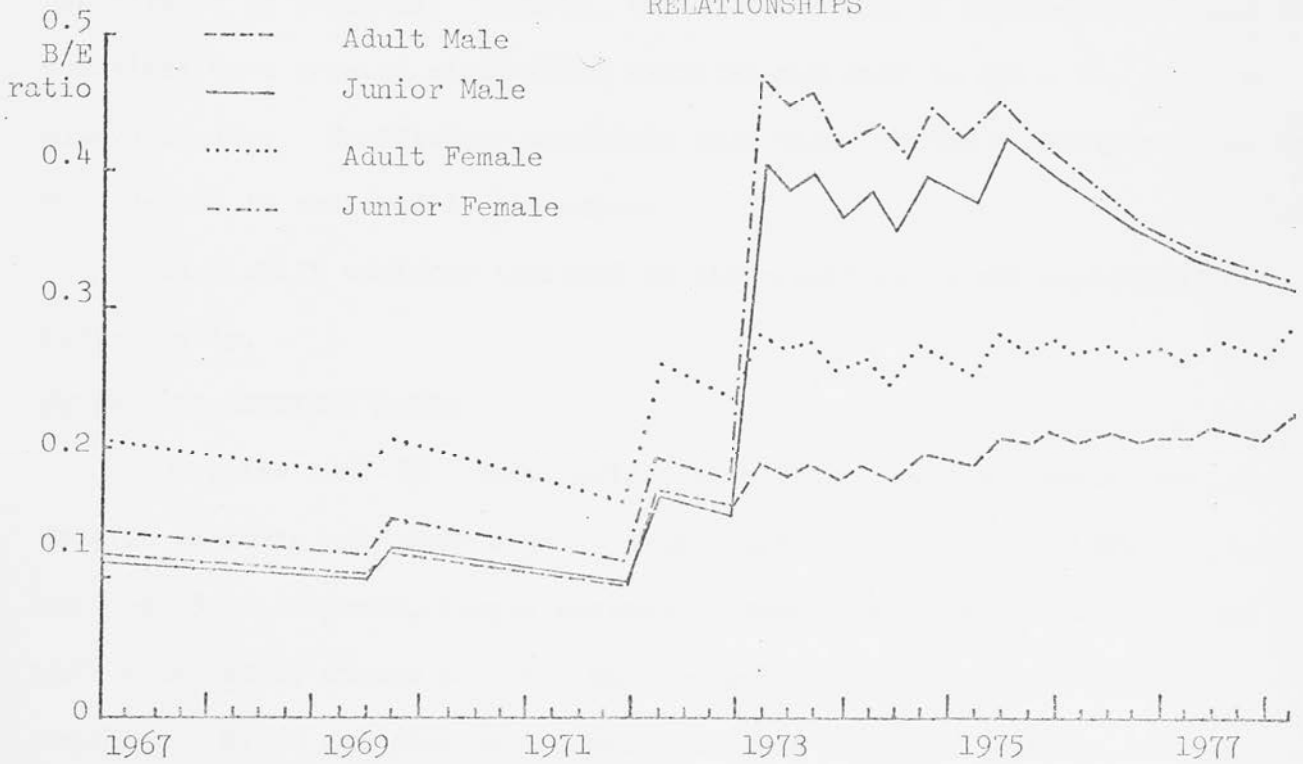


FIGURE 18
BENEFIT TO EARNINGS RATIO

- . B/E - Benefit to earnings ratio
- . ED - eligibility requirement dummy
- . RW - deviation of real wages from trend
- . IMM - settler arrival numbers relative to labour force size
- . MP - proportion of employment in manufacturing.

Table 12 gives the estimated inflow equations. These equations appear to fit the data well. Improvements in the coefficients of determination over the simple equations are dramatic. The lowest coefficient of determination is 0.80, and eight of the ten are greater than 0.90. The positive serial correlation in the residuals has been removed from all equations except those of the young age groups, where perhaps changing parameter values or omitted variables are still generating serial correlation.

The relationship between inflows and vacancies, *ceteris paribus*, is negative as in Table 11. However, the coefficients on vacancies in Table 12 sometimes have greater statistical significance than in Table 11, and are always smaller. Coefficient stability over time (at the 5 per cent level of confidence) is achieved in all cases.

Each shift variable included in the equations is now considered individually.

BENEFIT TO EARNINGS RATIO

Over the 1967-78 data period, at various times different levels of Benefit payments have been made to single persons less than 18 years, single persons 18 to 20 years, single persons 21 years and over, married persons with a dependent spouse only and married persons with a dependent spouse and children. Males and females are paid the same level of Benefits, but if both husband and wife are unemployed, it is the husband who receives the Benefit, with an allowance for his dependent spouse.

TABLE 12
 FULL INFLOW EQUATIONS^(a)

	V	V ₋₁	B/E ₋₁	ED	RW	IMM	MP	\bar{R}^2	D.W.
MALE <21	-0.62 (-2.79)	-0.09 (-0.48)	0.45 (2.66)	-0.31 (-1.72)	0.17 (0.14)	-0.22 (-1.24)	-3.97 (-2.14)	0.94	1.03
MALE 21-24	-1.25 (-3.55)	0.39 (1.09)	1.16 (2.98)	-0.42 (-2.07)	1.32 (0.85)	-0.44 (-1.90)	-3.60 (-1.74)	0.93	1.63
MALE 25-44	-1.15 (-4.92)	0.27 (1.13)	0.75 (2.90)	-0.41 (-3.04)	2.10 (2.02)	-0.31 (-2.05)	-3.15 (-2.29)	0.96	1.97
MALE 45-54	-0.83 (-3.62)	0.17 (0.74)	0.48 (1.89)	-0.42 (-3.21)	1.54 (1.50)	-0.25 (-1.68)	-2.81 (-2.07)	0.93	2.31
MALE 55+	-0.56 (-2.41)	-0.08 (-0.33)	0.58 (2.26)	-0.37 (-2.82)	1.56 (1.51)	-0.05 (-0.32)	-2.48 (-1.80)	0.89	2.01
FEMALE <21	-0.26 (-1.43)	0.06 (0.32)	0.23 (2.18)	-0.10 (-0.77)	0.35 (0.59)	-0.37 (-2.23)	-2.31 (-4.70)	0.97	0.66
FEMALE 21-24	-1.25 (-4.19)	0.65 (2.23)	0.90 (2.95)	-0.29 (-2.02)	1.75 (2.32)	-0.53 (-2.57)	-0.20 (-0.24)	0.95	2.52
FEMALE 25-44	-1.43 (-5.51)	0.62 (2.45)	0.60 (2.30)	-0.30 (-2.41)	1.44 (2.20)	-0.70 (-3.91)	0.93 (1.31)	0.96	2.45
FEMALE 45-54	-1.20 (-3.90)	0.08 (0.26)	0.74 (2.36)	-0.56 (-3.85)	2.67 (3.42)	0.003 (0.01)	0.70 (0.82)	0.92	2.24
FEMALE 55+	-0.96 (-2.35)	-0.26 (-0.66)	0.58 (1.39)	-0.57 (-2.91)	4.00 (3.85)	0.12 (0.42)	2.22 (1.96)	0.80	1.93

- (a) V - vacancy rate
 B/E - Benefit to earnings ratio
 ED - eligibility requirement dummy
 RW - real wage deviation from trend
 IMM - settler arrivals relative to the labour force
 MP - proportion of employment in manufacturing
 Bracketed figures are t statistics

For males and females in the adult age groups, the Benefit payment measure used is that paid to single persons 21 years and over.¹ For those less than 21 years, the single rate for those less than 18 years is chosen.²

Average weekly earnings for adult and junior males and females are available for October of each year.³ These yearly observations are linearly interpolated to give quarterly time series, and divided into the appropriate Benefit payment series to give separate Benefit to earnings ratios for adult and junior males and females. These ratios are plotted in Figure 18 (p.99). The series for adults and juniors move very differently over time, giving different stimuli to the various age-sex groups.

The Benefit to earnings ratio lagged one quarter proved to be the most appropriate specification for the inflow equations. This variable is statistically significant for eight of the ten age-sex groups (Table 12). The coefficient exhibits the expected positive sign in all cases.

The 'elasticity' of UB recipient inflows with respect to the Benefit to earnings ratio is greatest for the 21 to 24 years age groups (1.16 for males and 0.90 for females), and lowest for young people (0.45 for males and 0.23 for females). The elasticity is somewhat greater for males than females for three of the five age groups.

UB RECEIPT ELIGIBILITY REQUIREMENTS

A dummy variable taking the value of zero for observations prior to I.1976 and one from this point onwards is used to capture any effects of the change in eligibility requirements. The estimated coefficient is always

-
1. For adults, single and married rates have moved in a very similar fashion over time.
 2. Single rates are chosen as most would be single in this age group. Selection of the rate paid those less than 18 years instead of that paid those 18 to 20 years (or a combination of these) was based on experiments with inflow and duration equations.
 3. ABS, Earnings and Hours. Several series were spliced together to give the consistent series 'All Employees (Private and Government, including Managerial), Full Time Average Weekly Earnings'.

negative. It is statistically significant in eight cases, with the coefficient for young males just below conventional significance levels ($t = -1.72$), and that for young females well below.

The insignificance of this variable for the young age group (especially females) is not surprising in that the new eligibility requirement applies only to those quitting their job. Many young people considering Benefit receipt will be without previous work experience and therefore not affected by the change in eligibility requirements.¹

The proportions by which inflows have been reduced due to this eligibility change have been calculated as $1 - e^{\alpha_{ED}}$, where α_{ED} is the coefficient on the eligibility dummy variable (recall ED is a 0-1 variable in a double logarithm equation). These proportions are presented in Table 13. The large proportional reductions indicate a very strong effect from the change

TABLE 13
PROPORTIONAL REDUCTION IN INFLOWS FROM
THE 6-WEEK ELIGIBILITY REQUIREMENT

	PROP'AL REDUCTION		PROP'AL REDUCTION
MALE <21	0.27	FEMALE <21	0.09
MALE 21-24	0.34	FEMALE 21-24	0.25
MALE 25-44	0.33	FEMALE 25-44	0.26
MALE 45-54	0.34	FEMALE 45-54	0.43
MALE 55+	0.31	FEMALE 55+	0.43

1. The requirement introduced in November 1977 that the applicant for Benefits have left school at least 6 weeks previous may affect inflows for young people more significantly than the quit related requirements. This cannot be tested as we only have two observations since school-leaver changes were introduced (i.e. observations up to II.1978).

in eligibility requirements, the exception being teenage females. In total, 28 per cent fewer spells of UB receipt have been commenced each quarter since January 1976 as a result of the 6-week requirement policy initiative.

REAL WAGE DEVIATION (SHAKE-OUT OF HOARDED LABOUR)

Age- and sex-specific measures of deviation of real wages from their trend over time are used to capture any shake-out effects. The appropriate real wage variable is taken to be the weighted average minimum weekly rates of wage as prescribed in awards, determinations and collective agreements, deflated by the Consumer Price Index.

The minimum wage rate measure is available monthly for adult males and females.¹ Every third month is taken to give a quarterly time series, starting February 1967. Junior rates for males and females are obtained by applying to the adult rates the junior to adult ratios for males and females obtained from the quarterly observations on average weekly earnings used earlier. The trend apparent in the real wage series over the period 1967 through 1973 is extrapolated through to 1978, and deviation of actual real wages from this trend calculated. The timing and extent of deviation from trend is shown in Figure 19. The current value of this variable is found to be the most appropriate in the inflow equations.

This variable displays the expected positive sign for all age-sex groups (Table 12). However, it is statistically significant for only five of the ten groups, due in part at least to highly correlated independent variables. If the immigration and manufacturing employment proportion variables are suppressed in the estimated equation, then the real wage deviation variable is significant in eight of the ten cases. In these equations, the coefficients of the real wage deviation variable are not statistically significant for teenage males and females (Table 14).

1. ABS, Wage Rates.

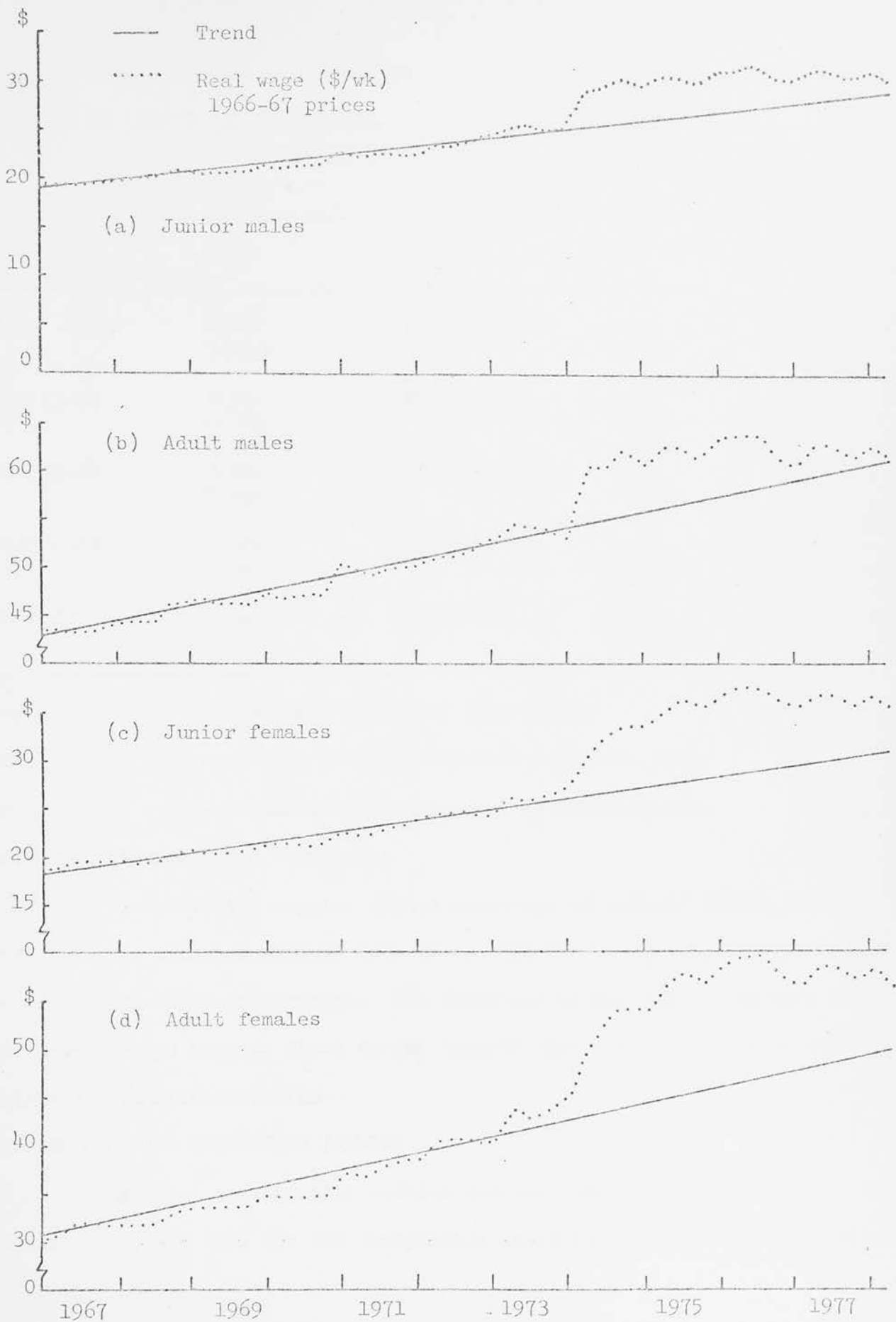


FIGURE 19

REAL WAGE DEVIATION

TABLE 14

RW COEFFICIENTS WHEN IMM, MP VARIABLES SUPPRESSED
IN INFLOW EQUATIONS^(a)

	RW		RW
MALE <21	1.80 (1.59)	FEMALE <21	1.31 (1.59)
MALE 21-24	4.85 (3.26)	FEMALE 21-24	3.18 (4.93)
MALE 25-44	4.91 (4.65)	FEMALE 25-44	2.77 (4.60)
MALE 45-54	3.94 (3.99)	FEMALE 45-54	2.34 (3.96)
MALE 55+	2.96 (3.35)	FEMALE 55+	2.68 (3.16)

(a)

RW	- real wage deviation from trend
IMM	- settler arrivals relative to labour force
MP	- proportion of employment in manufacturing

Bracketed figures are t statistics

These results suggest that a shake-out of hoarded labour has significantly affected inflows into UB receipt for all age-sex groups except perhaps young males and females. The shake-out effect may not operate for the young groups because firms do not 'hoard' this kind of labour as their skills are not firm-specific.

SETTLER ARRIVALS (MIGRATION INTAKE)

Age- and sex-specific settler arrival numbers¹, divided by the labour force, are used for the immigration variable. The number of settler

1. Department of Immigration and Ethnic Affairs, Australian Immigration: Quarterly Statistical Summary.

arrivals 15 to 19 years is used for the less than 21 years groups, with the number 20 years and over used for the rest. These variables are plotted in Figure 20. Experimentation with a variety of lags as well as current values of these variables were carried out, with current values finally selected.

The theoretical discussion in Chapter Four suggested that the sign of the coefficient on the immigration variable is indeterminant. Table 12 shows this coefficient to be negative in the full inflow equations for eight groups, and significantly different from zero in four of these cases. However, if the real wage deviation and manufacturing employment proportion variables are suppressed, the coefficient attached to the settler arrivals variable is negative for all groups, and is statistically significant for eight of ten cases (Table 15).

TABLE 15

IMM COEFFICIENTS WHEN RW, MP VARIABLES SUPPRESSED
IN INFLOW EQUATIONS^(a)

	IMM		IMM
MALE <21	-0.35 (-2.07)	FEMALE <21	-0.68 (-3.53)
MALE 21-24	-0.80 (-4.73)	FEMALE 21-24	-0.83 (-5.43)
MALE 25-44	-0.70 (-5.58)	FEMALE 25-44	-0.79 (-5.99)
MALE 45-54	-0.57 (-4.88)	FEMALE 45-54	-0.31 (-1.81)
MALE 55+	-0.35 (-2.95)	FEMALE 55+	-0.18 (-0.75)

(a) RW - real wage deviation from trend
IMM - settler arrivals relative to labour force
MP - proportion of employment in manufacturing

Bracketed figures are t statistics

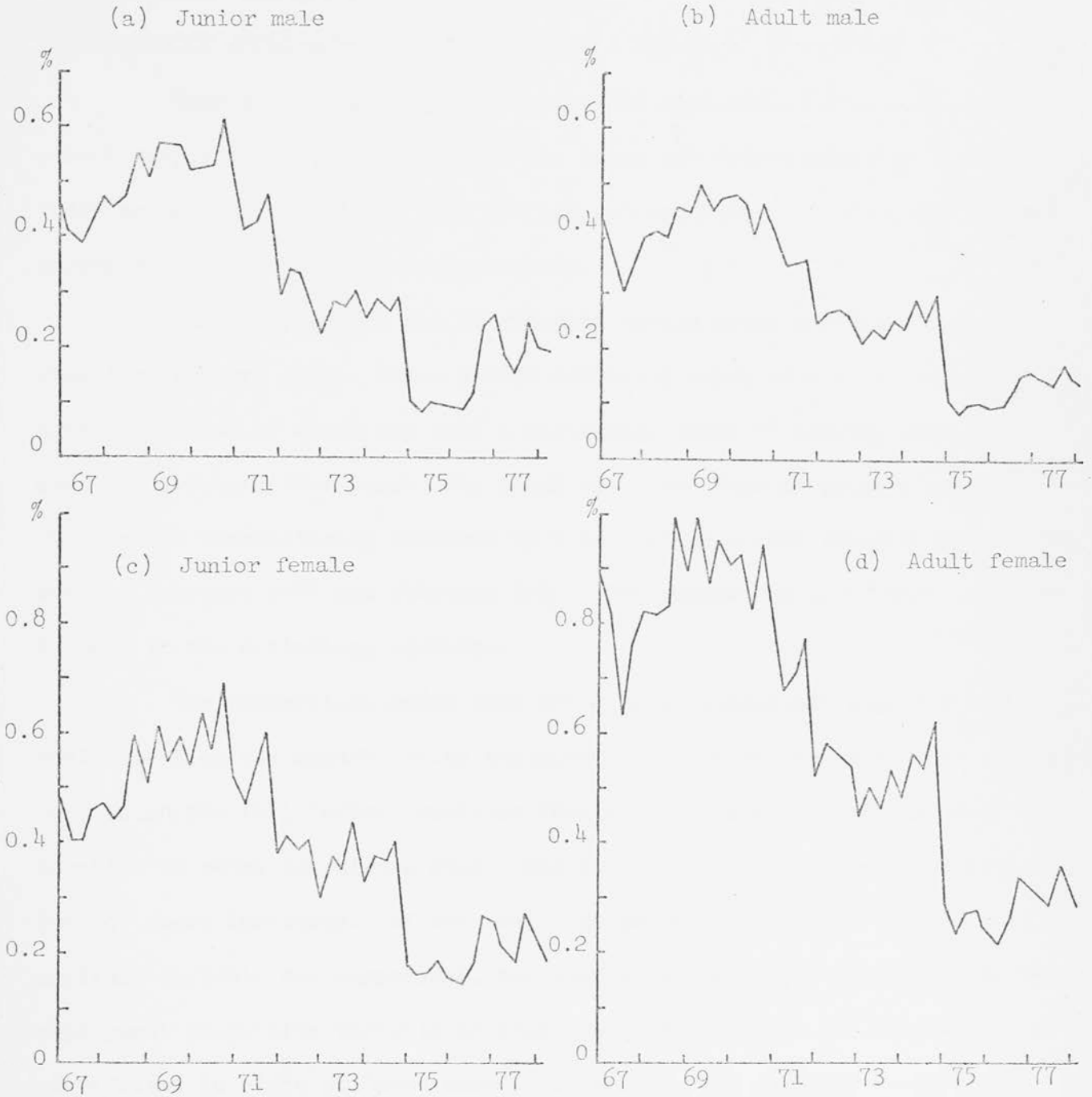


FIGURE 20

SETTLER ARRIVALS AS A PROPORTION OF THE LABOUR FORCE

Based on the relative magnitude of the estimated coefficients from both the full equations (Table 12) and the reduced equations (Table 15), the elasticity with respect to the immigration variable seems to be greatest for the middle age groups.

PROPORTION OF EMPLOYMENT IN MANUFACTURING (INDUSTRIAL STRUCTURE)

Wage and salary earners in civilian employment, classified by main industry groups, are available for males and females monthly.¹ From these series are calculated male and female proportions of civilian wage and salary earners in manufacturing industry.

Quarterly series are obtained by taking every third month, starting February 1967. These series exhibit a sharp drop over 1974-75. After declining by about one half a percentage point on average each year over the previous five years, the total (male and female) proportion employed in manufacturing declined by 5 percentage points (from 0.30 to 0.25) between February 1974 and February 1975. The current value of this variable is used in the estimating equations.

The theoretical model does not give a determinant sign for the coefficient on the manufacturing employment proportion variable. The regression results on the full inflow equations (Table 12) show this coefficient to be negative in seven out of ten cases, and significantly different from zero in four of these instances. If the real wage deviation variable and the settler arrivals variable are suppressed, the coefficient attached to the manufacturing employment proportion variable is negative in nine cases, and statistically significant in eight of these cases (Table 16). The positive coefficient for females 55 years and over comes nowhere near statistical significance. Thus the near-significant positive coefficients in the full equations (Table 12) apparently arise from multicollinearity problems and do not reveal a true positive relationship.

1. ABS, Employment and Unemployment.

It is apparent from both the full equations (Table 12) and the reduced equations (Table 16) that for the younger age groups the negative elasticity with respect to the manufacturing employment proportion variable is greater for males than females. However, this does not necessarily imply that the unemployment position of these females is not as severely affected by a certain degree of structural change in employment. UB receipt eligibility conditions affect males and females differently, with females often ineligible to enter the beneficiary pool.

TABLE 16

MP COEFFICIENTS WHEN RW, IMM VARIABLES SUPPRESSED
IN INFLOW EQUATIONS^(a)

	MP		MP
MALE <21	-4.79 (-2.91)	FEMALE <21	-2.79 (-5.86)
MALE 21-24	-7.07 (-4.67)	FEMALE 21-24	-2.61 (-3.24)
MALE 25-44	-6.36 (-5.90)	FEMALE 25-44	-1.77 (-2.26)
MALE 45-54	-5.31 (-5.26)	FEMALE 45-54	-0.75 (-0.97)
MALE 55+	-3.75 (-3.89)	FEMALE 55+	0.38 (0.36)

(a)

RW - real wage deviation from trend
 IMM - settler arrivals relative to labour force
 MP - proportion of employment in manufacturing

Bracketed figures are t statistics

5.3 The Estimation of Stable Duration-Vacancies Relationships

The estimated duration equations are presented in Table 17. They fit the data well. The exception is females 55 years and over.¹ The lowest coefficient of determination for the other regressions is 0.80, and the highest 0.90. In this regard, these full duration equations show a marked improvement over the simple relationships presented in Table 11. The problem of positive serial correlation in the residuals that existed for the simple duration-vacancies relationships is no longer present.

The stability of the duration-vacancies relationships is greatly improved by the inclusion of the shift variables. Coefficient stability over time is achieved at the 1 per cent level of confidence for all groups, and at the 5 percent level for six of the ten equations.²

Not all variables used in the inflow equations are included in the final form of the duration equations (Table 17). The coefficient attached to the eligibility dummy was always insignificant ($t < 1.0$ in seven of ten cases), so this variable was dropped. The insignificance of the eligibility variable suggests that expected additional duration of unemployment after 6 weeks in the pool is not significantly different to that after only 1 week in the pool. This supports our finding in Chapter Two that retention rates do not rise over the first few months of Benefit receipt.

-
1. The duration measure for this group may be distorted by data problems arising from the small numbers in each current duration interval. With very few beneficiaries for this age group, small absolute errors of measurement by the Department of Social Security, and errors in our estimates, could have dramatic effects. This implies these results should be ignored, rather than considered an exception.
 2. The cusum of squares deviates outside the 5 per cent confidence limits for the four younger female age groups.

TABLE 17

FULL DURATION EQUATIONS^(a)

	V	V ₋₁	B/E	RW ₋₁	IMM	MP	\bar{R}^2	D.W.
MALE <21	-0.35 (-2.14)	0.18 (1.31)	0.14 (1.25)	2.63 (2.55)	0.23 (1.92)	-3.04 (-2.28)	0.86	1.83
MALE 21-24	-0.54 (-2.08)	0.33 (1.33)	0.66 (2.67)	2.65 (2.10)	0.33 (2.20)	-3.47 (-2.80)	0.87	2.53
MALE 25-44	-0.63 (-2.71)	0.49 (2.19)	0.67 (2.99)	1.28 (1.13)	0.30 (2.19)	-3.56 (-3.20)	0.88	2.48
MALE 45-54	-.85 (-3.60)	0.59 (2.62)	0.92 (4.07)	1.45 (1.26)	0.24 (1.74)	-2.13 (-1.89)	0.89	2.38
MALE 55+	-0.73 (-2.97)	0.53 (2.25)	0.83 (3.52)	0.57 (0.47)	0.08 (0.59)	-2.66 (-2.25)	0.90	1.73
FEMALE <21	-0.63 (-2.84)	0.44 (2.65)	0.27 (2.61)	0.76 (1.04)	0.30 (1.82)	-1.01 (-2.10)	0.83	1.84
FEMALE 21-24	-0.55 (-1.75)	0.30 (1.09)	0.53 (1.92)	0.18 (0.22)	0.21 (1.10)	-1.20 (-1.74)	0.81	2.64
FEMALE 25-44	-0.68 (-2.23)	0.49 (1.81)	0.60 (2.24)	0.35 (0.42)	0.35 (1.87)	-1.44 (-2.13)	0.81	2.25
FEMALE 45-54	-0.83 (-2.34)	0.62 (1.97)	0.75 (2.39)	0.73 (0.75)	0.19 (0.87)	-0.88 (-1.11)	0.80	1.79
FEMALE 55+	0.02 (0.04)	-0.09 (-0.16)	0.65 (1.24)	-1.62 (-0.99)	-0.32 (-0.88)	-1.92 (-1.45)	0.62	2.61

(a)

V -- vacancy rate

B/E -- Benefit to earnings ratio

RW -- real wage deviation from trend

IMM -- settler arrivals relative to the labour force

MP -- proportion of employment in manufacturing

Bracketed figures are t statistics

The relationship between duration and current vacancies remains negative, but the size of the coefficients and their significance level is reduced when the shift variables are included. The coefficients on the lagged vacancies term are positive as before, are significant in five of the ten instances, and are smaller when all the shift variables are included. These results contrast with inflows for which the relationship with vacancies is often strengthened by the inclusion of the shift variables.

The negative duration-vacancies relationships in these equations exhibit strong anti-clockwise loops. On the upswing of the cycle duration relative to vacancies will be lower than the equilibrium level, and on the downswing it will be higher. Unlike the situation for inflows, these loops are quantitatively quite important. This can be seen from a comparison of the first quarter duration response to vacancies and the steady state response. On average (excluding females 55 years and over) the steady state response is 33 per cent of the first quarter response, compared to 81 per cent for inflows.

The signs of the coefficients attached to the shift variables are consistent over the age-sex groups, except where females 55 years and over are involved. All coefficients except those belonging to the settler arrivals variable have the expected sign, but some are not significant.

The Benefit to earnings variable is significant in eight of ten instances. However the real wage deviation variable is significant in only two cases, as is the settler arrivals variable. The manufacturing employment proportion variable does somewhat better, being significant in six of ten cases.

It would seem reasonable that the statistical significance of the latter three variables is being reduced by a high degree of correlation between them (as was the case for the inflow equations). However, this does not appear to be the case. If any two of these variables are suppressed in general the statistical significance of the third variable does not increase,

and in fact sometimes decreases.¹ The coefficient of determination is reduced and positive autocorrelation occurs. If all three variables are suppressed, these tendencies are exaggerated.

Thus it seems all variables are required in the duration equations for these to be meaningful. Accordingly, only the full equations are considered.

UNEMPLOYMENT BENEFIT PAYMENTS

Use of the current value of the Benefit to earnings ratio proves to be appropriate for the duration equations. The coefficients attached to this variable are significantly different from zero in eight of ten cases (Table 17).

Duration responds positively to an increase in Benefit payments relative to earnings, as expected. This elasticity is greatest for the 45 to 54 years age groups, and lowest for teenagers. For all but the youngest age group, the elasticity for males is slightly greater than that for females. These qualitative results coincide roughly with those for inflows, although for inflows the 21 to 24 years group has the greatest elasticity.

REAL WAGE DEVIATION (SHAKE-OUT OF LABOUR)

The real wage deviation variable is entered in the duration equations with a lag of one quarter. The coefficient is positive (as expected) in all cases except females 55 years and over, but is significant in only two cases (Table 17). The elasticity with respect to this variable is relatively high for younger beneficiaries, and greater for males than females.

1. For example, if the real wage deviation and manufacturing employment proportion variables are suppressed, the coefficient on the immigration variable is negative for six cases and positive for four, but is not statistically significant in any of these instances.

SETTLER ARRIVALS

Current values of the settler arrivals variable are used. The estimated coefficient attached to this variable is always positive, except for females 55 years and over. It is significantly different from zero in two instances, although the t statistic is close to 2.00 in another four cases (Table 17).

The theoretical model developed in Chapter Four suggests the coefficient attached to the settler arrivals variable should be negative. As the migration intake is cut, imbalances and resulting bottlenecks in the labour market should increase the duration of spells. Although this effect comes through for inflows, it seems to be swamped by some other effect for duration. One possible mechanism is that new immigrants, once in receipt of Benefits, have longer durations than others - when their intake is cut, the expected duration of Benefit receipt falls. The estimated elasticities, however, seem to be larger than expected from this effect, as only a small proportion of beneficiaries could be new immigrants (in recent times at least).

No systematic differences in the elasticities between the age-sex groups are obvious.

PROPORTION OF EMPLOYMENT IN MANUFACTURING

The current value of the manufacturing employment proportion variable is used in the duration equations. The coefficient on this variable always exhibits the expected negative sign, and is statistically significant in six instances (with two other cases quite close to reasonable significance).

The elasticity with respect to the manufacturing employment proportion is larger for males than females. No systematic differences between the age groups are apparent.

Two possible shift effects we have not considered so far are a change in youth work ethic and the influx of women into the labour force. The effect of the influx of women is considered in Chapter Six. The changed work ethic effect is considered in the following section.

5.4 Changing Teenage Unemployment

The theoretical model suggests that a changed work ethic among young people would be manifested in an increase in duration relative to vacancies, and perhaps an increase in inflows. Presumably the changes in attitude behind these effects would take place steadily over time, so we need to look for steady increases in duration and inflows, *ceteris paribus*. This is done by examining the estimated inflow and duration equations for the less than 21 years age groups (Table 12 and Table 17).

The estimated inflow equations do not preclude the possibility of a work ethic effect operating. Positive serial correlation is present in the residuals of the equations for both males and females. When a time trend variable is included, it proves to have a significant positive coefficient. Finally, cusum and cusum of squares tests show the coefficients to be a little closer to instability through time for the young age groups.

On the other hand, the duration equations give no suggestion of such an effect operating. The equations fit the data well, and there is no evidence of positive serial correlation in the residuals. The regression coefficients attached to the shift variables are no larger for young people (larger coefficients possibly indicating some work ethic effects being captured by these variables), and coefficient instability is no greater. A time trend variable comes nowhere near statistical significance when entered in the equations.

Thus any special effects operating for young people apparently change only their propensity to enter the beneficiary pool, not their tendency to remain there. This suggests not so much a change in work ethic, but a change in attitude toward receiving Benefits. *The results for young people are consistent with a liberalising of attitudes to receiving Benefits when unemployed.*

In the following chapters, the estimated equations reported above are used to determine the contributions of vacancies and the various shift variables to changes in UB recipient inflows, duration and stock levels.

CHAPTER SIX

STRUCTURAL CHANGE AND UNEMPLOYMENT OF INDIVIDUAL LABOUR MARKET GROUPS

In this chapter we use the results from Chapter Five to examine the quantitative importance of the various shift variables on the unemployment position of the individual age-sex groups. The first section is concerned with measuring the changes in UB recipient inflows, duration and stock level in response to change in all the shift variables considered together. The next section looks at the impact of changes in individual shift variables - in particular the Benefit to earnings ratio. In the final section we return to the original point of departure, the shift in the unemployment-vacancies relationship, and consider the causes of this shift.

6.1 The Impact of the Shift Variables in Total

The total impact of the shift variables is shown using a simulation-type approach. Hypothetical series are generated from estimated equations by setting all the shift variables at their 1971 levels and allowing only vacancies to vary. These hypothetical series are then compared to the estimates of the original series arising from the equations to show directly the total effect of the shift variables on inflows and duration. Estimated original, and hypothetical, expected stock level series are calculated by multiplying together inflows and average (expected) completed duration series, and these are used to draw implications for the actual stock level.¹

Figure 21 shows the original series (line A) and the hypothetical series with all shift variables held constant (line B). This is done for inflows (Figure 21(a)), duration (Figure 21(b)) and the expected stock level (Figure 21(c)). To save space some summation across age groups has been

1. The t^{th} period expected stock level is that which would prevail if labour market conditions determining inflows and duration remained at their t^{th} period level indefinitely. At any point in time this measure will not necessarily equal the actual stock level, but over time will exhibit the same broad movements. Thus between 1971 and 1978 the number of UB recipients (actual stock level) increased by 1261 per cent, while the expected stock level increased by 1278 per cent.

carried out to give the results for junior and adult males and females, and for total UB recipients. The series have been smoothed using a 4-quarter moving average.

Line A in Figure 21(a) shows that for all groups there was a dramatic increase in inflows into UB receipt over late-1974 and 1975, and a definite dip over the following years. Prior to this there was a slight rise and fall in inflows over 1971-73. A comparison of line B with line A suggests that the decrease in the number of vacancies has increased unemployment but, with the exception of adult females, most of the increase in inflows to UB receipt is due to changes in the shift variables. Table 18 shows that in total inflows would have been 66 per cent lower in 1978 had the shift variables remained at their 1971 levels. For adult females the corresponding figure is much lower at 42 per cent.

Figure 21(b) tells much the same story for duration. Duration displays a slight hump over 1972 and 1973, and increases dramatically over 1974 and 1975. For the adult age groups this increase continues through to the end of the data period (line A). Again with the exception of adult females, most of the increase is due to shift variables (line B). Average completed duration of UB receipt would have been 50 per cent lower in 1978 had the shift variables not increased since 1971 (Table 18).

The expected stock level (Figure 1(c)) reflects the inflows and duration results. The total number of UB recipients in May 1978 would have been 83 per cent lower had the shift variables not moved from the 1971 levels, and the number of adult females 66 per cent lower. Most of the large increase in the stock level between 1971 and 1978 apparently would not have occurred had the shift variables not changed, implying only a small response to the decrease in the number of vacancies.

(a) Inflows

- A Original
- C Benefit to earnings ratio constant
- - - B All shift variables constant

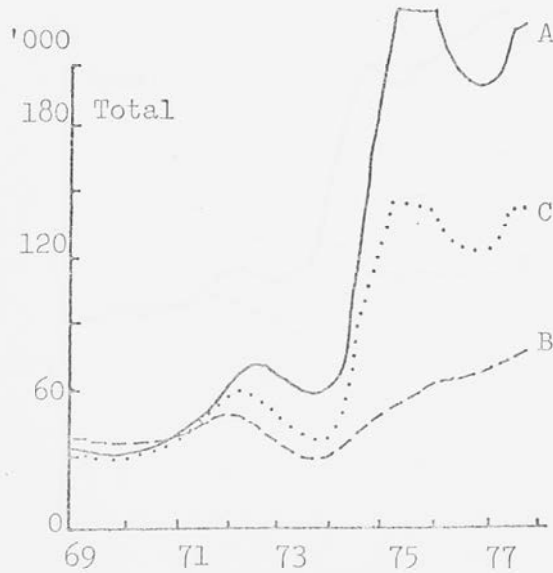
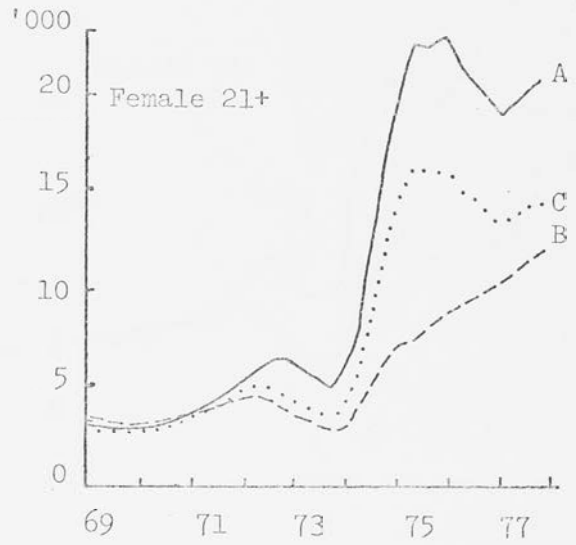
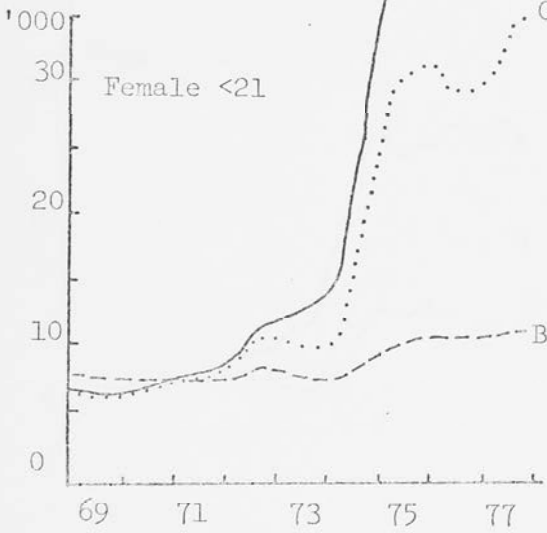
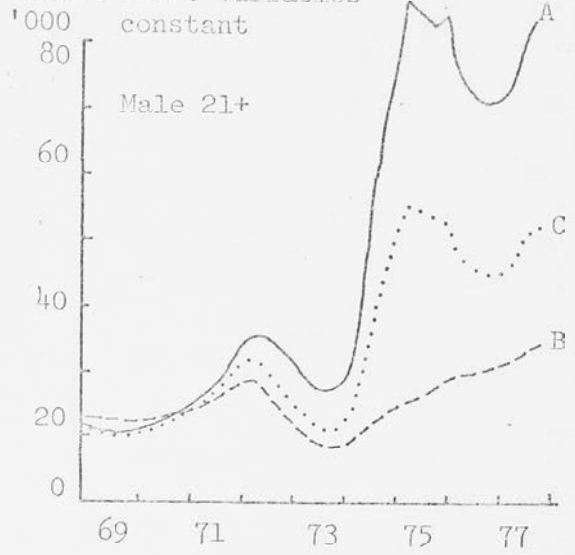
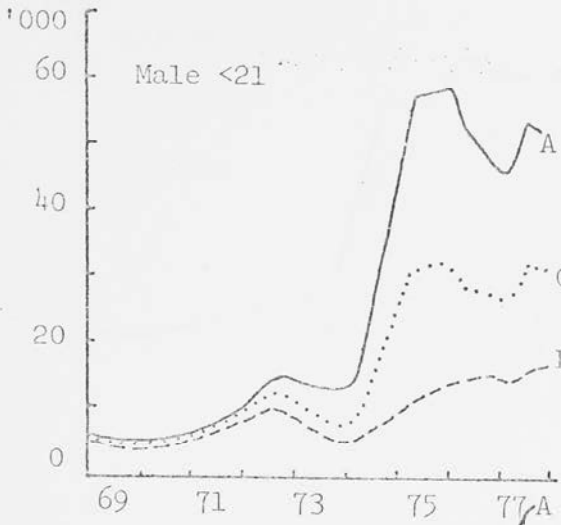


FIGURE 21

SIMULATIONS WITH BENEFITS TO EARNINGS VARIABLE, AND ALL SHIFT VARIABLES, HELD CONSTANT

(b) Duration

— A Actual
 C Benefit to earnings ratio const.
 - - - B All shift vars. const.

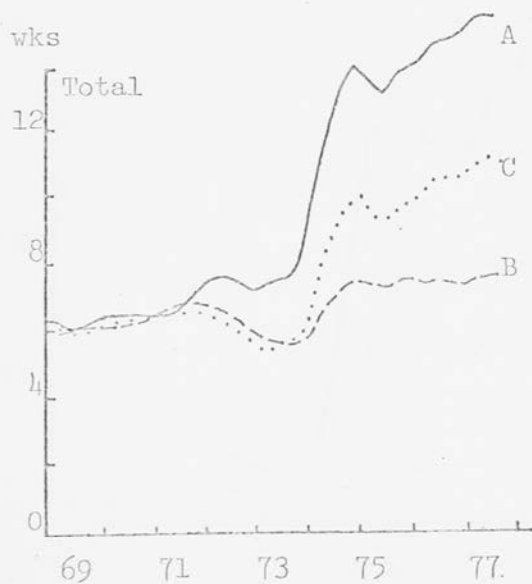
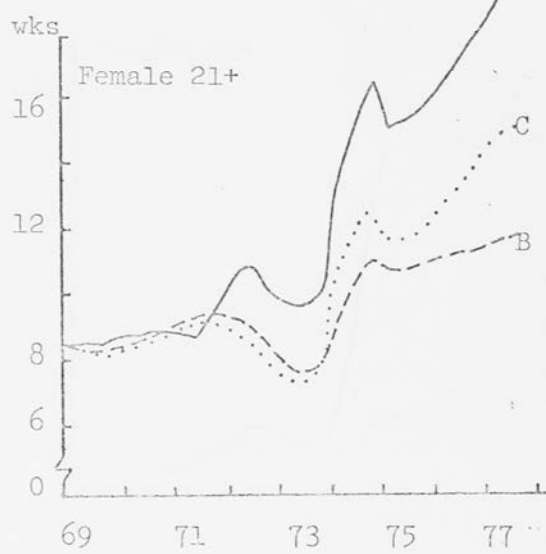
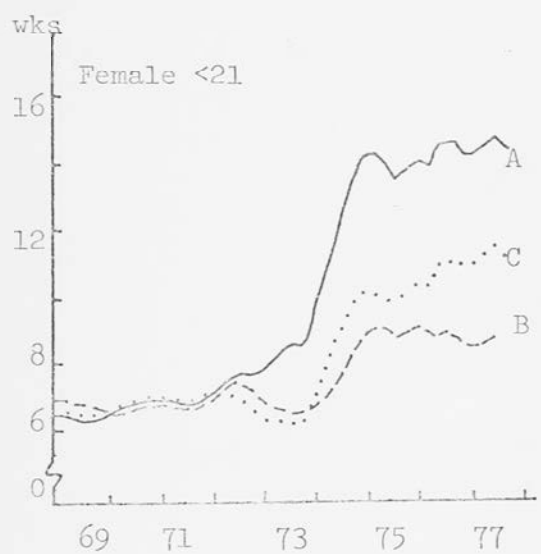
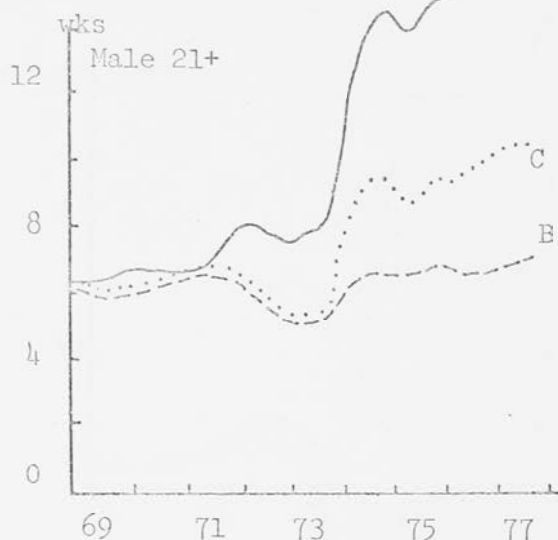
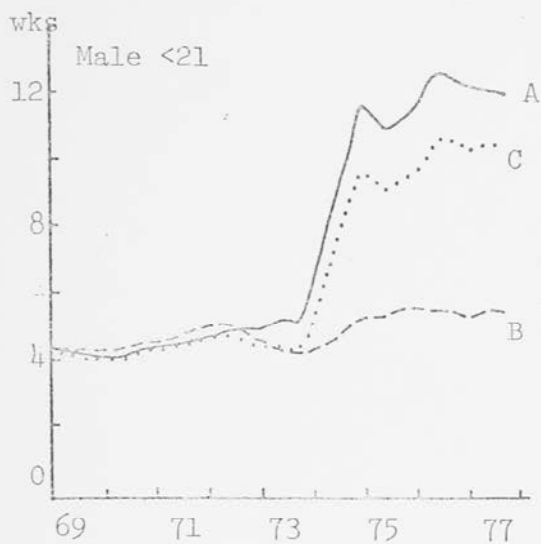


FIGURE 21 (continued)

(c) Stock level

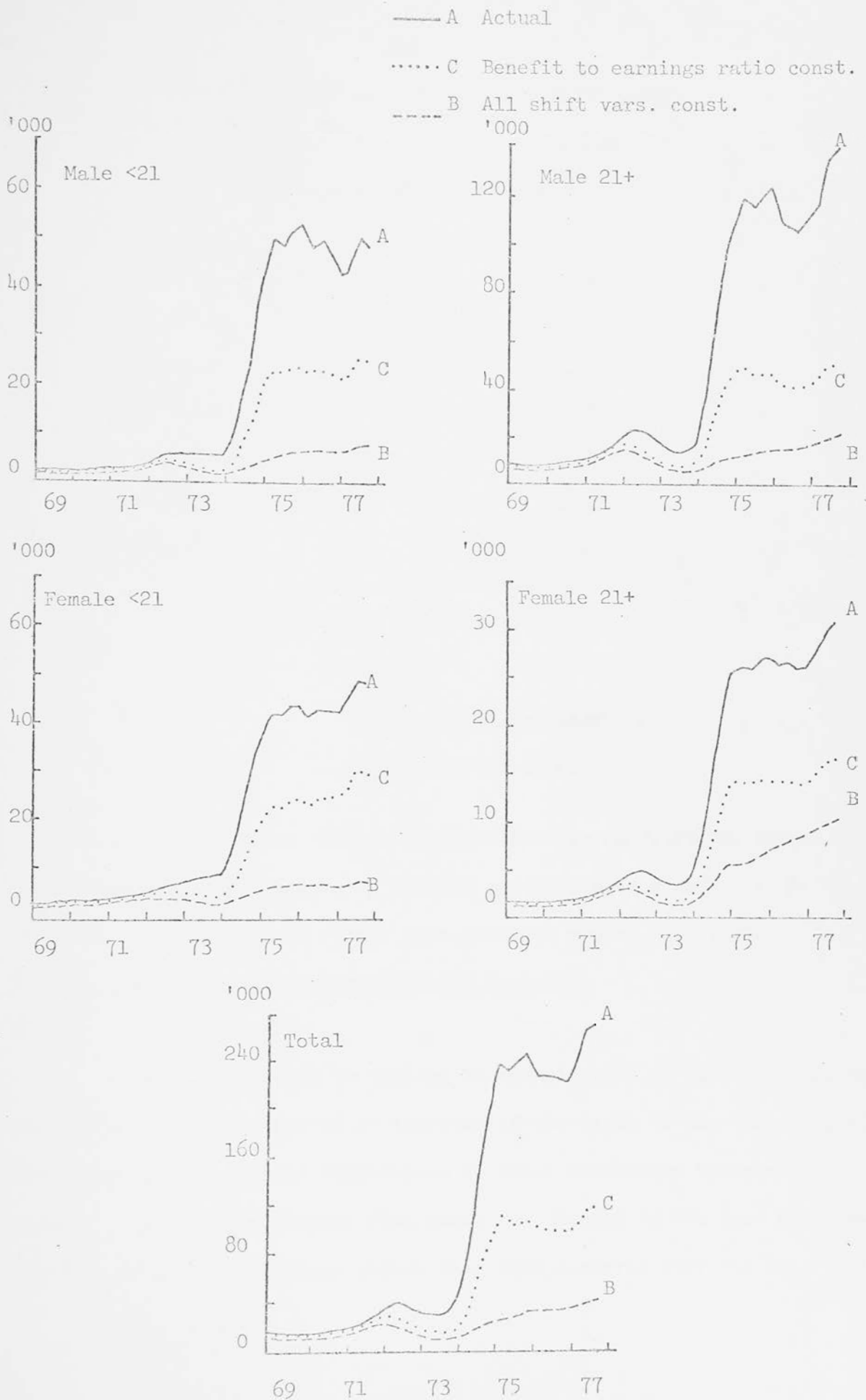


FIGURE 21 (continued)

TABLE 18

UB RECIPIENT INFLOWS, DURATION AND STOCK LEVEL:
 PROPORTION LOWER AT II.1978 HAD THE
 SHIFT VARIABLES NOT CHANGED^(a)

	I	D	U ^E
MALE <21	0.68	0.52	0.85
MALE 21+	0.65	0.57	0.85
FEMALE <21	0.75	0.40	0.85
FEMALE 21+	0.42	0.42	0.66
TOTAL	0.66	0.50	0.83

(a) Proportion lower measured by $(A-B)/A$

I - inflows
 D - average completed duration
 U^E - expected stock level

Overall, these results suggest that *the overwhelming reason behind the greatly increased number of Benefit recipients is a shift in the UB recipient-vacancies curve* rather than movement around this curve.

6.2 The Impact of the Individual Shift Variables

BENEFIT TO EARNINGS RATIO

The contribution to changes in unemployment of variations in the Benefit to earnings ratio is of interest in the light of the largeness of these variations, and the differences in these variations between age-sex groups. Figure 18 in Chapter Five shows the changes in the age- and sex-specific Benefit to earnings ratios that have occurred over the data period.

The Benefit to earnings ratio increased strongly in early 1972 for all groups. For adult males and females this ratio remained at this higher level throughout the data period. For junior males and females, the Benefit to earnings ratio increased again in early 1973 (this time very dramatically), remained at this high level through to the end of 1975, then fell away for the rest of the data period.¹

The effect of changes in the Benefit to earnings ratio depends not only on the size of these changes, but also on the respective elasticities of inflows and duration. These elasticities and the changes in the Benefit to earnings ratio are given in Table 19.² There are no systematic differences in these elasticities between the sexes, but marked differences are apparent across age groups.

For both males and females, the less than 21 years age group have far smaller elasticities of inflows and duration than the older age groups. The changes in the Benefit to earnings ratio, however, are far greater for young people. Consequently the effect of changes in the Benefit to earnings ratio for young people may be either greater or less than that for older people.

To work out the effects of changes in the Benefit to earnings ratio, we could use the *ceteris paribus* approach of multiplying the changes in this ratio with the elasticities, or alternatively use the simulation-type approach introduced above. The simulation approach is chosen. This involves the generation of additional hypothetical inflows, duration and stock level

-
1. In early 1973 the level of Benefits paid to all those less than 21 years was raised to the level paid to adults, and maintained at this level till late 1975. From this point on Benefit payments to those less than 18 years have been held constant (while payments to the rest have increased).
 2. The elasticity of the expected stock level is the sum of the respective elasticities for inflows and duration.

TABLE 19
 CHANGES IN THE BENEFIT TO EARNINGS
 RATIO, AND ELASTICITIES W.R.T. THIS VARIABLE^(a)

	CHANGES IN B/E			ELASTICITY WITH RESPECT TO B/E		
	II.71- II.73	II.73- II.75	II.75- II.78	I	D	U ^E
	%	%	%			
MALE <21	277	-7	-16	0.45	0.14	0.59
MALE 21-24	75	-1	20	1.16	0.66	1.82
MALE 25-44				0.75	0.67	1.42
MALE 45-54				0.48	0.92	1.40
MALE 55+				0.58	0.83	1.41
FEMALE <21	268	-14	-20	0.23	0.27	0.50
FEMALE 21-24	64	-11	14	0.90	0.53	1.43
FEMALE 25-44				0.60	0.60	1.20
FEMALE 45-54				0.74	0.75	1.49
FEMALE 55+				0.58	0.65	1.23

(a)

- B/E - Benefit to earnings ratio
 I - inflows
 D - average completed duration
 U^E - expected stock level

series holding the Benefits to earnings ratio constant while allowing all other variables to change. This is line C in Figure 21. This series shows what UB recipient inflows, duration and expected stock level would have been had the Benefit to earnings ratio remained at its 1971 level.

Consider first inflows. Line C in Figure 21(a) shows that for all groups if the Benefit to earnings ratio had remained at its 1971 level, much the same qualitative movement in inflows as actually occurred would have taken place. However, the decline over 1973 would have been sharper than it was, and the rise over 1974 and 1975 less dramatic. In total, inflows into UB receipt would have been 36 per cent lower in 1978 had the Benefit to earnings ratio not increased from its 1971 level (Table 20).

Figure 21(a) suggests that the contribution of increases in the Benefit to earnings ratio to the rise in inflows has not been much different between juniors and adults, but has been greater for males than females.

TABLE 20

UB RECIPIENT INFLOWS, DURATION AND STOCK LEVEL:

PROPORTION LOWER AT II.1978 HAD THE BENEFIT
TO EARNINGS RATIO NOT CHANGED^(a)

	I	D	U ^E
MALE <21	0.40	0.15	0.48
MALE 21+	0.42	0.39	0.65
FEMALE <21	0.20	0.23	0.39
FEMALE 21+	0.29	0.24	0.47
TOTAL	0.36	0.29	0.55

(a) Proportion lower measured by $(A-C)/A$

I - inflows

D - average completed duration

U^E - expected stock level

Consider now duration. Figure 21(b), line C indicates that if the Benefit to earnings ratio had not risen from its 1971 level then the hump in duration over 1972 and 1973 would not have occurred. Average duration of spells of UB receipt would have been very low at the start of 1974, and would have increased less dramatically over 1974 and 1975 than actually occurred. For all UB recipients average duration would have been 29 per cent lower in 1978 had the Benefit to earnings ratio remained at its 1971 level (Table 20). The effect of the Benefit to earnings ratio on duration is particularly strong for adult males and relatively weak for junior males.

The stock level story in Figure 21(c) is as we would expect from the inflow and duration effects. The number of UB recipients apparently would have followed the same broad movements had the Benefit to earnings ratio not increased, but would have been considerably lower. The total number of UB recipients would have been 55 per cent lower in 1978 had the Benefit to earnings ratio remained at its 1971 level (Table 20). When the inflow and duration effects are combined in the stock level, it is seen that the influence of the Benefit to earnings ratio is greater for adults than juniors, and greater for males than females.

These results suggest that *the effect of the rises in Benefit payments relative to earnings over the data period has been very significant.* The final effect on the number of UB recipients works strongly through both inflows and duration.

It is interesting to note that despite the very large increases in Benefit payments to young people, their response in terms of increased numbers of beneficiaries is certainly no greater (and is apparently smaller) than that for older people.

It is also interesting to note that when the effect of rises in the Benefit to earnings ratio is taken into account, the number of Benefit recipients used as a cyclical indicator suggests a very tight labour market in late 1973 and early 1974. However, at the time the Government of the day read the

unemployment figures (unadjusted for the effects of Benefits) as indicating continuing slack in the economy and reacted accordingly, fuelling inflationary tendencies already present (Gruen 1976, pp. 18-22).

The same simulation-type approach as used for the Benefit to earnings ratio is used to discern the effects of the other shift variables. For each shift variable treated individually we consider what inflows, duration and stock level would have been had this variable alone remained at its 1971 level.¹ These effects can then be compared between the different shift variables to determine the relative impact of these variables on the beneficiary stock. Note that because of the multiplicative nature of the inflow and duration equations, the effects of the different shift variables cannot be added together to give the total effect talked about above.

REAL WAGE DEVIATION

For inflows the real wage deviation variable has a very weak effect on junior males and a particularly strong effect on adult females. For duration the opposite occurs, with this variable having a strong effect on junior males and a fairly weak effect on adult females. Consequently the impact of real wage deviation on the stock level is not greatly different between the groups. However, there is a greater effect on the number of UB recipients for adult females than for the other groups. These results are reflected in Table 21.

SETTLER ARRIVALS

The results associated with the immigration variable (settler arrivals) are particularly interesting. The impact of this variable is positive for inflows but negative for duration. Thus the decline over time in the number of settler arrivals relative to the resident labour force has apparently increased inflows into UB receipt, but has reduced the duration of these spells. These opposite effects are virtually offsetting for all groups except adult females. This means that the effect on the stock level is negligible for all but adult

1. Real wage deviation is in fact set to zero.

females, for whom the effect on duration outweighs the effect on inflows. These results can be seen in Table 21, and for purposes of illustration the actual series (A) and hypothetical series (B) for junior males and adult females are plotted in Figure 22.

PROPORTION OF EMPLOYMENT IN MANUFACTURING

The relative decline in employment in the manufacturing sector is seen to have increased inflows into UB receipt substantially for all but adult females. For this latter group the full inflow equations from Chapter Five indicate the effect has gone in the opposite direction. In Chapter Five it was decided that this positive elasticity result was due to multicollinearity problems, with a small negative effect being the probable true situation. However, Figure 23 shows the predicted effect on inflows of the wrongly-signed elasticity is not large.

For duration the effect has apparently been much the same for all age-sex groups, with the duration of spells greater as a result of the fall in the proportion employed in manufacturing. The overall effect on the number of UB recipients has been to increase this number by a similar proportion for all groups except adult females (for whom this proportion is smaller). Table 21 demonstrates these results, and Figure 23(b) shows the effect of the changing employment pattern for total UB recipients.

Table 21 can be used to draw accurate comparisons of the relative effects of the four shift variables included therein.¹ *In terms of the overall effect on the number of UB recipients, the proportion of employment in manufacturing is the most important variable, followed by the Benefit to earnings ratio.* This is so for all age-sex groups except adult females, for whom the manufacturing employment proportion results are suspect.² The real

-
1. Because of the multiplicative specification of the estimated inflow and duration equations, these individual effects do not sum to the total effect. This does not prohibit meaningful comparison of the individual effects.
 2. Elasticity estimates are suspect due to multicollinearity problems. See Chapter Five.

TABLE 21

UB RECIPIENT INFLOWS, DURATION AND STOCK LEVEL:PROPORTION

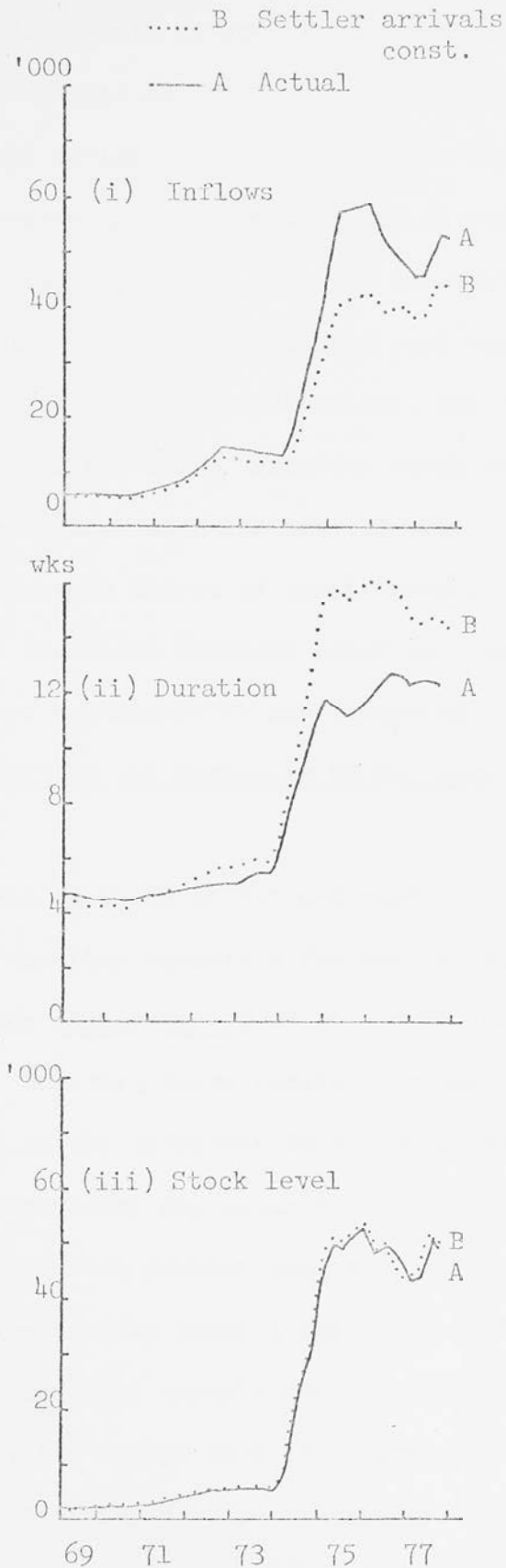
LOWER AT II.1978 HAD INDIVIDUAL SHIFT

VARIABLES NOT CHANGED^(a)

	I					D					U ^E				
	RW	IMM	MP	B/E	ALL	RW	IMM	MP	B/E	ALL	RW	IMM	MP	B/E	ALL
MALE <21	0.01	0.16	0.53	0.40	0.68	0.18	-0.20	0.43	0.15	0.52	0.19	-0.01	0.73	0.48	0.85
MALE 21+	0.04	0.26	0.45	0.42	0.65	0.06	-0.31	0.44	0.39	0.57	0.10	0.03	0.69	0.65	0.85
FEMALE <21	0.06	0.28	0.42	0.20	0.75	0.13	-0.31	0.32	0.23	0.40	0.18	0.07	0.71	0.39	0.85
FEMALE 21+	0.24	0.37	-0.19	0.29	0.42	0.05	-0.27	0.37	0.24	0.42	0.28	0.20	0.24	0.47	0.66
TOTAL	0.06	0.25	0.44	0.36	0.66	0.10	-0.27	0.38	0.29	0.50	0.15	0.05	0.65	0.55	0.83

- (a)
- RW - real wage deviation
 - IMM - settler arrivals
 - MP - proportion of employment in manufacturing
 - B/E - Benefit to earnings ratio
 - ALL - all shift variables

(a) Male <21



(b) Female 21+

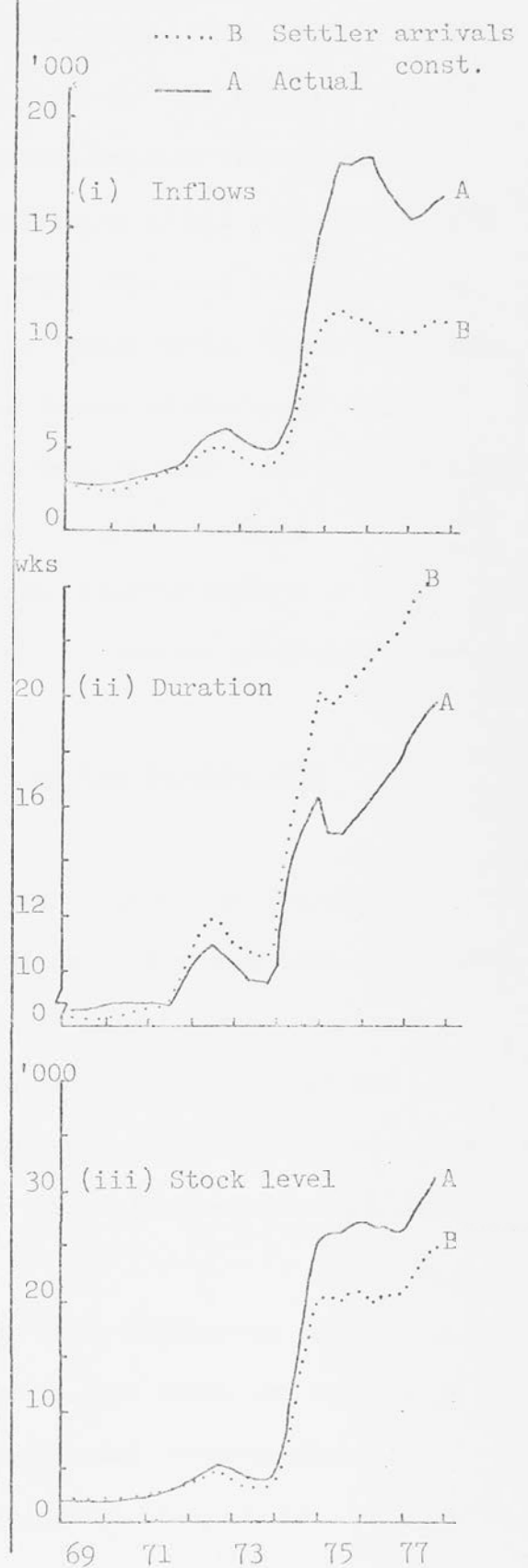


FIGURE 22

SIMULATIONS WITH SETTLER ARRIVALS CONSTANT

wage deviation and settler arrivals variables are far smaller in their relative effect.

The overall effect of immigration on the number of UB recipients is low because of opposed effects on inflows and duration. The relative size of the real wage deviation effect is in one way misrepresented (understated) in Table 21 because this variable is not at the extremity of its range in II.1978, while other variables are. Thus if an earlier date were used (say II.1976), then the relative importance of the real wage deviation effect would be greater.

In all these considerations, the high degree of multicollinearity between some of the shift variables needs to be kept in mind. Multicollinearity will to some extent mask the true effect of the variables involved. Its presence puts some degree of qualification on the relative effects of the three shift variables involved (real wage deviation, settler arrivals and the proportion of employment in manufacturing).

6.3 The Shift in the Aggregate UB Recipient-Vacancies Relationship

The goodness of fit and coefficient stability of the estimated inflow and duration equations for the individual age-sex groups indicates that shifts in the disaggregated UB recipient-vacancies relationships have been explained. However, there remains the question as to the effects of the aggregation of the different UB recipient-vacancies relationships. Additional unexplained movement may occur from changes in labour force composition and changes in relative vacancy levels.

The age-sex composition of the labour force determines the weights given the individual unemployment-vacancies curves when these are aggregated. If these weights change then the aggregate unemployment rate-vacancies rate can change without any of the individual relationships changing (provided the individual relationships are different).

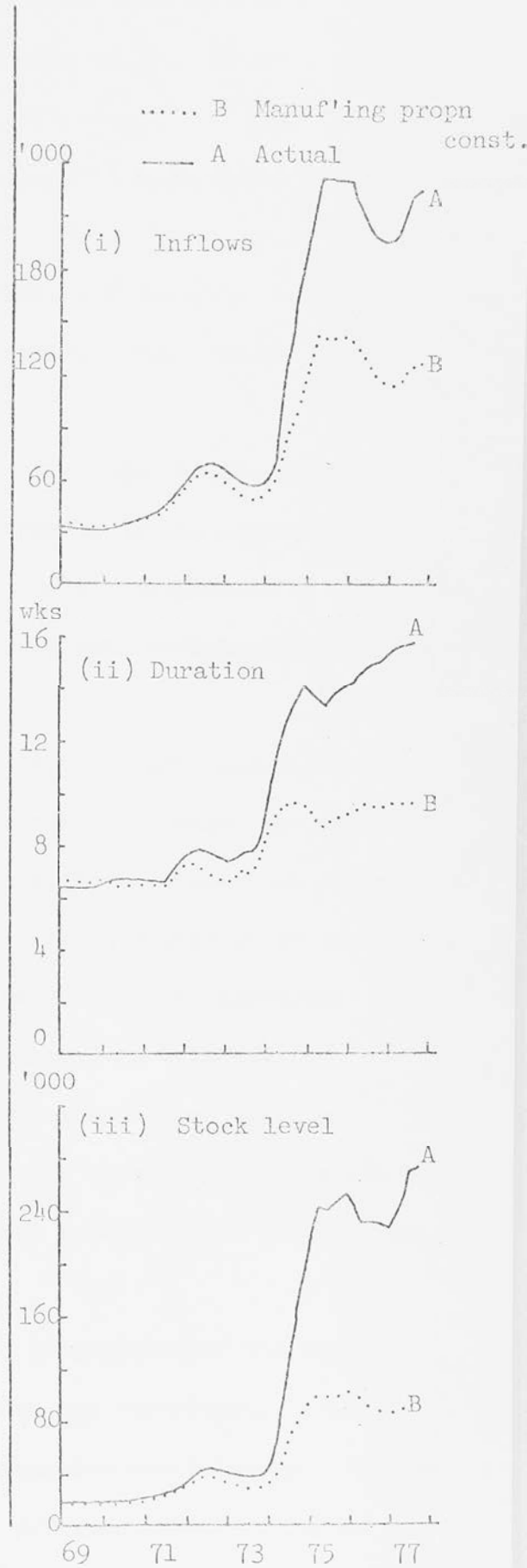
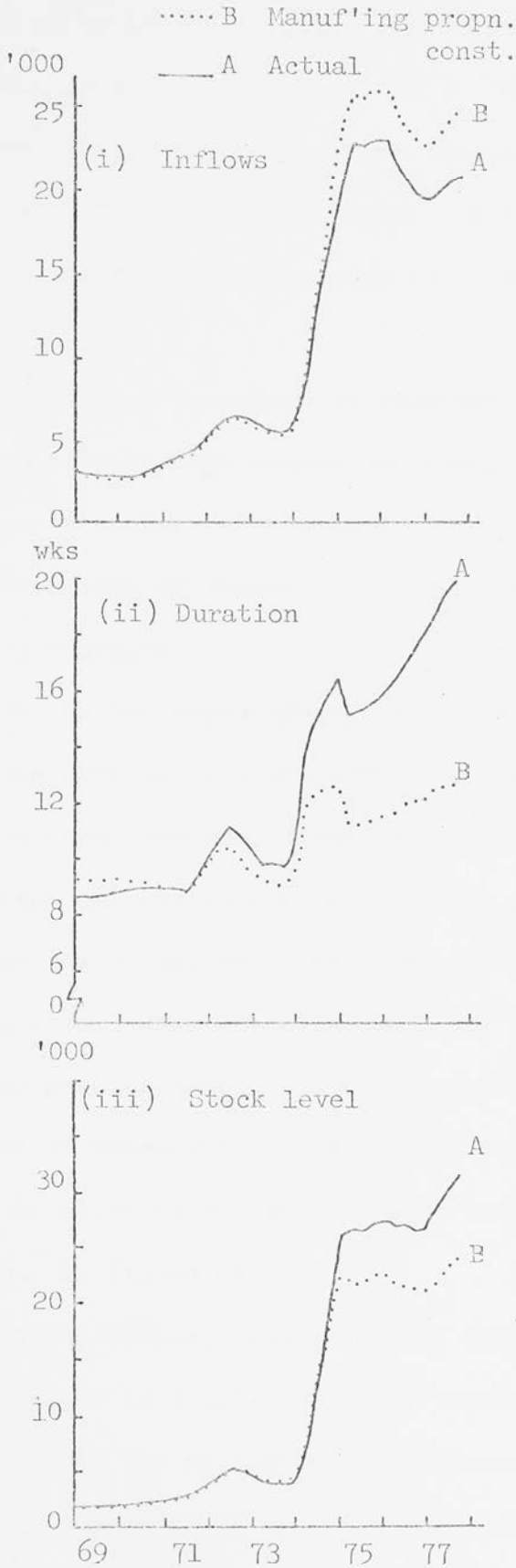


FIGURE 23

SIMULATIONS WITH PROPORTION OF EMPLOYMENT IN MANUFACTURING CONSTANT

To determine the magnitude of this effect, predicted UB recipient expected stock level series are calculated for each age-sex group, and then these added up as if labour force proportions had remained at their 1971 levels. This series is then compared to the aggregate series obtained by directly adding up the expected stock levels for the groups. The results indicate that changes in labour force composition have had a minimal effect on the aggregate unemployment-vacancies relationship. This result is shown in Figure 24.

It is also necessary to consider the effect of changes in the distribution of vacancies across the groups. Changes in the aggregate unemployment-vacancies relationship could come about from changes in the age-sex composition of vacancies without any individual unemployment-vacancies relationship changing.

To see the magnitude of this effect, we construct vacancies series for which the 1971 age-sex proportions are preserved throughout the period, but with the total level of vacancies specified by their historical path. These hypothetical series are then used to generate UB recipient stock levels for each age-sex group, which are then summed to predict the aggregate beneficiary stock. The UB recipient level calculated in this way is considerably greater than the original level, which indicates that the distribution of vacancies across age-sex groups has changed in such a way as to reduce the shift in the unemployment vacancies relationship. This result is also shown in Figure 24.

In conclusion, changes in the age-sex composition of the labour force and changes in relative vacancy levels have not contributed to the observed shift in the aggregate unemployment-vacancies relationship. *All the change in the aggregate UB recipient-vacancies relationship is explained by the shift variables.*

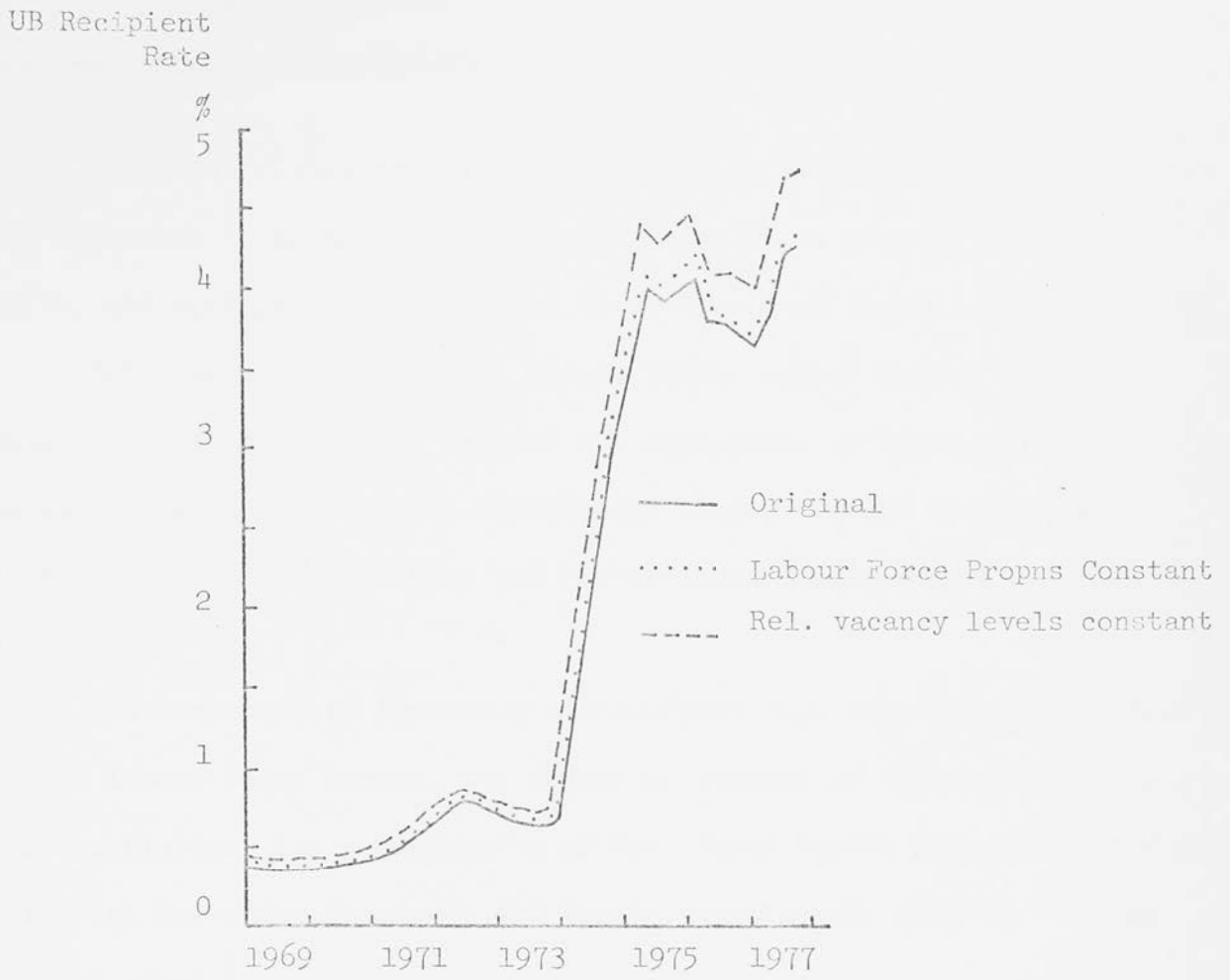


FIGURE 24

EFFECTS OF AGGREGATION ON THE TOTAL UB RECIPIENT LEVEL

CHAPTER SEVEN

STRUCTURAL CHANGE:

WHY RELATIVE UNEMPLOYMENT RATES CHANGE OVER TIME

A characteristic of the labour market in Australia and other Western economies is that unemployment of teenagers is greater than that of adults, and unemployment of females is greater than that of males.

Relationships between the groups in the labour market are not constant, however, and in this respect the experience of different countries has varied. Most countries have experienced rising teenage unemployment relative to adults, and some have had rising female unemployment relative to males.

The situation in Australia has differed from this somewhat. Based on the ABS labour force survey, the important changes in Australia have been teenage unemployment (as a proportion of the labour force) increasing relative to adults (at least for females), and female unemployment steadily falling relative to males.¹

Similar sorts of changes in relative positions have occurred for UB recipients. Stock levels (again as a proportion of the labour force) have increased for juniors relative to adults (for both females and males), and have declined for females relative to males. These changes were documented in Chapter Three.

In this chapter we use the model from Chapter Five to consider these UB recipient changes.² The changes are explained in terms of vacancies and the various shift variables used in the estimated inflow and duration equations.

-
1. The ABS unemployment rate for teenage females was 2.1 times that of adult females in 1964 and 2.8 times in 1978 (based on second quarter observations). The teenage male unemployment rate was 3.6 times that of adults in both 1964 and 1978. The unemployment rate of females was 3.0 times that of males in 1964 and 1.6 times in 1978, with this female-male decline occurring for both juniors and adults.
 2. As in Chapter Six, the four older groups are aggregated to give an adult group.

To the best of our knowledge this is the first application of the inflow-duration dichotomy to explaining why relative unemployment rates change through time. Other studies have disaggregated into inflows and duration but have not attempted to explain causes of variation in these measures through time (e.g. Smith and Holt 1970; Perry 1972; Hall 1972; Bowers and Harkness 1974).

The analysis is extremely rich and generates a large amount of detailed information about the labour market. The mass of detail is so considerable it is sometimes difficult to assimilate all the results. Accordingly, we have attempted to highlight a subset of these results to throw light on the broad questions

- . why has teenage UB receipt increased relative to adults?
- . why has female UB receipt decreased relative to males?

The issues we consider are

- (i) the differential impact of changes in the level of economic activity
- (ii) the effect of changes in Unemployment Benefit payments on the relative beneficiary positions of different groups (especially teenagers relative to the rest)
- (iii) the effect of the real wage explosion on the relative unemployment position of teenagers and females
- (iv) the influence of immigration policy on the relative unemployment positions of different groups (especially females)
- (v) the neutrality or otherwise, with respect to the beneficiary position of different groups, of changing patterns of production
- (vi) the impact of changes in UB receipt eligibility requirements.

These issues account for the first six sections of the chapter. The last section then pulls these findings together in the framework of the two broad questions posed above on the behaviour of teenage-adult and female-male UB receipt.

7.1 The Differential Impact of Changes in the Level of Economic Activity

A downturn in economic activity may affect the unemployment position of different age and sex groups in different ways. Employment of these groups will be distributed differently across industries (e.g. more males in the manufacturing sector and more females in the service sector), and the various industries will be affected differently by recession. Within industries, human capital theory as expounded by Becker (1975) and others, and work by Oi (1962) on labour as a quasi-fixed factor of production, suggests that firms may lay off one class of workers more readily than another in a recession. Finally, the 'discouraged worker' and 'additional worker' hypotheses imply different groups will respond differently in their labour market behaviour to declining levels of activity. Naturally, upturns in economic activity may also affect the various age-sex groups differently.

To see how change in the level of economic activity differentially affects unemployment of the various groups, we use the UB recipient equations of Chapter Five to analyse the effect of changes in vacancies on relative inflows, relative durations and the implied relative stock levels (i.e. expected stock levels - the product of inflows and average completed duration)¹.

We consider the following relative UB recipient rates

- . junior/adult males
- . junior/adult females
- . female/male juniors
- . female/male adults.

JUNIOR/ADULT MALES

Over the 1967 through 1978 period there has been an overall increase in the UB recipient rate of junior males relative to adults. The ratio of rates is steady through to 1971 and then rises sharply over 1972 and

1. Throughout this chapter inflows and stock level for each group are expressed as a proportion of their labour force. The data problems encountered in doing this have been discussed in Chapter Three.

1973 to fluctuate around a higher level. This reflects very similar behaviour of relative inflows. Relative duration is steady through to 1974 and rises after this date.

Line A (unbroken) in diagram (i), Figure 25(a) shows the ratio of junior to adult inflows for males as predicted by the inflows equations. Line B (dashed) shows the same ratio constructed from the hypothetical inflow levels that we estimate would have occurred had vacancies for each group (divided by the labour force) remained steady at 1968 levels.¹ The difference between these two lines shows the overall effect of changes in vacancies on relative inflows. Line B lying below line A from 1972 onwards indicates that changes in vacancies have caused inflows for male juniors to rise relative to inflows for male adults over this period.

Line B may deviate from line A because:

- the distribution of vacancies between the groups changes over time; and/or
- the absolute level of vacancies changes, with the impact of these changes having different effects on the junior and adult labour markets (i.e. invoking a different unemployment response). This distinction allows us to answer important questions such as . . . 'if a collapse in the demand for labour is neutral i.e. vacancies for all groups fall by the same proportion, would we expect this to have a differential effect on youth unemployment?'

Line C (dotted) in diagram (i), Figure 25(a) shows the junior-adult male inflow ratio that would have occurred had the distribution of vacancies between the groups remained unchanged from 1968 onwards, with the

1. The ratio series considered in this chapter have been smoothed using a 4-quarter moving average.

total level of vacancies following its historical path. This line, used in conjunction with lines A and B, allows us to isolate the effect of changes in the distribution of vacancies between the groups and the effect of changes in the absolute level of vacancies.

The difference between line C (steady distribution between the groups but a varying level of vacancies) and line A (historical distribution and level of vacancies) shows the effect of changes in the distribution of vacancies. Line C lying below line A from 1972 onwards in diagram (i) shows that over this period change in the distribution of vacancies across the groups has increased inflows for junior males relative to adult males.

The difference between line B (steady distribution and steady level of vacancies) and line C (steady distribution, varying level) isolates the effect of changes in the absolute level of vacancies. Changes in the absolute level of vacancies, keeping the distribution across the groups fixed, will affect relative inflows if the elasticity of inflows with respect to vacancies differs between the groups. In diagram (i) lines B and C are indistinguishable, indicating that in this case no significant effect from changes in the absolute level of vacancies is operating. The inflows elasticity with respect to vacancies is very similar in the junior male and adult male labour markets. The change in relative inflows originates from changes in the distribution of vacancies.

We now consider relative durations (diagram (ii), Figures 25(a)) . Lines A, B and C are derived in the same way as described above, but for durations. Again line B (steady distribution, steady level) lies below line A (varying distribution, varying level). This indicates that the overall changes in vacancies since 1972 have increased the duration of junior males relative to adult males. Here also the paths of lines B (steady distribution, steady level) and C (steady distribution, varying level) are very similar, indicating that the effect of vacancies on relative duration arises not from

different responses to changes in absolute level, but from changes in the distribution of vacancies over the two markets. The effect, however, is not as strong as for inflows.

Multiplying together inflows and duration gives the expected stock level series in diagram (iii), Figure 25(a). Here the relationship between lines A, B and C is the same as for both inflows and duration.

The number of junior males receiving Unemployment Benefit relative to the number of adults has been influenced upward since 1973 by vacancies - not through the behaviour of the absolute level of vacancies in itself, but through changes in the distribution of vacancies over the groups. Vacancies for junior males have fallen relative to vacancies for adult males. The effect works through both inflows and duration.

JUNIOR/ADULT FEMALE

The UB recipient rate of junior females relative to adult females displays a slight upward trend over the data period, but with some large fluctuations around this trend. An interesting feature is a sharp relative rise in teenage Benefit receipt over 1973, and a subsequent fall over 1974. The behaviour of relative UB recipient rates arises from strong fluctuations imposed on a rising trend for relative inflows, and sharp rises and falls with no apparent trend for relative duration (Figure 25(b)).

The story behind the changing unemployment relationship for junior and adult females is very different to that for junior and adult males. For females changes in the absolute level of vacancies rather than changes in their distribution over the groups exerts an important influence. This effect is concentrated in the inflows (diagram (i), Figure 25(b)). A smaller elasticity with respect to vacancies for junior females has resulted in changes in the absolute level of vacancies in general having an upward influence on inflows for junior females relative to adults up to mid-1974, and a strong downward influence since then. (The change in direction of influence comes

about from the number of vacancies generally being above 1968 levels prior to mid-1974 and below this level after this date). Relative duration is virtually unaffected by either changes in the absolute level of vacancies or changes in their distribution (diagram (ii), Figure 25(b)).

Different inflow responses to fairly similar changes in labour market tightness result in an upward influence on junior female UB recipient numbers relative to adults prior to 1974, and a strong downward influence since then. This differs from the junior/adult male situation, both in direction of influence and the mechanism operating. Unlike males, the distribution of vacancies does not matter.

FEMALE/MALE JUNIORS

Over the 1967 through 1978 data period the UB recipient rate of junior females has fallen considerably relative to junior males, although this fall has not been steady. This arises from a somewhat irregular fall in relative inflows throughout the period, and a fall in relative duration since 1974 (Figure 25(c)).

Reduction in the absolute level of vacancies, working through differences in the inflow elasticity, has tended to reduce inflows for junior females relative to males over 1971 and 1972 and from mid-1974 onwards (diagram (i), Figure 25(c)). The fall in relative duration of junior females from 1974 onwards is explained by factors other than vacancies. Only over the early part of the data period do changes in the distribution of vacancies work to reduce the ratio of durations (diagram (ii), Figure 25(c)). Thus for a large part of the data period, changes in vacancies (distributional and/or absolute) have had a downward influence on the expected stock level of junior females relative to males.

The major contributing factor in the downward influence of vacancies on the number of junior female UB recipients relative to males is changes in the absolute level of vacancies, accounting for all the influence after 1974 and approximately half before this date.

FEMALE/MALE ADULTS

With the exception of the 1972 and 1973 period, the adult female UB recipient rate has fallen relative to the rate for adult males. This reflects falls in both relative inflows and relative duration (Figure 25(d)).

Prior to 1973 changes in the distribution of vacancies tended to reduce inflows, duration and stock level of adult females relative to males, and since this time have worked in the opposite direction.

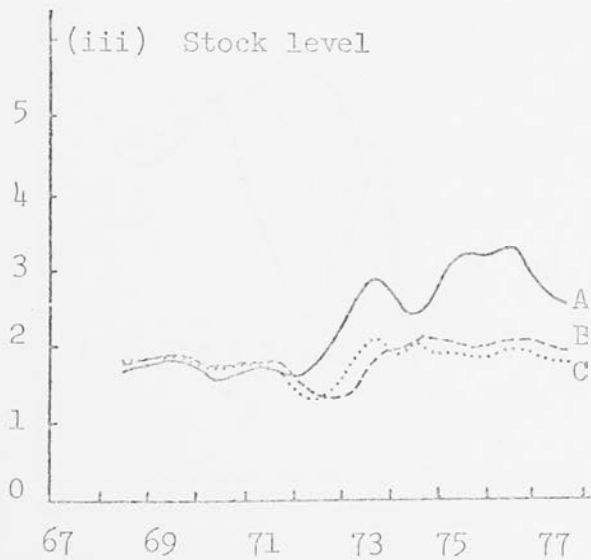
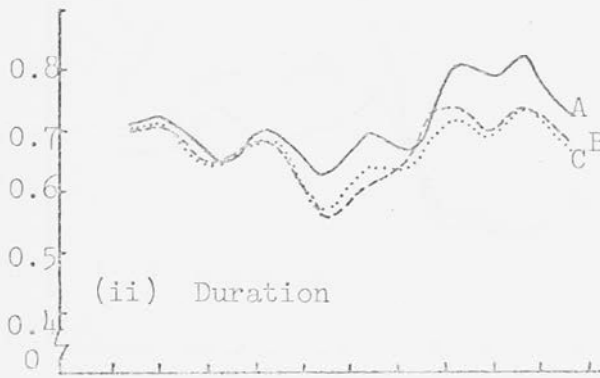
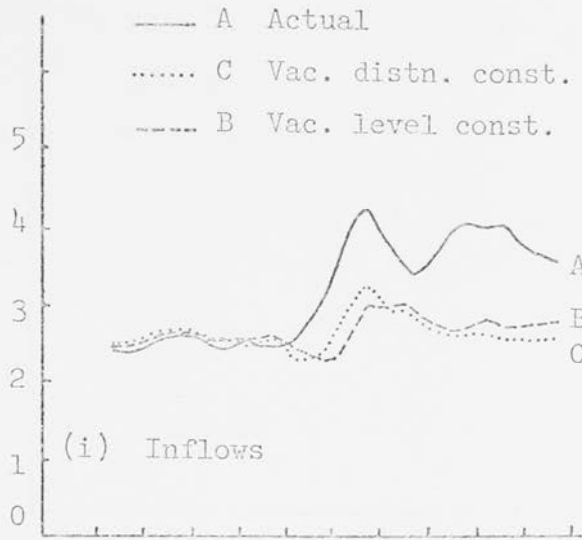
Changes in relative tightness of the female adult and male adult labour markets worked to reduce relative UB recipient numbers of adult females prior to 1973, but worked to increase their relative numbers after this date.

OVERVIEW

For all groups, the labour market has been depressed since mid-1974. The fall in the absolute level of vacancies associated with the decline in economic activity has influenced downward the stock of UB recipients for junior females relative to adult females and junior females relative to junior males. In both cases this influence has worked through inflows rather than duration.

Besides the general decline in labour market conditions, some changes in the distribution of vacancies across the groups have occurred. Vacancies for adult males have not decreased to the same extent as other groups during the current recession, especially in the early stages. This has reduced the stock of UB recipients for male adults relative to male juniors and for male adults relative to female adults. These effects work through both relative inflows and relative duration, with the inflow response more important.

(a) Male junior/male adult



(b) Female junior/female adult

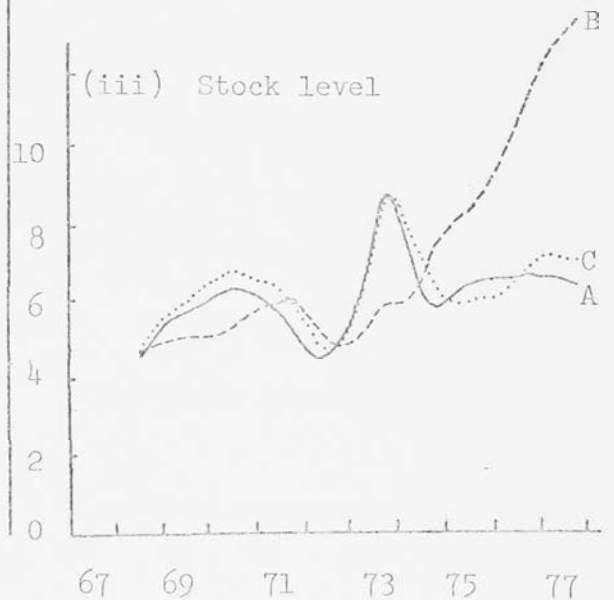
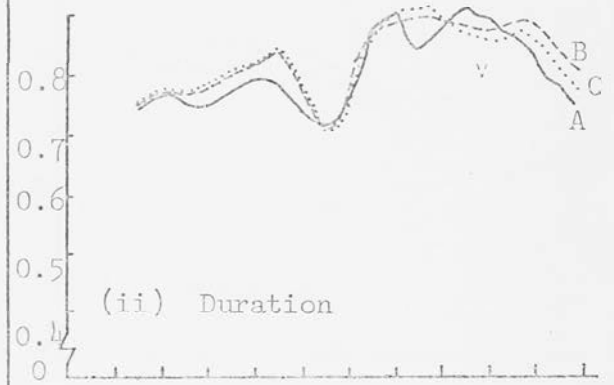
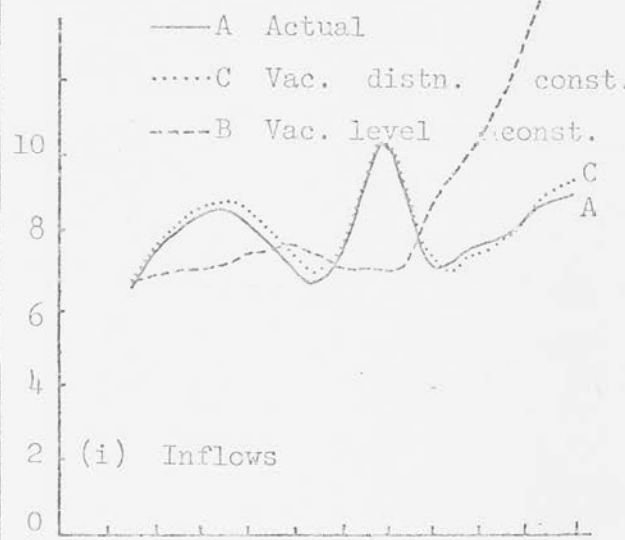
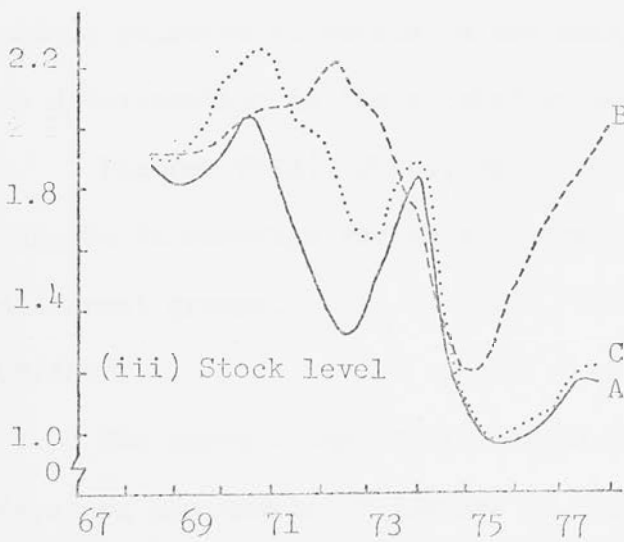
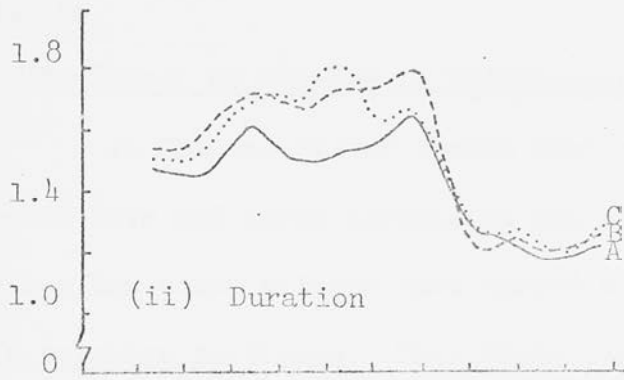
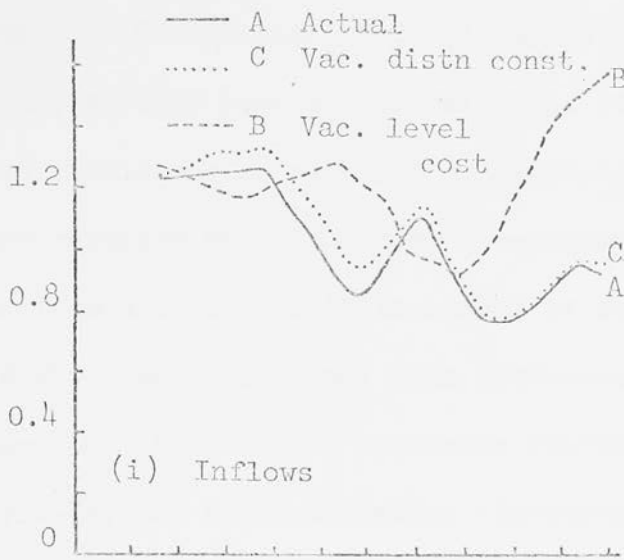


FIGURE 25

EFFECT OF VACANCIES ON RELATIVE
UB RECIPIENT POSITIONS.

(c) Female junior/male junior



(d) Female adult/male adult

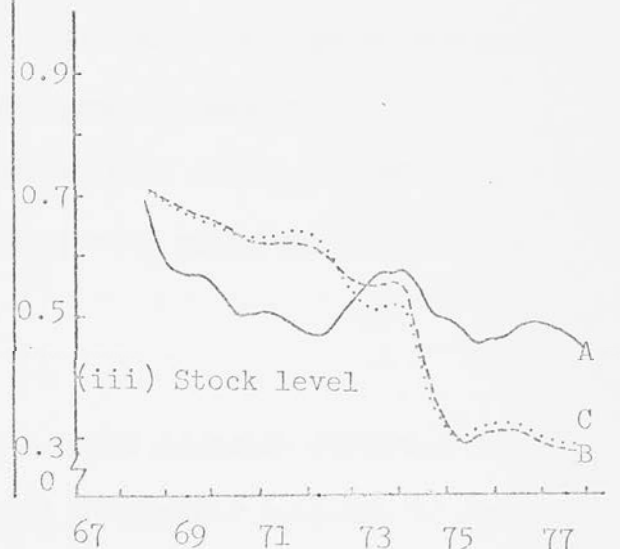
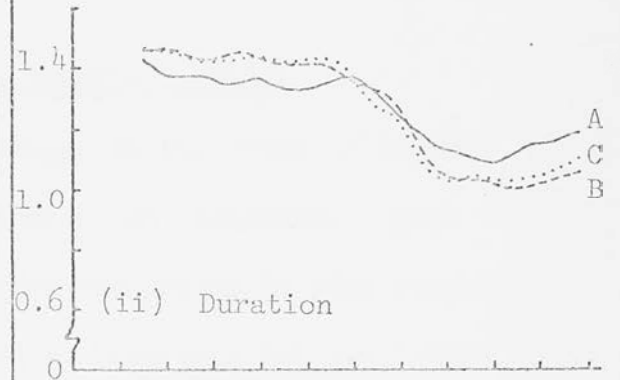
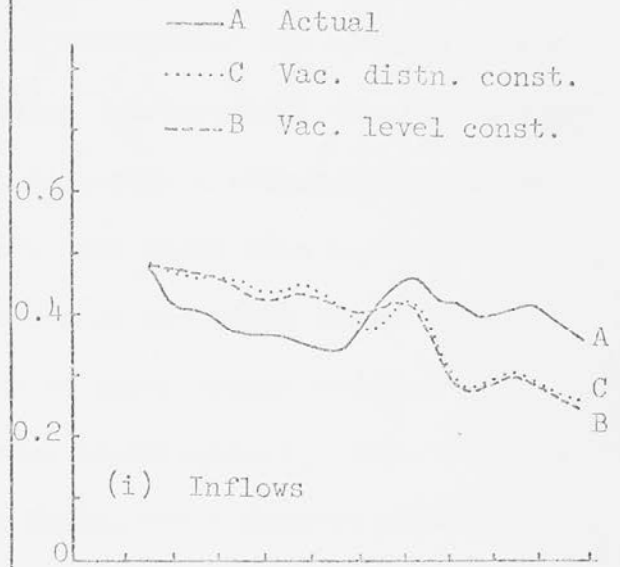


FIGURE 25 (continued)

One of the interesting unemployment phenomena in Australia's recent history is the relative rise in teenage unemployment in the boom years of 1973 and early 1974, a period immediately following the large increase in Unemployment Benefit payments to teenagers. Our analysis shows that during this period, for males and females (particularly females) labour market conditions as measured by vacancies have made a strong contribution to the relative rise in junior unemployment. For males this contribution comes from differences in tightness of the junior and adult labour markets, while for females it comes from differences in unemployment response to changes in labour market tightness (different elasticities). Over 1973 and early 1974, the shift variables (including Unemployment Benefit payments) have had very little impact on the UB recipient position of juniors relative to adults.

7.2 The Effect of Changes in Unemployment Benefit Payments

In Chapter Six we showed that changes in the level of Benefit payments have had large effects on the number of UB recipients. Here we consider how these effects have varied across the groups to give changes in their relative positions. This sheds light on important but previously untested propositions such as . . . 'the large increases in UB payments made to juniors relative to adults in the early 1970s have contributed strongly to the deterioration in their relative unemployment position'.

Figures 26(a), 26(b), 26(c) and 26(d) show the impact of changes in the Benefit to earnings variable on the relative UB recipient positions of the different groups.

JUNIOR/ADULT

The overall impact of changes in Benefit payments (relative to earnings) on the number of juniors in receipt of Benefit relative to the number of adults is minimal for both males and females.

This can be seen by comparing lines A and B in diagram (iii) of Figures 26(a) and 26(b). Line A is the historical ratio of expected stock levels (as in Section 7.1), and line B is the ratio that would have occurred had there been no change in the Benefit to earnings variable for each group since 1968. For females the overall effects on both inflows and duration of juniors relative to adults are small (Figure 26(a)); while for males larger overall effects (upwards for inflows and downwards for duration) are offsetting (Figure 26(b)).

The reader may well ask how it is possible that Benefits have had such a small impact on relative stock levels when for each labour force group Benefits affect the absolute level of unemployment strongly (Chapter Six), and changes in relative Benefits across the groups have been very large (Chapter Five). The answer lies in the fact that the overall impact of the Benefit to earnings variable on relative unemployment positions is the net result of both changes in Benefit to earnings relativities between the groups and changes in absolute levels alone. In the junior/adult case these effects work in opposite directions. The increases in relative Benefit payments to juniors increase junior unemployment relative to adults, but the increases in the absolute level of Benefit payments for all groups reduce junior unemployment relative to adults (through differences in elasticities).

These two offsetting effects are described in Figures 26(a) and 26(b). Line C indicates the inflow, duration or stock level ratio that would have occurred had the Benefit to earnings variable for juniors not increased relative to adults from 1968 onwards (with the adult variable taking on its actual historical values). The difference between line C (steady Benefit relativities but varying levels of Benefits) and line A (varying relativities,

varying levels) shows the effect on juniors relative to adults of changes in relative Benefit payments to these groups. The difference between line B (steady relativities, steady levels) and line C (steady relativities, varying levels) shows the effect of changes in absolute levels of Benefit payments, this effect operating through differences in elasticities.

In Figures 26(a) and 26(b) line C is always below line A, and line B is always above line C. Thus *the strong increase in Benefit payments to juniors relative to adults in itself most certainly increases their relative inflows, duration and stock level; but this is offset by the effect of lower elasticities for juniors.*

FEMALE/MALE

Changes in the Benefit to earnings variable have tended to reduce the number of females in receipt of Benefits relative to the number of males (Figures 26(c) and 26(d)). This downward influence on female unemployment is stronger for adults than for juniors, and occurs for different reasons.

For juniors the effect largely works through differences in elasticities. Similar absolute increases in Benefit to earnings ratios have had a stronger impact on junior males, increasing the number of junior male beneficiaries more than junior females beneficiaries.

In the case of adults, female unemployment numbers fall behind male unemployment numbers because the Benefit to earnings variable (which has a positive influence on unemployment) rises slower for females. The Benefit to earnings ratio rises slower for females because their earnings rise faster than for males.

For adults, female UB recipient numbers are held down relative to males through their supply response to higher wages - it appears that they become less willing to commence unemployment and remain unemployed relative to males as their opportunity cost of doing so increases relative to males.

(a) Male junior/male adult

(b) Female junior/female adult

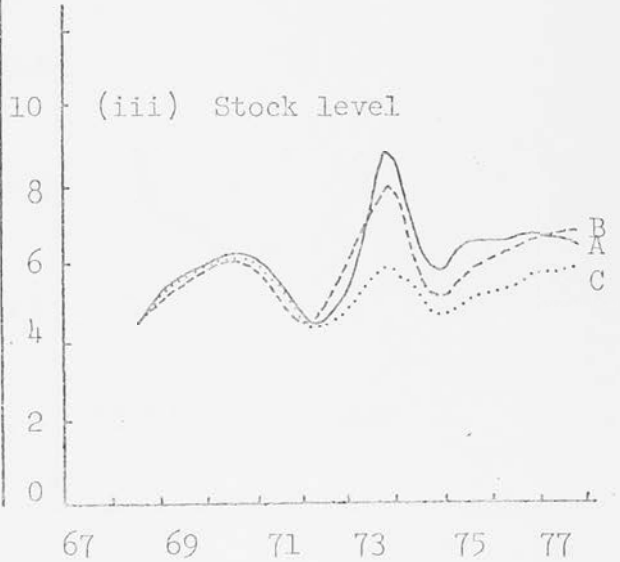
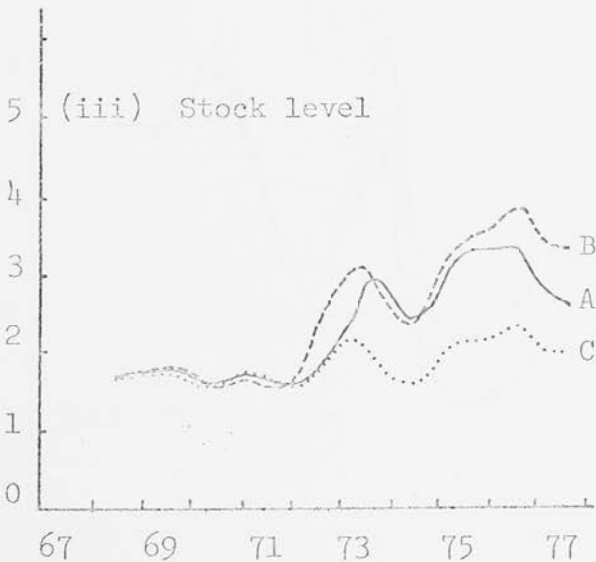
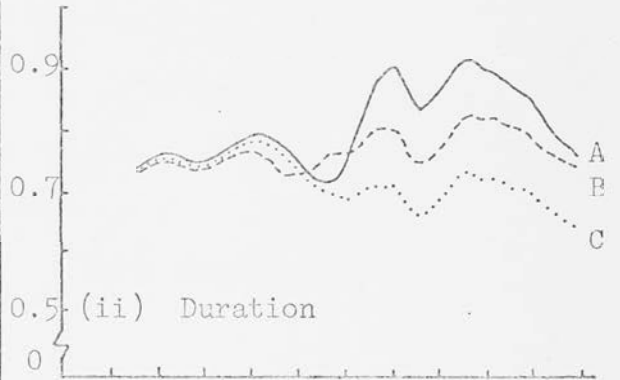
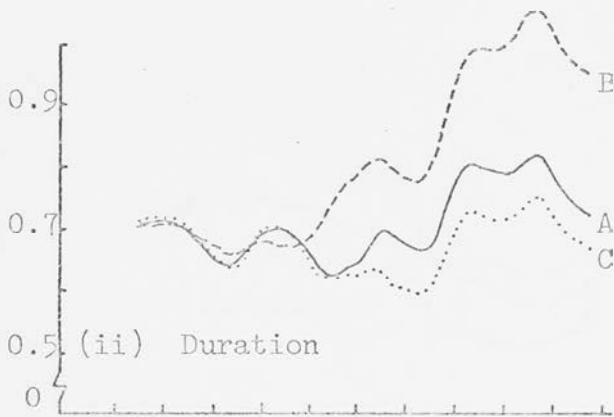
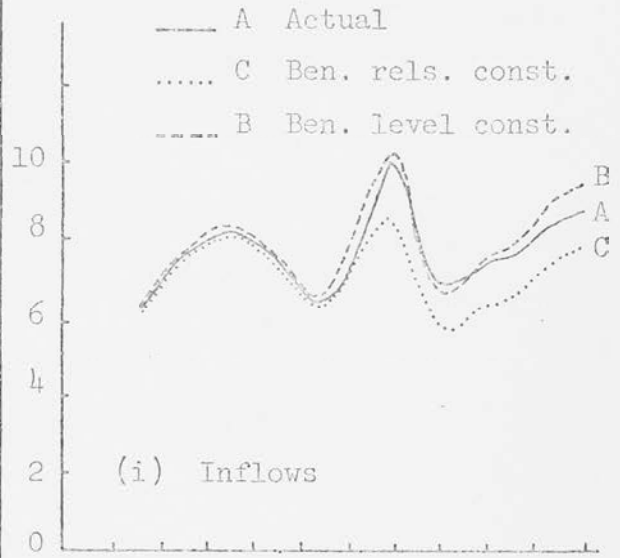
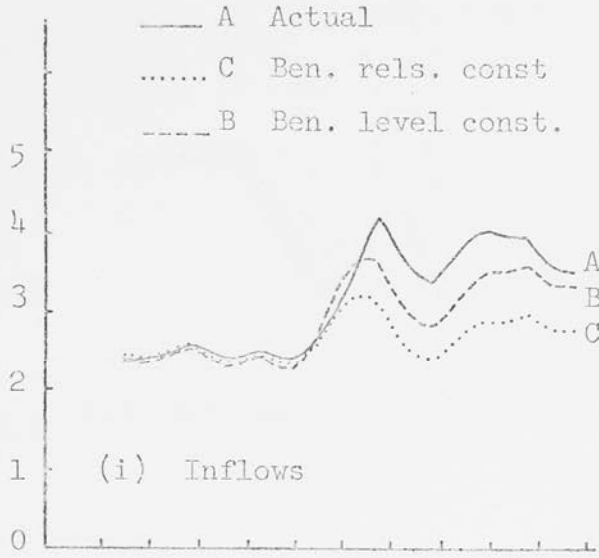
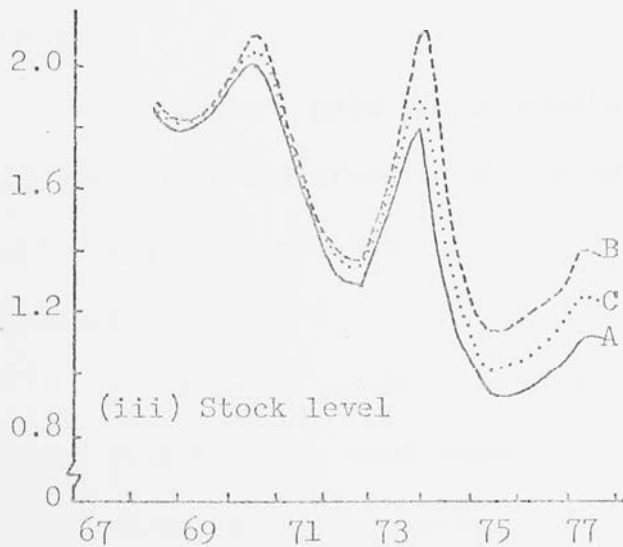
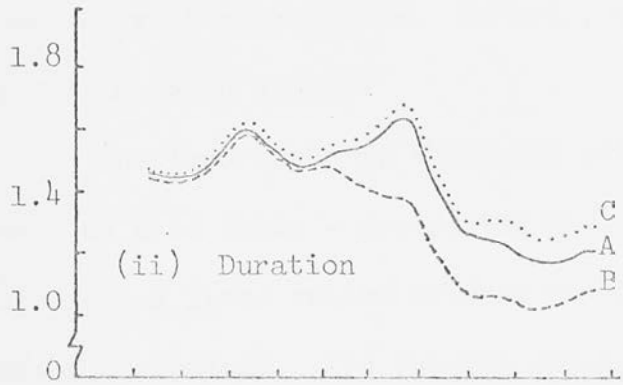
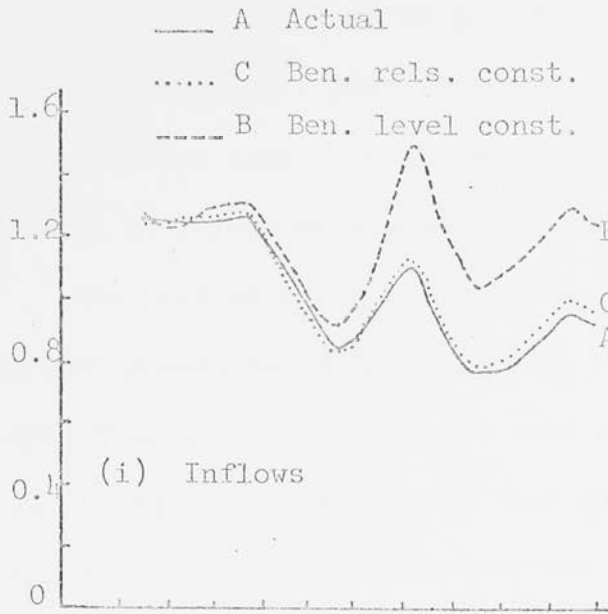


FIGURE 26

EFFECT OF BENEFIT TO EARNINGS RATIO ON
 RELATIVE UB RECIPIENT POSITIONS

(c) Female junior/male junior



(d) Female adult/male adult

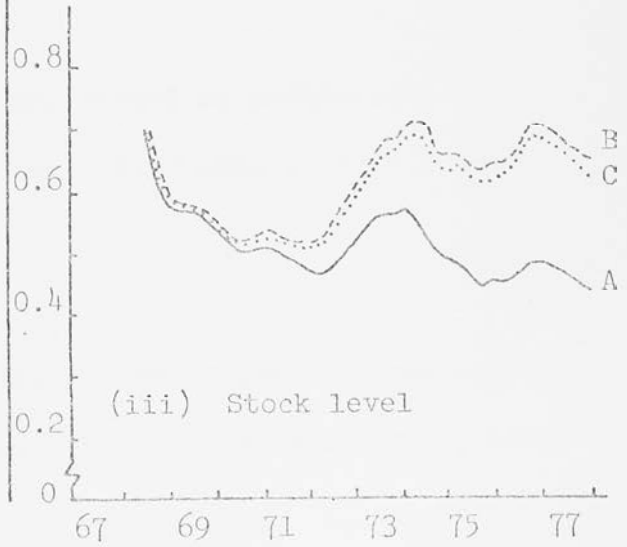
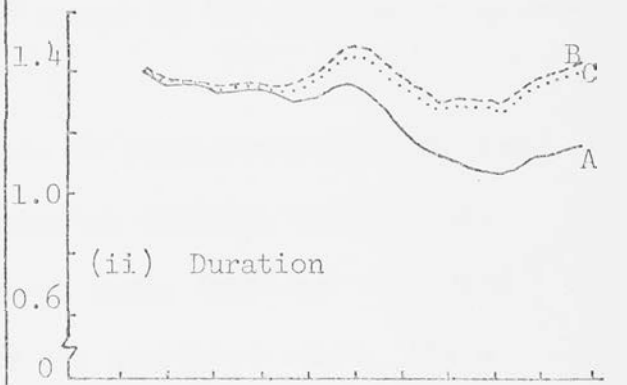
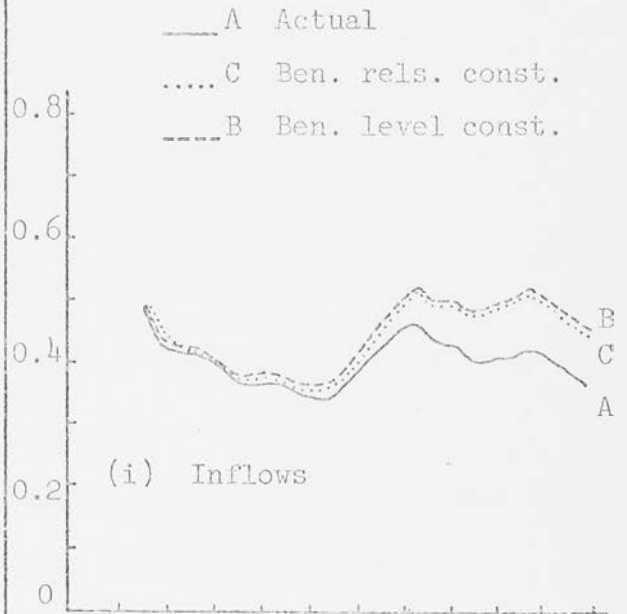


FIGURE 26 (continued)

7.3 The Impact of the Real Wage Explosion of the 1970s.

In the previous section we saw that the faster rate of growth of female earnings has resulted in a change in the female/male relative unemployment situation. Here we consider another earnings-related effect - whether deviations from trend in real minimum wages have caused relative unemployment positions to change over time.

The real wage explosion of the 1970s can affect the relative unemployment positions of the groups in two ways. The response of employers to a certain amount of above-trend real wage increase may differ for different types of labour, due to varying degrees of generality of their training, different recruiting costs etc. This will be reflected in differences in elasticities of inflows and duration with respect to the real wage deviation variable. As well, the extent of the real wage deviation may differ between groups.

The importance of these two effects is considered using the same approach as used above - generating and comparing inflows, duration and expected stock level ratios between the groups under different real wage deviation conditions. The results obtained are discussed below. These results do not warrant inclusion of the diagrams used.

JUNIOR/ADULT

For juniors relative to adults, the effect on inflows and duration of differences in elasticities are offsetting. Differences in real wage deviation are not important.

FEMALE/MALE

For females relative to males, the effect of greater (positive) deviation from trend in real wages for females is partially offset by the effect of differences in elasticities.

The overall impact of the real wage explosion of the 1970s on relative numbers of the different groups in receipt of Benefit payments is in general trivial.

7.4 The Influence of Immigration Policy

Simulations demonstrate that the effects of changes in settler arrival numbers are much the same for each group, and do not cause large changes in relative inflows and duration. While immigration policy is an important variable in explaining inflow and duration levels for individual groups, it appears to be neutral in its impact across the groups.

Immigration has not been a strong influence on the relative beneficiary positions of the different age-sex groups.

7.5 The Differential Impact of Changing Proportions of Employment in Manufacturing

One of the largest structural changes over the last decade has been the decline in the manufacturing sector. The proportion of the total number of wage and salary earners employed in the manufacturing sector has fallen from 0.33 in February 1968 to 0.24 in February 1978. Much of this change took place very rapidly over 1974 and 1975, the proportion declining from 0.30 in February 1974 to 0.25 in February 1975.

These large changes have generated much concern and have led to the Jackson Report, the White Paper on Manufacturing Industry and the Crawford Report. To a large extent debate surrounding the manufacturing sector has been concerned with tariffs and other forms of protection. However, apart from the effect on employment of women in a few specific industries such as footwear and textiles, the labour market implications across the groups have largely been ignored. Our results suggest these implications are important.

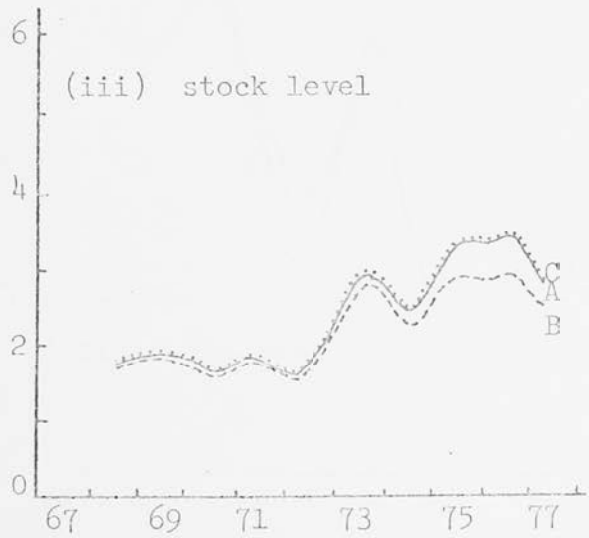
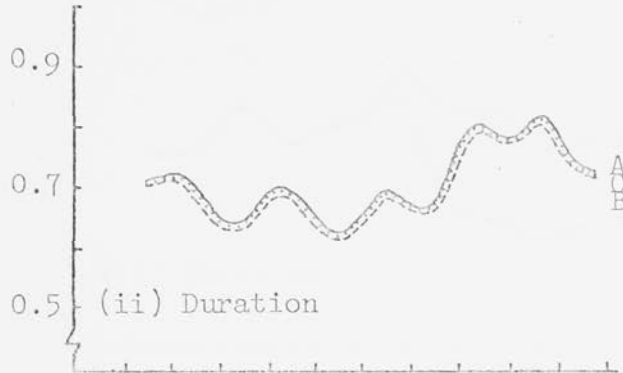
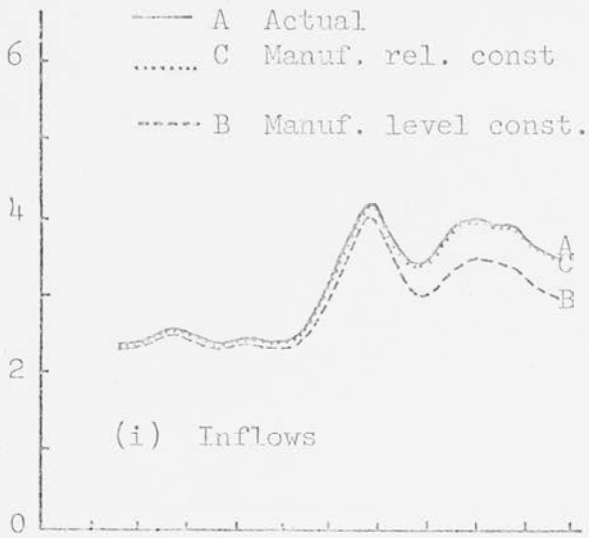
The detail of the results can be seen in Figures 27(a), 27(b), 27(c) and 27(d). Line A is the historical ratio between the groups for inflows, duration and expected stocks. Line B is the ratio generated by holding steady the proportion of employment in manufacturing for each group. Finally, line C is the ratio generated by allowing the proportion of employment in manufacturing to change but with this change the same for all groups. Thus the difference between lines C and A shows the effect of the uneven impact across the groups of structural change in employment. Note that we can take account of this uneven impact on males relative to females only, and not on juniors relative to adults. Industry mix employment data by age are not available, so the same variable is used in the junior and adult equations. The difference between lines B and C shows the effect of the absolute change in employment mix working through differences in elasticities.

Figure 27 shows that the substantial downward influence on adult female beneficiary numbers relative to both junior females and adult males comes about largely from differences in inflow elasticities. For all males, and junior females, this elasticity is negative, but for adult females it is positive. For most groups inflows into UB receipt increase as the proportion of employment in manufacturing falls, but for adult females inflows fall.¹ The absolute as well as the relative unemployment position of adult females improves from the change in the structure of employment.

Changing proportions of employment in manufacturing have very little effect on the relative unemployment positions of junior and adult males. The uneven impact on the different groups of the change in the structure of employment tends to push down female junior UB receipt relative to male juniors,

1. In Chapter Five the positive elasticity of adult female inflows with respect to the proportion of employment in manufacturing is attributed to multicollinearity problems. However, even if the true elasticity was negative and small (as we have conjectured it may be), the qualitative results would not be changed.

(a) Male junior/male adult



(b) Female junior/female adult

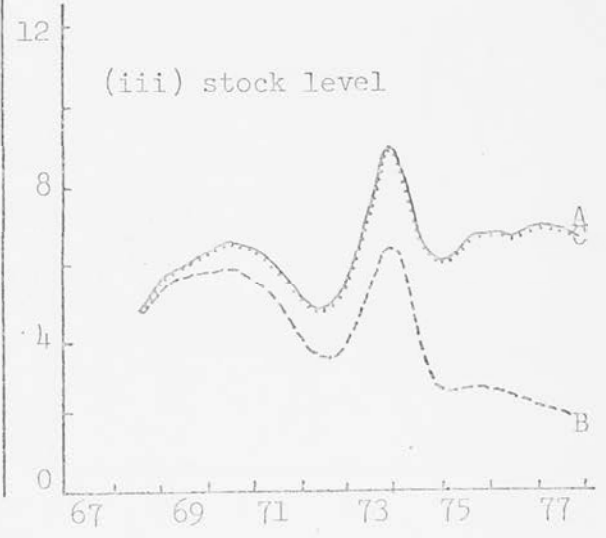
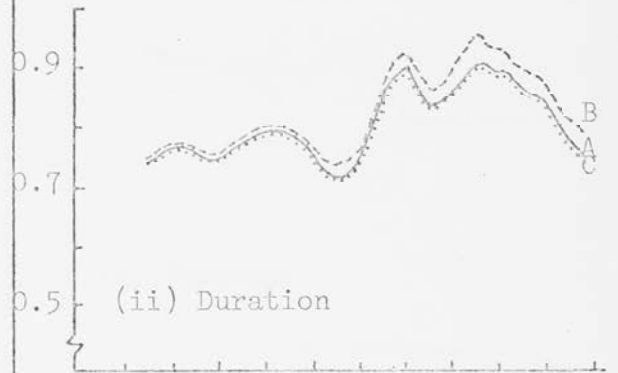
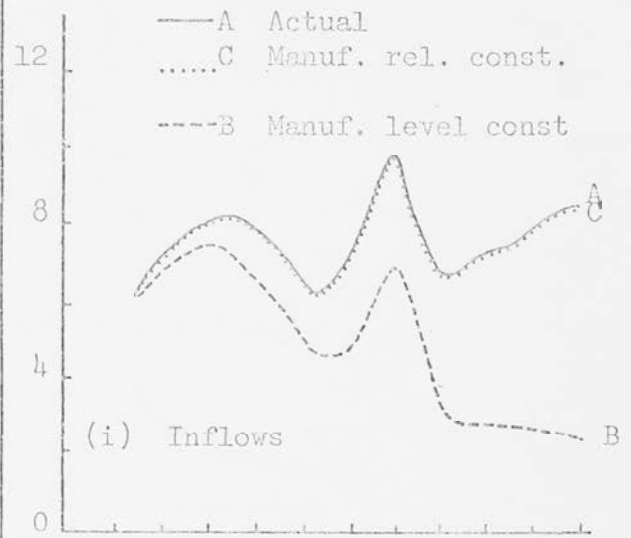
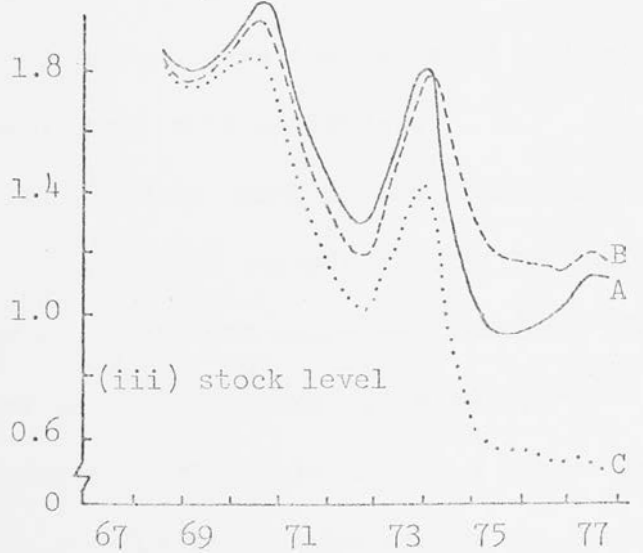
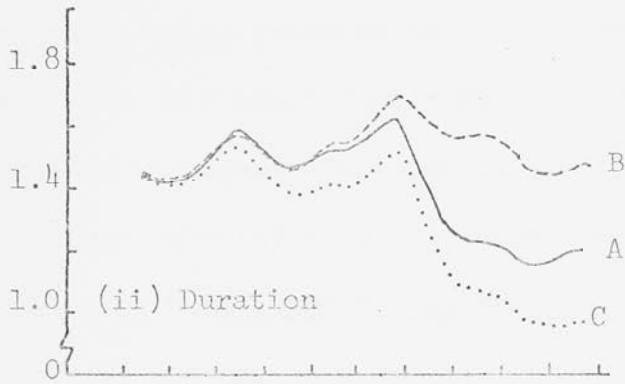
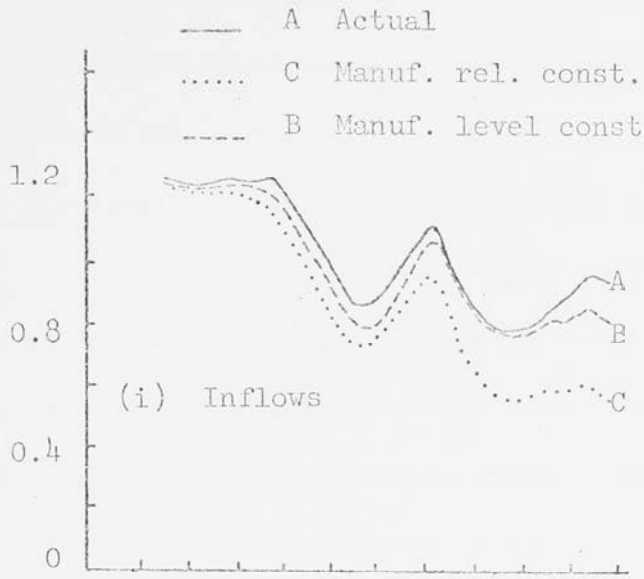


FIGURE 27

EFFECT OF PROPORTION OF EMPLOYMENT IN
MANUFACTURING ON RELATIVE UB RECIPIENT
POSITIONS.

(c) Female junior/male junior



(d) Female adult/male adult

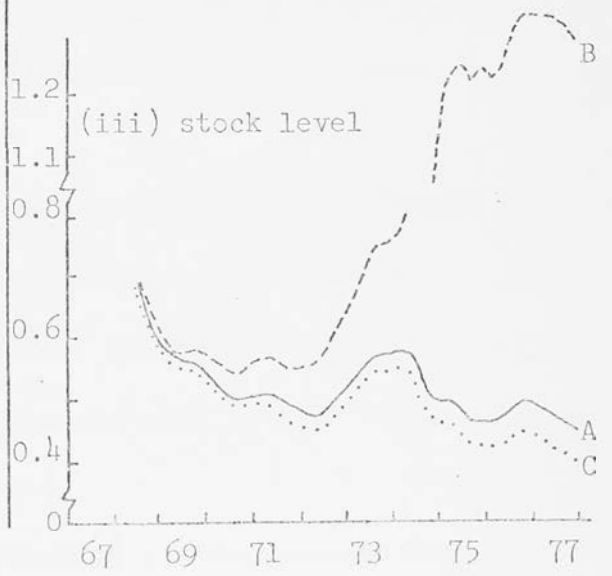
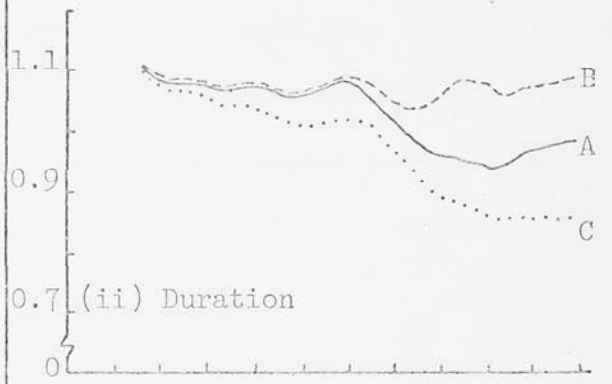
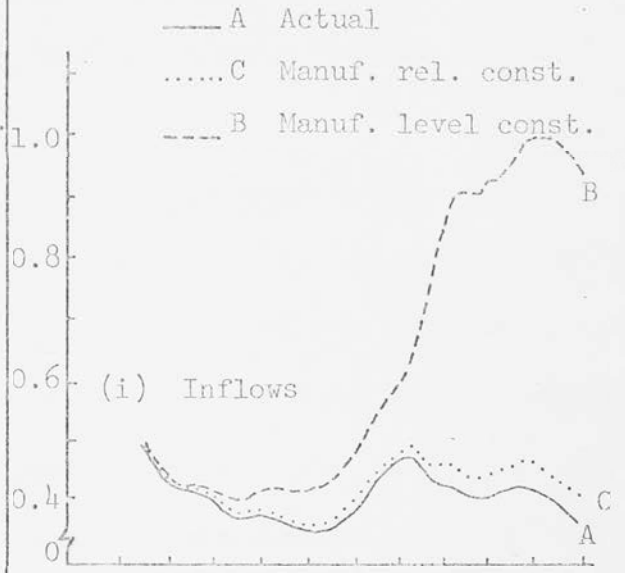


FIGURE 27 (continued)

but differences in elasticities largely offset this influence.

Changes in the structure of the economy as represented by the proportion of employment in the manufacturing sector have tended to substantially reduce unemployment of adult females relative to both junior females and adult males.

7.6 The Impact of Changes in UB Recipient Eligibility Requirements

In January 1976 the requirement that those quitting their previous jobs wait 6 weeks before being eligible for Benefit receipt was introduced. This change in eligibility requirements proves to have a fairly uniform impact on the various age-sex groups, apart from junior females. For junior females, the reduction in UB recipient stock level from the introduction of the new requirements is only very small. Thus the number of beneficiaries from the other groups falls relative to junior females. Accordingly, the ratio between junior female and adult female UB recipient rates is 6.6 rather than 5.4 in 1978 due to the change in eligibility requirement. For female juniors and male juniors, the ratio is 1.1 rather than 0.9.

7.7 Changing Unemployment Relationships: Conclusions

We are now in a position to comment on why relative unemployment rates have changed over time. However, as for our work in Chapter Six, in all these considerations we need to keep in mind the multicollinearity between some of the shift variables.

WHY HAS TEENAGE UNEMPLOYMENT INCREASED RELATIVE TO ADULT UNEMPLOYMENT?

The UB recipient rate for juniors relative to adults has increased over time for both males and females. In fact the ratio of junior to adult rates is fairly steady up to 1972, rises sharply over late 1972 and 1973, then commences to fluctuate around a higher level.

For males, changes in the distribution of vacancies account for virtually all the increase in junior relative to adult UB recipient rates - changes in the other variables have very little overall effect. The uneven

impact of changes in labour market tightness has discriminated against young males relative to adult males.

For females, the situation is different. Changes in the level of vacancies account for most of the sharp fluctuations in the ratio of junior to adult UB recipient rates up to mid-1974, and after this point exert a strong downward influence. As well, right from the start of the data period changes in the proportion of employment in manufacturing have exerted a substantial upward pressure on the UB recipient rate of juniors relative to adults. From 1976 onwards, the change in UB receipt eligibility requirement has also worked in this direction.

Thus up to 1974 changes in overall labour market tightness and changes in the structure of employment have influenced the labour market in the same direction to increase the UB recipient rate of junior females relative to adults. Changes in vacancies apparently account for the sharp changes in the ratio of rates over 1972 and 1973. From 1974 onwards the effects of changes in employment structure as captured by the proportion of employment in manufacturing, and changes in eligibility requirements, work in the opposite direction to the effect of vacancies to give the observed net result for junior/adult relative unemployment

WHY HAS FEMALE UNEMPLOYMENT DECREASED RELATIVE TO MALE UNEMPLOYMENT?

The UB recipient rate for females relative to males has exhibited a downward trend over the 1967 to 1978 data period for both juniors and adults. Superimposed on this downward trend is a strong rise in female rates relative to male rates over late 1972 and 1973.

The causes of these broad movements in female/male relative unemployment positions are quite different for juniors and adults.

For juniors, changes in overall labour market tightness as measured by vacancies have been the prime influence on female/male relative UB recipient rates. The smaller response (elasticity) of female UB recipient numbers to changes in vacancies is largely responsible for the falling ratio of female/male rates. However, it is also changes in the level of vacancies which account

for most of the rise in relative female rates in 1972 and 1973, although changes in Benefit payments also make a (small) contribution. Finally, changes in UB receipt eligibility requirements save the female/male ratio of rates from falling from 1976 onwards.

For adults, the downward trend in the ratio of female to male UB recipient rates comes about from the interaction of the influences of three variables. Decreases in the Benefit to earnings variable for female relative to males (from larger increases in female earnings), and the perverse response of adult females to changes in the proportion of employment in manufacturing, work to reduce female UB recipient rates relative to males. The combined influence of these two variables outweighs the influence in the opposite direction of changes in the distribution of vacancies, giving the observed downward trend. It is changes in the distribution of vacancies that gives the sharp changes in relative female-male UB recipient rates over 1972 and 1973.

PART III

UB RECIPIENT TURNOVER RESULTS IN PERSPECTIVE

CHAPTER EIGHT

UB RECIPIENTS AND TOTAL UNEMPLOYMENT

Over the preceding chapters we have carried out turnover analysis for UB recipients. Results on the nature and behaviour of the stock of beneficiaries are important because the number of beneficiaries is an important variable in itself. Payments to Unemployment Beneficiaries are expected to total about \$100m. over 1979-80, or 3.4 per cent of total Government expenditure (Budget Speech 1979-80). From a labour market perspective, UB recipients are an important subset of total unemployment. The eligibility requirements for receiving Benefit payments suggests that the pool of UB recipients will be a good measure of those experiencing unemployment-induced hardship.

It would be interesting to apply the analysis of previous chapters to total unemployment. However, a turnover analysis of total unemployment cannot be carried out easily. For the most comprehensive measure of unemployment, ABS survey unemployment,¹ there are no inflow data and only limited current duration intervals in the quarterly snapshot.² The grid approach cannot be used without considerable data manipulation and interpolation. For CES unemployment,³ inflow data are available, but the current duration data are 2-monthly observations with 3-monthly duration intervals - the width of the duration intervals is not equal to the length of the accounting period. Again the grid approach cannot be readily applied.

-
1. A definition of this measure of unemployment is contained in Appendix D. Hancock et al. (1973) recognise ABS survey unemployment as the most comprehensive measure of unemployment available in Australia.
 2. Current duration intervals are restricted to the first 13 weeks of unemployment up to 1973 for males and females and up to 1975 for juniors and adults.
 3. A description of this measure is contained in Appendix D.

Rather than tackling the difficulties of carrying out turnover analysis for the more comprehensive measures of unemployment, at this late stage of the thesis we opt for an incomplete analysis of two key issues arising from our earlier work:

- (i) Does the strong effect of the level of Benefit payments on beneficiary numbers (Chapter Six) arise from flows within the total unemployment pool?
- (ii) Do increases in the level of Benefit payments increase the size of the total unemployment pool?

The analysis presented is to be interpreted as indicative of the direction in which our research will proceed in the months after submission of the thesis.

The first step is to consider the proportion of total unemployment covered by Benefit payments. If all the unemployed received Benefits, the answer to the above questions would be obvious. This is not the case, however, and we go on to the consideration of the relationships between the level of Benefit payments, the beneficiary pool and total unemployment.

8.1 UB Recipients as a Proportion of Total Unemployment

If all the unemployed received Benefit payments, then our results for UB recipients would tell the total unemployment story exactly. However, not all the unemployed receive Unemployment Benefit payments. The proportion of total unemployment receiving Benefit payments has changed over time, and varies between age-sex groups.

In Figure 28 the total stock of UB recipients, the total stock of ABS unemployment, and the ratio of these two series, are plotted. The proportion of the total unemployed who receive Benefits rises from less than 20 per cent in 1970 to almost 70 per cent from 1975 onwards. This large increase in the proportion of total unemployment receiving Benefits occurs

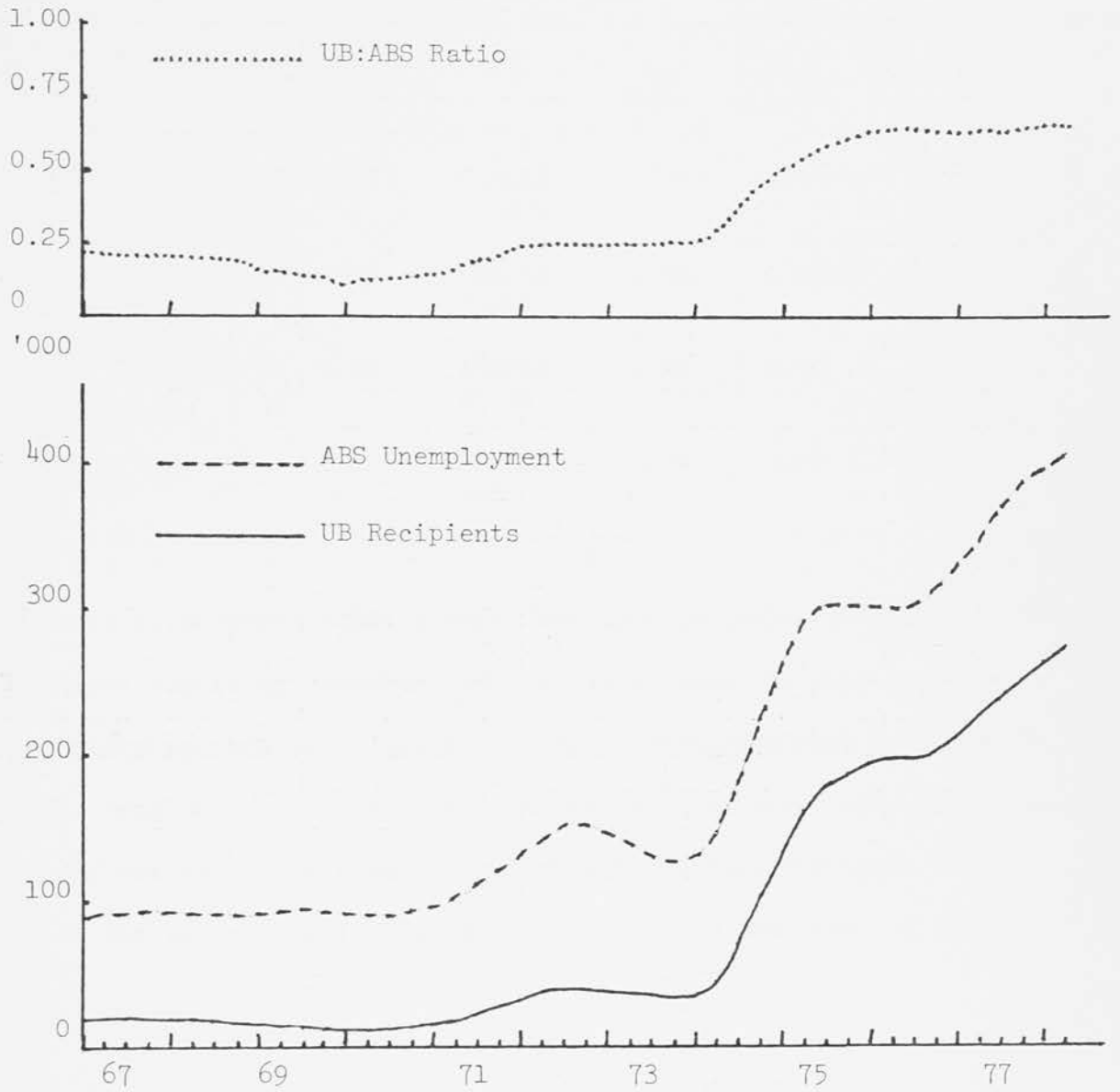


FIGURE 28

UB RECIPIENTS RELATIVE TO ABS SURVEY UNEMPLOYMENT

for each of the age-sex groups. This is shown in Table 22.¹

TABLE 22

UB RECIPIENTS AS A PROPORTION OF ABS SURVEY UNEMPLOYMENT:

1970 and 1978

	May 1970	May 1978		May 1970	May 1978
MALE <24	0.10	0.81	FEMALE <24	0.12	0.62
MALE 25-44	0.19	0.96	FEMALE 25-44	0.04	0.18
MALE 45-54	0.33	1.02	FEMALE 45-54	0.08	0.30
MALE 55+	0.23	1.02	FEMALE 55+	0.09	0.27

Marked differences exist between the age-sex groups in the proportion of the unemployed receiving Benefits, but for each group the same large rise in the beneficiary proportion is present.² For adult males from 1975 onwards, as many people received Unemployment Benefit payments as there were unemployed people.³ These shifts in the beneficiary proportions form the basis of our examination of the inter-pool influence of increases in the level of Benefit payments.

1. The UB recipient age groups less than 21 years and 21 to 24 years are summed to match the sum of the ABS age groups less than 20 years and 20 to 24 years.
2. These differences between age-sex groups reflect, at least in part, differences in access to Benefits due to the eligibility requirements.
3. This implies that for this group, our UB recipient results for the 1975-78 period can be carried over directly to total unemployment. The same is probably true for males less than 24 years.

8.2 Why has the Proportion of the Unemployed Receiving Benefits Increased?

In this section we consider why the proportion of the unemployed receiving Benefits was low in the early 1970s, and why this proportion increased. This is done with the question posed above in mind:

- does the effect of Benefit payments on beneficiary numbers arise from flows within the unemployment pool?

Unemployed workers not in receipt of Benefits either are ineligible for Benefit receipt or do not bother to apply. Thus changes in the proportion receiving Benefits come about from variations in the eligibility status of the unemployment pool and/or changes in the 'take-up rate'.

UB recipient eligibility requirements are documented in Appendix A. UB recipients are required to be registered for employment with the Commonwealth Employment Service, and meet the CES definition of unemployed (Appendix D). This means Unemployment Benefits are available only to those seeking full-time jobs. Therefore as a first step towards taking account of the Benefit eligibility requirements, the number of beneficiaries should be related to the number of the unemployed seeking full-time work.

Also of relevance for our consideration is the requirement of being unemployed at least one week. In times of low unemployment, a significant proportion of those entering unemployment may leave within a week and thus never become eligible for Benefit payments. As the economy slumps and unemployment increases, fewer people will leave the unemployment pool within a week of entering, so more become eligible for Benefit receipt. Thus the proportion of the unemployed receiving Benefits should increase. To take account of this effect, we consider only those in the total unemployment pool longer than one week.

If these two eligibility-related effects were the only cause of the observed increase in the proportion of total unemployment receiving Benefits, then the ratio of UB recipients to that part of ABS survey unemployment in the

pool longer than 1 week and seeking full-time work would not increase over time. Table 23 contains these ratios for males and females.¹

TABLE 23
UB RECIPIENTS AS A PROPORTION OF 'ELIGIBLE'
ABS UNEMPLOYMENT

	TOTAL ABS UNEMP.			F-T 2+ WKS ABS UNEMP.		
	Ratio UB/ABS May 70	Ratio UB/ABS May 78	Prop'al Change in Ratio %	Ratio UB/ABS May 70	Ratio UB/ABS May 78	Prop'al Change in Ratio %
MALES	0.17	0.90	429	0.25	1.05	320
FEMALES	0.09	0.43	378	0.19	0.64	237

This table shows that the changing proportion of unemployment in receipt of Benefits is not explained by the requirements of seeking a full-time job and unemployed longer than one week. Although the increase in the UB recipient:ABS unemployment ratio between 1970 and 1978 is not as great with these effects taken into account, the rise is still large (a threefold increase for males and a twofold increase for females). Even if we were to allow for some delay in applying for Benefits once unemployed and take ABS unemployed in the pool 4 weeks and longer, a strong rise in the Benefit proportion would still be apparent. It seems *the eligibility requirements of seeking a full-time job, and unemployed longer than one week, have had only a limited effect on the proportion of the unemployed receiving Benefits.*

The failure of the eligibility effects to account for the change in Benefit recipient:ABS unemployment ratio indicates that the proportion of the unemployed receiving Benefits was low at the start of the decade because people

1. This ratio cannot be calculated for the age groups as no suitable age-specific duration data for ABS unemployment are available prior to 1975.

did not bother to apply for Benefits, and increased from a rise in the propensity to take up Benefits. The 'take-up rate' was previously low, but has increased over time.

The 'take-up rate' of Unemployment Benefits will be affected by several factors. Amongst these is the variable of interest to us, the level of Benefit payments. With higher Benefit payments, unemployed persons should be more inclined to pursue Benefit receipt.

The influence of Benefit payments has been examined by estimating some take-up rate regression equations. Quarterly time series of the ratio of UB recipients to ABS unemployed in the pool longer than 1 week and seeking a full-time job are regressed on the level of Benefits deflated by the Consumer Price Index. Also included in the equation is the expected duration of Benefit receipt. This variable is included as an indicator of the expected duration of all unemployed - we have not estimated completed duration for ABS unemployment. It is anticipated that the take-up rate will depend on the expected duration of unemployment as well as the level of Benefit payments. If people anticipate being unemployed only a short time they may not bother to apply for Unemployment Benefit payments. But with the likelihood of a long spell of unemployment confronting the new entrant, they may go to the trouble of registering. These regression results are presented in Table 24. The estimated equations are specified as having a linear functional form, and are estimated using Ordinary Least Squares.

The positive and significant coefficient on the Benefits variable for both males and females shows that as real Benefit payments increase, the rate of take-up of Benefits rises. This indicates that as the level of Benefit payments rises relative to the cost of living, unemployed workers are more inclined to avail themselves of these payments. *The large effect of the level of Benefit payments on the number of beneficiaries arises at least in part from flows within the total unemployment pool.*

The estimated coefficients on the expected duration variable are also positive and significant. This suggests that the longer people expect to stay unemployed, the greater propensity they have to take up Benefits.

TABLE 24

UNEMPLOYMENT BENEFIT TAKE-UP RATE REGRESSION RESULTS^a

	BEN/CPI	D ^E	\bar{R}^2	D.W.
MALES	0.028 (6.06)	0.027 (4.82)	0.88	1.96
FEMALES	0.017 (8.67)	0.009 (3.38)	0.86	1.79

^a BEN/CPI - level of Benefit payments deflated by the CPI (May 1967 = 100.0)

D^E - expected completed duration

\bar{R}^2 - coefficient of determination adjusted for degrees of freedom

D.W. - Durbin-Watson Statistic

Seasonal dummy variables, and a variable representing the introduction of the 6 weeks eligibility requirement in January 1976, were tried in the equation. These proved to be insignificant and were not used in the final equation.

The estimates in Table 24 have been adjusted to remove serial correlation from the residuals. Serially correlated residuals in the original estimates may indicate a mis-specified equation, as some influences that may affect the take-up rate could not be included. The Benefit take-up rate might be influenced by economic necessity brought on by the unemployment of other members of the family. A measure of economic necessity, however, would be closely related to the expected duration of unemployment, and therefore was not included. Peoples' propensity to apply for Unemployment Benefits will be affected by community attitudes to Benefit receipt, but this cannot be quantified readily.

In this section we have just made a beginning on the analysis of Benefit take-up rates. There is much work still to be done. In particular, analysis of variation in take-up rates needs to be extended across groups. The information in Table 22 indicates that the proportion of the unemployed receiving Benefits varies markedly between age and sex groups. Sufficient data are available to consider variation in this proportion for single and married workers, but this is not done here.

8.3 The Effect of the Increase in Benefit Payments on Total Unemployment

In the previous section we showed that the level of Benefit payments has had an effect on inter-pool flows. With increases in the level of real Benefit payments, the rate of take-up of Benefits by those already unemployed rises. An interesting question we have not yet answered is whether all the large response of inflows into the beneficiary pool comes from these inter-pool flows, or whether the total pool of unemployment increases when Benefit payments increase. We now turn to this issue.

To test for the effect of Benefit payments on the total unemployment pool, quarterly inflows into CES unemployment are regressed on the same set of variables as used in the UB recipient inflow equations in Chapter Five (Table 12)¹. The estimated equations are presented in Table 25.

These estimates indicate that for only junior males does the Benefit payments variable have a significant effect on inflows into CES unemployment. For this group, a one per cent increase in the Benefit to earnings ratio increases the incidence of inflows by 0.23 per cent. For the other groups, the effect of Benefits on inflows into CES unemployment is not significant. This is in sharp contrast to the UB recipient inflow situation. Table 26 shows the

1. Inflow data are not available for ABS unemployment, but CES unemployment moves in close coincidence with ABS unemployment. The CES inflow data are tabulated in Appendix D. The dependent variable in the estimated equations is in fact the incidence of inflows (inflows divided by the labour force).

TABLE 25

CES UNEMPLOYMENT INFLOW EQUATIONS^(a)

	V	V ₋₁	B/E ₋₁	ED	RW	IMM	MP	\bar{R}^2	D.W.
MALE <21	-0.25 (-2.25)	0.12 (1.29)	0.23 (2.83)	-0.07 (-0.75)	-0.97 (-1.63)	-0.09 (-1.06)	-1.03 (-1.14)	0.87	1.00
MALE 21+	-0.23 (-3.54)	-0.02 (-0.33)	0.07 (1.01)	-0.20 (-5.72)	0.54 (1.90)	-0.05 (-1.26)	-1.67 (-4.42)	0.95	2.30
FEMALE <21	-0.09 (-1.05)	0.13 (1.57)	-0.01 (-0.10)	0.06 (1.04)	0.45 (1.58)	-0.11 (-1.37)	-1.12 (-4.73)	0.96	1.31
FEMALE 21+	-0.50 (-5.35)	0.08 (0.83)	0.002 (0.02)	-0.24 (-5.33)	1.05 (4.41)	0.22 (3.43)	0.27 (1.05)	0.84	1.67

(a)

- V - vacancy rate
 B/E - Benefit to earnings ratio
 ED - eligibility requirement dummy
 RW - real wage deviation from trend
 IMM - settler arrivals relative to the labour force
 MP - proportion of employment in manufacturing

Bracketed figures are t statistics

estimated Benefit to earnings variable coefficients for UB recipients
 (transcribed from Table 12) and CES unemployment (Table 11).

TABLE 26

COEFFICIENTS ON THE BENEFIT TO EARNINGS VARIABLE:
 INFLOW EQUATIONS: UB RECIPIENTS AND CES UNEMPLOYMENT

	UB RECIPS.	CES UNEMP.
MALE <21	0.45 (2.66)	0.23 (2.83)
MALE 21+	0.75 (2.95)	0.07 (1.01)
FEMALE <21	0.23 (2.18)	-0.01 (-0.10)
FEMALE 21+	0.74 (2.75)	0.002 (0.02)

This Table highlights the smallness and low significance of the coefficients in the CES inflow equations. It seems that *only for junior males do increases in the level of Benefit payments increase the size of the total unemployment pool*. For the other groups, the rise in inflows into the beneficiary pool when the level of Benefits increases is apparently due wholly to inter-pool transfers. We consider this to be a very important result, and an obvious point of departure for further work.

CHAPTER NINE

CONCLUDING REMARKS

We began the study with the belief that a great deal more could be learned about the labour market from a consideration of flows, and in particular flows into and out of unemployment. This interest was pursued by the calculation and analysis of inflows and completed duration for Unemployment Benefit recipients. Through the application of appropriate techniques to a suitable data base, many of the conceptual and practical problems encountered in doing this in previous studies were avoided.

Inflow and duration measures have been used to compare unemployment between different labour market groups and different points in time. Changes in unemployment over time have been considered with regard to variations in aggregate demand, discretionary government labour market policy and structural change in the economy. Our major conclusions are summarised at the end of Chapter One.

Towards the end of the thesis our attention shifted towards the Unemployment Benefit take-up rate. A large proportion of the total welfare budget is directed towards the unemployed, and the proportion of the unemployed availing themselves of Benefit payments has increased. We considered why this take-up rate has increased.

It is clear that there is a great deal more work to be done. We mention four areas for further analysis.

First, turnover analysis needs to be extended to total unemployment. A number of questions cannot be answered precisely until this has been done.

Second, the study of flows throughout the whole labour market offers rich rewards in terms of improved understanding of how the market functions. To do this, however, would require longitudinal labour market data that are not collected in Australia at present. It is hoped that serious consideration will be given to the collection of such data in the near future.

APPENDIX A

UNEMPLOYMENT BENEFIT RECIPIENTS

Eligibility Requirements

Unemployment Benefit is paid to males 16 to 65 years and females 16 to 60 years who apply for payment and meet the following eligibility requirements:¹

- . registered for employment with the CES
- . finished school or voluntarily left their previous job at least six weeks previous, or if not in either of these categories then commenced unemployment at least one week previous²
- . been living in Australia continuously during the preceding twelve months, or be likely to live in Australia permanently
- . unemployment not due to direct participation in a strike
- . willing and able to undertake a suitable job
- . satisfy an income test.

At November 1978, the maximum benefit payable to single persons 16 to 18 years was \$36.00 per week, and over 18 years \$51.45. For married persons, the maximum benefit payable to the couple was \$88.70 per week plus \$7.50 for each dependent child.³

-
1. Eligibility requirements as of November 1978 and applying over the period studied.
 2. The six week postponement for those voluntarily leaving their previous job was introduced in January 1976, and the six week wait for school leavers was introduced in November 1977. Up till November 1977 persons were required to be registered with the CES for at least one week, but this has been broadened to simply unemployed one week, whether registered with the CES or not.
 3. These maximum amounts are payable only when gross income does not exceed \$3.00 per week for single persons 16 to 18 years, or \$6.00 per week for single persons over 18 years and all couples. Incomes above this level are subtracted on a dollar-for-dollar basis from the Benefit payment.

Estimation of Missing Current Duration Observations¹

End-of-quarter snapshots of current duration have not been made for the quarters IV.1970, IV.1972, I.1975, III.1975, IV.1975, I.1976 and II.1976. To implement turnover analysis, these missing observations needed to be interpolated from existing data.

Quarterly inflow data are available throughout the 1967-78 period, so $p0_t = U0_t / I_t$ can be calculated for each quarter except those listed above. A predicting equation was estimated relating the available $p0_t$'s to variables that were available for every quarter, and $p0_t$ predicted for the seven quarters for which observations were missing. From these predictions and our observations on I_t , we predicted $U0_t$ for these quarters. Then $p1_t$ was calculated for all except the same seven quarters as mentioned above, and the same procedure used to calculate $U1_t$. Finally, $p2_t$ was calculated for all quarters except IV.1970, I.1971, IV.1972, I.1973 and I.1975 through III.1976, and the same procedure used to calculate the missing observations on $U2_t$. This procedure was carried out separately for the different age-sex groups.

Several different predicting equations were tried. The final equations used related the duration-specific transition proportions to the overall retention rate², the inverse of the inflow level, and seasonal dummy variables. These equations were selected ahead of the others tried on the basis of three criteria

- how well they fitted the data over the whole 1967-78 period
- how well they fitted the data over 1974 when retention rates increased rapidly
- how close the sum over the predicted numbers in the different

1. To understand the concepts and terminology used, this part of Appendix A is best read after working through Chapter Two.

2. The overall retention rate, $p_t = U_t / (U_{t-1} + I_t)$, is the proportion of the total 'at risk' population that remains to the end of the period. This variable can be calculated without using current duration data.

duration intervals and over the age groups came to the actual end-of-quarter male and female stock level for the seven quarters for which observations on current duration are missing.

Estimation of Inflows for the Age-Sex Groups

Quarterly inflows for the 10 age-sex groups were estimated from observations on inflows for total males and females using current duration snapshot data on the relative numbers of the different age-sex groups in the pool less than 2 weeks. Total inflows were allocated between the age groups according to the distribution over the age groups of the total number in receipt of Benefits less than 2 weeks at the end of the quarter.

In using the distribution of the numbers in the pool less than 2 weeks, we are implicitly assuming that the average probability of leaving for those in their first 2 weeks in the pool is the same for all age groups. Obviously this will not be the case. However, it is felt that two weeks is a sufficiently short time (relative to the expected length of stay on entry and in the light of the differences in the proportion leaving from the different age groups) that the relative sizes across the groups of the less than two weeks intervals will be a good indicator of the relative size of inflows.¹

It is also (implicitly) assumed that relative (between age groups) inflows for the last two weeks of the quarter hold throughout the accounting period.

1. Consider, for example, two different age groups with the same inflow level over a certain fortnight, say 100. One group has 5 per cent of this 2-weekly inflow leave by the end of the fortnight. The other group has 10 per cent leave. Then whereas the true inflow level ratio between the groups is 1, the ratio using our method of allocation would be $0.95/0.90 = 1.0556$. In practice, the difference between the age groups in the proportion leaving within the fortnight are not as large as in this example, meaning a somewhat smaller error. This is considered to be a satisfactory approximation.

For some quarters observations on current duration are missing (see above) - the distribution across the age groups of the less than 2 weeks UB recipients cannot be calculated. To fill these gaps, these proportions are interpolated from existing observations. This is done using a predicting equation for each age group which relates their proportional representation in the total less than 2 weeks pool to the total inflow level, the aggregate ABS unemployment rate, a time trend and seasonal dummies.

APPENDIX B

AVERAGE COMPLETED DURATION

Under stationary conditions, average completed duration can be calculated simply by dividing the stock level by inflows each period. The stationary stock level represents the total number of man-periods of unemployment experienced by an inflow group. For real-world situations, however, estimation of average completed duration is not this straightforward. Here we derive an expression for actual average completed duration. In Chapter Three this expression is adapted to estimate expected average completed duration.

Actual average completed duration, D_t^A , is an estimate of the average length of time actually spent in the unemployment pool by the t^{th} period inflow group. This is calculated as man-quarters of unemployment experienced by this inflow group divided by the number in the group.

When unemployment is changing through time, total man-quarters of unemployment experienced by the t^{th} period inflow group is not given by the stock of unemployment at time t ($U0_t + U1_t + U2_t$). Rather, it is given by the sum

$$U0_t + U1_{t+1} + U2_{t+2} + U3_{t+3} + \dots + U_n_{t+n}$$

where $U0_t$ is the number in the pool less than one quarter (3 months) at time t , $U1_{t+1}$ the number in the pool 1 to 2 quarters at time $t+1$, $U2_{t+2}$ the number in the pool 2 to 3 quarters at time $t+2$, etc. n is the maximum time anyone spends in the pool.

Now from the definition $po_t = U0_t / I_t$ given in Chapter Two

$$U0_t = I_t \cdot po_t$$

Similarly, from $pl_{t+1} = U1_{t+1} / U0_t$,

$$U1_{t+1} = U0_t \cdot pl_{t+1} = I_t \cdot po_t \cdot pl_{t+1}$$

where I is quarterly inflows and p_0, p_1 are duration-specific retention rates.

To calculate $U2_{t+2}, U3_{t+3}, \dots, Un_{t+n}$ in the same manner would require retention rates for these longer duration groups up to n quarters, the maximum spell length. But for UB recipients there is no set maximum spell length, and what we have is an open-ended duration interval $U2+$ with a corresponding retention rate $p2+$ (see Chapter Two).

We could arbitrarily set n and use this average propensity to stay in the pool for those in the open-ended interval $p2+$ for each period to specify $U2_{t+2}, \dots, Un_{t+n}$. However, if n is set too short we may badly underestimate true average completed duration; but if set very long this will mean the loss of many observations at the end of the data period (the t^{th} period measure requires $p2+_{t+n}$ for calculation.)

Instead, we assume that after two quarters in the beneficiary pool the retention rate facing those in the open-ended duration interval is steady through time, with no limit on n . Thus

$$U2_{t+2} = U1_{t+1} \cdot p2+_{t+2} = I_t \cdot p0_t \cdot p1_{t+1} \cdot p2+_{t+2}$$

$$U3_{t+3} = U2_{t+2} \cdot p2+_{t+2} = I_t \cdot p0_t \cdot p1_{t+1} \cdot p2+_{t+2}^2$$

This means

$$U2_{t+2} + U3_{t+3} + \dots = I_t \cdot p0_t \cdot p1_{t+1} \cdot \frac{p2+_{t+2}}{1-p2+_{t+2}}$$

Referring back to the total man-quarters of unemployment experienced by the t^{th} period inflow group

$$U0_t + U1_{t+1} + U2_{t+2} + \dots = I_t \cdot p0_t + I_t \cdot p0_t \cdot p1_{t+1} + I_t \cdot p0_t \cdot p1_{t+1} \cdot \frac{p2+_{t+2}}{1-p2+_{t+2}}$$

Finally, dividing through by t^{th} period inflows gives actual average completed duration

$$D_t^A = p0_t + p0_t \cdot p1_{t+1} + p0_t \cdot p1_{t+1} \cdot \frac{p2+_{t+2}}{1-p2+_{t+2}} .$$

TABLE 27

UB RECIPIENT INFLOWS PER QUARTER: MALES

	MALE <21	MALE 21-24	MALE 25-44	MALE 45-54	MALE 55+	MALE TOTAL
I.1967	-	-	-	-	-	-
II	4477	3397	10611	4578	2830	25893
III	5432	3572	11019	5537	3691	29251
IV	3602	1844	6660	3347	2804	18257
I.1968	8923	4072	13160	5951	4449	36555
II	4841	3194	9667	4380	2949	25031
III	4108	3289	8985	4559	3154	24095
IV	4516	1830	6162	2710	2144	17362
I.1969	9806	4309	11228	5235	3865	34443
II	3932	2744	7525	3715	2351	20267
III	3347	2628	6636	3488	2474	18573
IV	4772	1300	3955	2083	1650	13760
I.1970	7557	3737	8623	3983	3361	27261
II	3096	1912	6024	2669	2062	15763
III	3830	2673	6899	3376	2316	19094
IV	4986	2215	5572	2476	1762	17017
I.1971	8612	4583	11214	4281	2810	31500
II	5392	3995	10706	4238	2752	27083
III	7076	5033	11725	4605	3038	31477
IV	9397	4978	10728	3606	2191	30900
I.1972	20163	11481	22024	7335	4081	65084
II	13971	9818	19525	6232	3902	53448
III	14626	11404	22364	7346	4377	60117
IV	13343	6481	13750	4834	3649	42057
I.1973	21714	11331	21190	7565	4502	66302
II	13300	7028	13186	4220	2963	40697
III	11996	6298	12151	5062	3252	38759
IV	11501	3442	6727	2875	1732	26288
I.1974	19198	10450	17438	6544	4074	57704
II	10116	5139	11244	4462	2714	33675
III	15951	9107	15792	5518	3340	39708
IV	29656	16544	29541	8579	4578	88898
I.1975	64553	32733	67817	22289	10383	197775
II	41983	24369	43632	12756	7157	129897
III	42575	28151	53126	17302	7361	148515
IV	52664	26516	51666	14808	6239	151893
I.1976	65254	33847	63740	17818	7794	188453
II	36295	22769	41619	10885	4957	116525
III	48523	27214	47567	12323	7003	142630
IV	39690	26186	45228	11435	5949	128488
I.1977	62019	26447	46008	11182	6688	152344
II	48444	29390	49814	12260	5875	145783
III	47140	30596	52483	13042	7683	150944
IV	47199	30946	53022	13375	7081	151621
I.1978	67956	30684	56534	12465	6206	173845
II	46998	32950	54239	13428	7443	155058

TABLE 28

UB RECIPIENT ACTUAL AVERAGE COMPLETED DURATION: MALES

	Weeks					
	MALE <21	MALE 21-24	MALE 25-44	MALE 45-54	MALE 55+	MALE TOTAL
I.1967	-	-	-	-	-	-
II	-	-	-	-	-	-
III	4.3	4.4	5.6	7.2	9.3	6.0
IV	4.8	5.4	6.4	9.7	11.0	7.3
I.1968	4.0	4.3	5.1	6.4	7.7	5.3
II	5.3	4.9	5.8	8.0	10.1	6.5
III	4.2	3.6	4.8	6.2	8.5	5.3
IV	4.4	5.7	6.8	10.0	13.0	7.3
I.1969	3.3	3.6	4.7	5.5	7.0	4.5
II	5.0	4.6	5.4	6.9	9.7	6.0
III	3.7	3.5	4.1	6.0	7.7	4.8
IV	3.5	5.7	6.9	9.2	10.9	6.5
I.1970	3.0	3.0	4.4	5.0	5.5	4.0
II	5.1	5.0	6.0	7.8	9.2	6.4
III	3.8	3.6	5.3	6.2	8.1	5.2
IV	3.6	4.6	6.2	9.0	12.1	6.2
I.1971	4.1	3.6	5.1	6.6	8.6	5.1
II	6.2	5.8	6.9	8.7	11.2	7.3
III	5.0	4.7	6.0	7.9	10.1	6.2
IV	5.0	6.0	7.7	12.2	16.8	7.7
I.1972	5.4	5.1	6.3	9.1	13.0	6.5
II	6.2	6.4	7.4	11.2	14.5	7.8
III	5.7	5.4	6.3	8.9	12.1	6.7
IV	5.0	5.6	7.3	9.9	13.3	7.2
I.1973	4.5	4.0	4.8	6.9	9.9	5.1
II	6.1	6.0	7.5	11.1	15.1	7.7
III	5.3	5.4	6.7	9.3	12.2	6.8
IV	5.6	8.4	11.0	15.1	23.4	9.5
I.1974	4.4	4.0	5.7	7.3	10.6	5.5
II	11.3	9.2	10.2	13.3	18.6	11.0
III	10.6	10.3	13.7	20.9	27.0	13.7
IV	12.9	12.7	14.5	20.7	33.7	15.1
I.1975	8.7	8.8	9.2	11.1	17.6	9.6
II	10.4	10.2	11.9	16.7	23.4	12.1
III	10.5	10.5	12.6	17.5	24.1	12.6
IV	9.9	11.2	14.0	19.1	27.7	13.1
I.1976	8.5	8.1	9.3	11.2	17.4	9.3
II	12.2	10.9	13.1	19.2	31.7	13.7
III	11.3	12.5	15.3	21.3	29.6	14.4
IV	11.9	11.8	14.9	20.2	30.5	14.4
I.1977	11.4	14.2	17.0	25.2	33.7	15.5
II	12.7	13.5	16.5	22.1	35.3	15.7
III	14.0	15.1	18.7	24.6	32.3	17.6
IV	11.9	13.9	17.7	23.1	36.0	16.3
I.1978	-	-	-	-	-	-
II	-	-	-	-	-	-

TABLE 29

UB RECIPIENT EXPECTED AVERAGE COMPLETED DURATION: MALES

Weeks

	MALE <21	MALE 21-24	MALE 25-44	MALE 45-54	MALE 55+	MALE TOTAL
I.1967	-	-	-	-	-	-
II	-	-	-	-	-	-
III	4.4	4.6	5.5	7.5	9.9	6.0
IV	3.9	4.4	5.2	7.9	8.7	5.8
I.1968	5.6	5.2	6.8	8.6	10.3	7.2
II	5.3	5.3	6.2	7.9	10.6	6.7
III	4.1	3.4	4.6	6.2	8.5	5.1
IV	4.1	5.2	5.8	8.9	11.6	6.5
I.1969	3.7	4.4	5.8	7.2	9.2	5.8
II	5.0	4.8	5.7	6.7	9.4	6.0
III	3.6	3.2	3.9	5.8	7.5	4.5
IV	3.4	5.2	6.2	8.5	10.9	6.1
I.1970	3.4	3.8	4.8	5.8	5.9	4.6
II	4.8	4.9	5.9	7.0	7.8	5.9
III	3.9	3.6	5.1	6.4	8.7	5.3
IV	3.2	4.1	5.3	7.8	10.0	5.4
I.1971	4.5	3.9	6.0	7.0	9.6	5.8
II	6.0	5.6	6.8	8.8	10.8	7.2
III	4.6	4.7	5.5	7.1	9.1	5.8
IV	4.6	5.6	7.4	10.8	14.6	7.2
I.1972	6.4	5.4	6.9	9.6	12.5	7.3
II	5.4	5.5	6.4	9.4	13.8	6.7
III	6.3	6.4	7.4	11.8	14.7	7.9
IV	4.7	5.3	6.9	10.8	15.3	7.0
I.1973	4.6	4.1	4.8	6.4	8.7	5.1
II	6.1	6.0	7.7	10.3	12.6	7.5
III	5.2	5.2	6.0	8.1	12.9	6.4
IV	5.3	8.0	9.9	13.6	20.8	8.7
I.1974	4.7	4.7	6.9	8.9	11.5	6.4
II	5.1	5.2	6.9	8.6	13.4	6.7
III	9.1	8.6	10.9	15.3	20.1	11.2
IV	18.0	15.2	16.0	25.1	32.9	17.4
I.1975	11.1	11.8	14.2	18.1	24.2	14.0
II	10.3	8.9	8.8	10.3	17.3	9.8
III	10.1	9.8	11.5	16.5	24.4	11.7
IV	10.1	11.3	13.9	21.3	31.4	13.5
I.1976	10.2	10.7	12.9	16.4	22.0	12.4
II	9.9	9.8	11.7	15.0	22.2	11.5
III	12.0	10.8	12.0	16.4	26.9	12.8
IV	12.1	11.4	14.0	20.6	30.9	14.2
I.1977	11.5	14.2	17.4	20.9	28.2	15.4
II	10.2	10.4	12.6	17.0	27.5	12.2
III	16.1	17.5	20.3	28.7	36.6	19.9
IV	10.0	11.9	16.5	22.6	34.7	14.3
I.1978	15.3	17.5	19.6	25.0	38.2	19.2
II	12.6	12.4	14.9	19.2	27.7	14.5

TABLE 30

UB RECIPIENT INFLOWS PER QUARTER: FEMALES

	FEMALE <21	FEMALE 21-24	FEMALE 25-44	FEMALE 45-54	FEMALE 55+	FEMALE TOTAL
I. 1967	-	-	-	-	-	-
II	7207	1706	1715	655	234	11517
III	6657	1501	1434	1048	243	10883
IV	5697	917	966	576	125	8281
I. 1968	10400	1655	1385	509	270	14219
II	8057	2002	1824	690	325	12898
III	6109	1313	1542	868	285	10117
IV	5263	826	845	435	205	7574
I. 1969	9250	1663	1298	584	236	13031
II	6375	1443	1295	509	241	9863
III	4904	1258	1032	526	268	7988
IV	5182	624	624	248	107	6785
I. 1970	7820	1675	977	458	192	11122
II	5371	1115	1105	446	112	8149
III	4536	1014	980	432	117	7079
IV	4995	826	766	324	110	7021
I. 1971	8044	1576	1409	532	129	11690
II	6733	1724	1736	516	209	10918
III	6136	1946	1513	541	204	10340
IV	7017	956	1005	335	91	9404
I. 1972	13878	2656	2383	629	231	19777
II	11566	2869	2673	937	323	18368
III	10042	3018	2650	990	256	16956
IV	10473	1702	1511	564	177	14427
I. 1973	17851	4406	3020	858	171	26306
II	13133	3093	2347	748	252	19573
III	11423	2278	2052	609	186	16546
IV	10647	1289	1300	351	140	13727
I. 1974	17651	4250	3021	846	255	26023
II	12443	2927	2054	619	230	18273
III	13680	3396	2713	889	192	20870
IV	23933	5654	4530	1524	484	36125
I. 1975	47830	15652	13206	3448	872	81008
II	33601	8428	7743	2245	690	52707
III	29538	9260	8253	2704	656	50411
IV	34956	8245	7560	2182	515	53458
I. 1976	50371	15630	12736	2985	697	82419
II	37340	10416	8926	2036	594	59312
III	37142	8169	7829	2214	407	55761
IV	32278	7998	6652	1892	310	49130
I. 1977	50583	8865	6804	1522	471	68245
II	44171	10936	9841	2075	568	67591
III	37600	9399	7520	1692	373	56584
IV	32527	8245	6322	1844	375	49313
I. 1978	55858	10725	8059	2179	448	77269
II	41359	10298	10020	2365	562	64604

TABLE 31

UB RECIPIENT ACTUAL AVERAGE COMPLETED DURATION: FEMALES

weeks

	FEMALE <21	FEMALE 21-24	FEMALE 25-44	FEMALE 45-54	FEMALE 55+	FEMALE TOTAL
I.1967	-	-	-	-	-	-
II	-	-	-	-	-	-
III	6.6	7.3	9.9	8.5	12.1	7.4
IV	8.3	11.0	12.1	12.3	27.9	9.6
I.1968	7.6	7.6	9.4	15.5	10.4	8.1
II	7.2	6.9	8.5	11.4	11.6	7.6
III	6.3	7.6	6.6	8.0	10.4	6.8
IV	7.6	10.3	10.6	13.4	14.4	8.7
I.1969	6.7	6.2	7.1	8.6	9.0	6.8
II	6.6	6.5	7.4	12.6	9.9	7.1
III	6.0	6.3	7.8	7.9	9.2	6.5
IV	6.8	11.2	13.3	15.2	15.1	8.2
I.1970	5.7	4.7	7.7	7.8	8.5	5.8
II	5.9	7.2	7.7	10.5	18.5	6.7
III	5.4	6.2	7.8	8.4	14.6	6.2
IV	6.6	10.2	10.9	12.7	16.6	7.9
I.1971	6.4	5.6	6.5	9.3	11.8	6.5
II	6.6	6.2	7.2	10.0	13.7	6.9
III	6.5	6.2	8.0	10.8	13.6	7.0
IV	7.2	13.1	13.5	16.7	24.1	9.0
I.1972	7.4	7.8	7.9	15.7	21.9	7.9
II	7.3	9.0	9.3	14.5	16.1	8.4
III	7.4	7.1	8.7	11.4	16.9	7.9
IV	9.1	11.8	12.5	14.8	19.6	10.2
I.1973	7.3	5.9	7.9	11.8	51.8	7.4
II	8.5	7.8	9.0	14.0	16.6	8.8
III	7.9	8.1	8.9	12.1	18.1	8.3
IV	10.0	14.4	13.1	20.2	29.0	11.1
I.1974	7.7	5.6	6.9	10.2	12.6	7.4
II	14.2	10.0	13.9	25.5	12.8	13.5
III	13.7	12.4	15.3	22.9	26.6	14.2
IV	17.4	18.7	22.9	30.4	33.4	19.0
I.1975	12.2	10.0	12.1	18.6	27.4	12.1
II	13.0	13.6	15.0	25.3	22.5	13.9
III	12.5	12.3	14.0	20.1	30.5	13.3
IV	13.2	16.4	17.7	24.4	32.8	15.0
I.1976	11.5	8.8	10.2	13.8	16.7	10.8
II	12.7	10.9	11.7	20.5	22.9	12.5
III	13.2	15.5	16.0	22.1	40.8	14.4
IV	14.0	15.4	17.9	26.8	57.3	15.4
I.1977	16.3	19.5	22.7	41.7	47.3	18.1
II	13.5	15.0	16.2	29.4	34.9	14.6
III	14.7	16.6	21.3	33.3	49.1	16.6
IV	15.8	20.6	24.6	32.0	52.6	18.5
I.1978	-	-	-	-	-	-
II	-	-	-	-	-	-

TABLE 32

UB RECIPIENT EXPECTED AVERAGE COMPLETED DURATION: FEMALES

weeks

	FEMALE <21	FEMALE 21-24	FEMALE 25-44	FEMALE 45-54	FEMALE 55+	FEMALE TOTAL
I.1967	-	-	-	-	-	-
II	-	-	-	-	-	-
III	6.6	7.5	11.1	9.8	17.6	7.6
IV	6.9	10.9	10.0	11.7	20.1	8.2
I.1968	9.2	7.5	10.2	13.9	14.2	9.4
II	7.7	7.8	9.6	12.1	13.5	8.2
III	6.0	7.1	7.1	9.6	10.2	6.6
IV	7.1	10.0	9.6	12.7	14.9	8.2
I.1969	8.0	7.0	7.8	9.9	12.0	8.1
II	6.4	6.6	7.7	11.0	8.8	6.8
III	5.8	6.2	7.7	8.2	7.0	6.2
IV	6.8	10.9	12.0	16.0	17.6	8.2
I.1970	6.3	5.0	7.1	8.4	8.4	6.4
II	5.8	7.1	7.1	9.9	12.8	6.4
III	5.1	6.5	9.6	8.2	23.3	6.1
IV	6.5	10.1	10.8	12.3	15.4	7.9
I.1971	6.6	4.7	6.5	7.9	13.2	6.5
II	6.4	7.3	6.8	9.7	12.5	6.8
III	6.1	5.9	7.4	11.8	10.4	6.5
IV	6.6	11.3	11.7	13.6	20.8	8.1
I.1972	8.4	7.6	9.0	14.3	16.7	8.8
II	6.8	9.0	9.2	15.0	19.7	7.8
III	7.1	8.0	9.1	13.0	22.0	8.0
IV	8.8	11.5	12.3	17.1	22.4	10.1
I.1973	7.5	5.7	8.0	9.8	22.6	7.5
II	8.7	8.4	9.5	13.2	10.3	8.9
III	7.7	7.7	8.4	14.3	69.8	8.1
IV	9.6	13.5	13.9	18.3	22.1	10.8
I.1974	8.5	6.5	7.0	10.5	15.3	8.2
II	7.2	6.9	8.7	12.2	15.8	7.5
III	10.9	10.1	11.6	18.4	15.5	11.2
IV	26.8	20.3	28.5	43.6	22.1	26.1
I.1975	14.6	12.9	15.5	21.8	30.7	14.8
II	12.8	11.4	13.3	18.7	20.5	13.0
III	12.3	12.4	14.8	23.4	36.2	13.2
IV	13.6	16.4	17.4	28.6	36.4	15.4
I.1976	13.1	11.1	13.4	19.4	28.0	13.2
II	11.4	11.5	12.7	20.0	21.9	12.0
III	13.3	11.1	10.8	15.0	24.3	12.5
IV	13.4	14.7	16.2	24.1	41.6	14.5
I.1977	15.2	17.3	21.1	30.0	35.2	16.9
II	12.6	12.5	13.7	26.0	33.3	13.2
III	16.9	20.9	22.7	38.8	60.9	19.0
IV	12.8	17.3	21.6	29.5	43.4	15.0
I.1978	19.7	20.0	24.8	27.9	45.0	21.1
II	13.1	17.0	14.5	21.4	30.4	14.2

APPENDIX C

DISAGGREGATION OF VARIATION THROUGH TIME IN

UB RECIPIENT RATES

In Chapter Three, visual evidence was offered to demonstrate the proposition that variation in inflows has been the dominant source of variation in UB recipient rates over time. In this Appendix we offer a more formal demonstration of this proposition.

A statistical technique has been developed for the partitioning of the variance of a variable that is the product of two other variables into those parts attributable solely to variation in each of the component variables, and those parts attributable to first- and second-order interactions (Burt and Finley 1968). To apply this technique, we introduce the concept of the 'expected UB recipient rate'. The expected UB recipient rate for the t^{th} period is defined as the product of the observed incidence of inflows and expected average completed duration for the t^{th} period. Conceptually, it is the stationary level that would result if t^{th} period inflows and duration remained steady indefinitely. The expected UB recipient rate will not necessarily equal the actual UB recipient rate at any particular point in time, but it will chart the same broad movements.¹

With the expected UB recipient rate being the product of the incidence of inflows and average completed duration, the abovementioned technique can be used to partition variation in this variable into the influence of inflows, the influence of average completed duration, and the influence of their interaction. This gives an indication of the relative contributions of inflows, duration and their interaction to changes in the actual UB recipient rate.

1. In fact the expected UB recipient rate will 'lead' the actual beneficiary rate.

Let u_t^E be the expected UB recipient rate for the t^{th} period, i_t the incidence of inflows and D_t^E the expected average completed duration. Then

$$u_t^E = i_t \cdot D_t^E.$$

Following Burt and Finley (1968)

$$\begin{aligned} \text{Var}(u^E) &= (\bar{D}^E)^2 \cdot \text{Var}(i) + (\bar{i})^2 \cdot \text{Var}(D^E) + 2 \cdot \bar{i} \cdot \bar{D}^E \cdot \text{Cov}(i, D^E) \\ &\quad + E[(i_t - \bar{i})(D_t^E - \bar{D}^E) - \text{Cov}(i, D^E)]^2 \\ &\quad + 2\bar{i} \cdot E[(i_t - \bar{i})(D_t^E - \bar{D}^E)^2] \\ &\quad + 2\bar{D}^E \cdot E[(i_t - \bar{i})^2(D_t^E - \bar{D}^E)] \end{aligned}$$

where 'bars' refer to means and E in front of a term denotes the expectations operator.

The first two terms in this expression are the direct effects of the inflow and duration variables respectively, and the third term is a first-order interaction effect. The fourth term is the variance of the covariance product about the covariance parameter, is necessarily positive, and is neutral for purposes of interpretation. The last two terms are higher-order interactions. Burt and Finley suggest that since the last three terms of this expression have their origin in the second-degree terms of a Taylor's series, they are likely to be relatively unimportant and can be ignored. For ease of interpretation they also suggest dividing the remaining three terms by the sum of the first two terms. By doing this the relative inflow and duration effects sum to unity.

Table 33 presents the relative direct inflow and duration effects, and their first-order interaction, for total males and females. Smoothed quarterly incidence of inflows and average completed duration data have been used over two periods, 1967 to 1973 and 1974 to 1978.¹

1. Smoothed using a 4-term moving average to remove seasonal and erratic short term movement.

TABLE 33
 PARTITIONING OF THE VARIANCE OF THE EXPECTED
 UB RECIPIENT RATE

	1967-73			1974-78		
	DIRECT I EFFECT	DIRECT D EFFECT	INTERACTN EFFECT	DIRECT I EFFECT	DIRECT D EFFECT	INTERACTN EFFECT
MALE	0.93	0.07	0.48	0.74	0.26	0.67
FEMALE	0.88	0.12	0.63	0.77	0.23	0.53

For the first period (1967-73), it can be seen that the direct effect of inflows on the UB recipient rate far outweighed that of duration for both males and females. In fact, the direct influence of changes in inflows was about 9 times that of duration. The interaction of inflows and duration also made a substantial positive contribution to variation in UB recipient rates, being less than the direct contribution of inflows but far greater than the direct contribution of duration.¹

Over the second period (1974-78) when the UB recipient rate increased rapidly to high levels, there was less difference in the direct effects of inflows and duration. However, the direct contribution of inflows still dominated. Again the interaction of these two influences made a substantial positive contribution.

Overall, the results obtained by graphical techniques in Chapter Three are confirmed by the more formal variance partitioning approach.

1. The positive interaction term arises from the incidence of inflows and average completed duration being positively correlated over time.

APPENDIX D

ABS UNEMPLOYMENT¹

ABS unemployment is an estimate based on the regular population survey carried out by the Australian Bureau of Statistics. The current definition of unemployment adopted for the survey is all civilians 15 years and over who either:

- (a) during survey week did not work and did not have a job, but could have taken one had it been available, and had been actively looking for part-time or full-time work in the preceding four weeks;
- or
- (b) were waiting to be called back to a job from which they had been temporarily stood down without pay for four weeks or less.

CES UNEMPLOYMENT²

CES unemployment comprises all those registered with the Commonwealth Employment Service who claimed when registering they were not employed and were seeking a full-time job. This includes persons referred to employers but whose employment was still unconfirmed, and persons who had recently obtained employment without notifying the CES. All recipients of Unemployment Benefit are included. Persons seeking part-time or short-term casual employment are not included.

1. From ABS, The Labour Force.

2. From Dept. of Employment and Youth Affairs, Monthly Review of the Employment Situation.

TABLE 34

CES UNEMPLOYMENT INFLOWS PER QUARTER

	MALE <21	Male 21+	FEMALE <21	FEMALE 21+
I. 1967	45309	112719	38035	38208
II	33141	113831	28934	45852
III	31661	110810	25273	42592
IV	34145	99498	30137	39968
I. 1968	50551	113736	41788	42109
II	34863	119187	29921	48226
III	31615	112854	25468	44640
IV	35819	106360	29718	42162
I. 1969	53849	111710	42324	41044
II	34279	116173	27958	46783
III	32824	108929	25077	44155
IV	38954	100555	29375	41557
I. 1970	54895	108094	39915	41516
II	35968	111629	27422	46367
III	37972	117351	24824	40882
IV	45123	111229	30430	39029
I. 1971	61699	116739	42495	40604
II	47272	130461	32772	49107
III	46087	124773	29613	44130
IV	50196	126656	33970	43232
I. 1972	75961	148300	51341	46094
II	56003	155133	37084	52218
III	53875	150927	34428	46905
IV	59669	138305	40154	44149
I. 1973	75047	151565	51646	46428
II	56949	134438	37811	45734
III	51990	126102	33389	49494
IV	53079	112958	35757	37325
I. 1974	93350	122707	54649	42253
II	54973	121134	38452	45370
III	61094	143275	41555	52322
IV	73999	175822	55863	71868
I. 1975	103892	210406	79210	74862
II	71269	189436	52551	72152
III	74630	211237	53010	67071
IV	80098	195651	59388	63185
I. 1976	112656	187299	89108	63172
II	78591	184363	61639	63662
III	75091	181410	58619	60984
IV	70977	165136	55998	54867
I. 1977	118005	198939	95705	66321
II	82102	189945	65178	66540
III	74439	185546	58232	62536
IV	84293	180954	67443	65441
I. 1978	112804	190187	96657	70210
II	80451	183661	64496	66630

APPENDIX E

SEARCH THEORIES OF UNEMPLOYMENT

Search theory models involve the assumption of imperfect information about job availability and attributes by job seekers, and imperfect information about worker availability and attributes by firms. Both job seekers and firms undertake search. In that search theory models consider the search processes of individual workers and firms and from this derive the behaviour of labour market aggregates, this approach has been dubbed 'the new microeconomics of labour markets' (Tobin 1972).

The dynamic labour market models proposed by the various authors differ in the extent of their coverage of the total labour market process. At the most basic level are models of the search and job acceptance or rejection process of job seekers. In that these models only describe the decision-making process of the job seekers, they do not in themselves provide hypotheses as to the nature or behaviour of unemployment. However, when combined with models of the search and employment activities of firms in the job market, macroeconomic hypotheses are forthcoming. The basic models of the search process of job seekers will be discussed first before looking at how these models have been incorporated into broader models of labour market behaviour.

Stigler (1962) was the first to examine the search process of job seekers with less than full information on the job market. Considering only the wage attribute of jobs, if the job seeker knows the parameters of the wage distribution of jobs open to him and each job offer remains open indefinitely, then it will be optimal (in the sense of maximising income) to seek out a certain number of wage offers. This certain number of wage offers sought out will depend on the cost of search, and in fact will be such that the expected marginal gain from search equals the marginal cost. After carrying out these certain number of investigations of wage offers, the job seeker accepts the highest offer made (provided it is higher than the return from the alternative

search or quitting to carry out unemployed search. This decision will depend on the costs of quitting (foregone income) and the return from quitting to search (an increased flow of job offers). As the return from the time input is assumed to increase when job offers are more readily forthcoming, quits to search for a job ('voluntary unemployment') should be more common in periods of rising aggregate demand. Thus Gronau's theory predicts that the flow of quits into unemployment will increase with increases in aggregate demand.

Another innovation in Gronau's model is allowance of the termination of search before a suitable job is found. A job seeker stops his search altogether when he finds that the value of his alternative activity exceeds the expected gains from job search. For employed job seekers, this means that they remain in their current jobs. For unemployed job seekers, this means dropping out of the labour force. Because expected gains from search fall as the rate of arrival of job offers declines, search will be discouraged in periods of falling aggregate demand. Employed persons will tend to stick to their jobs more, meaning a decline in quits made to take up new jobs. Drop-outs from unemployment to out of the labour force will increase.

Salop (1973) has developed a somewhat different model to those discussed above. He assumes that workers know something about firms in the job market, namely their wage offer distribution and the probability they will be hiring. On the basis of this information they rank firms according to the desirability of approaching them for work, and approach them in this order. Under the objective of maximising the present discounted value of expected wealth, this ranking depends not only on the expected wage offered by firms, but also on the probability that they are hiring. One firm is approached each period, and an acceptance wage set for the job offer that may be forthcoming (with some known probability). Thus the probability of the job seeker being placed during a certain period will depend on the probability of receiving a job offer as well as the probability of the wage being paid exceeding his acceptance wage.

It is shown that under these conditions the acceptance wage will decline as the duration of search increases. But, unlike the previous models, this tells us nothing about how the probability of being placed in a job varies with the duration of search. Here not only the probability of receiving a job offer varies from period to period, but the wage distribution from which offers are drawn also varies. Under these conditions, the effect on the probability of being placed of the declining acceptance wage as the duration of search increases is indeterminate.

Barron (1975) has proposed a model in the framework of economy-wide search as used by McCall and Gronau, rather than in the framework of searching specific firms as used by Salop. He is concerned that earlier models relied on a constant flow of wage offers each period, even under changing conditions. He suggests a model in which the individual faces a certain probability of locating a 'suitable' vacancy (the worker's attributes and the job requirements match up), with the worker knowing the wage offer distribution of these vacancies which he is attempting to locate. With worker attributes remaining intact during search, under unchanging conditions the probability of a worker locating a suitable vacancy will remain constant from period to period. Also, as an infinite time horizon is used, under unchanging conditions the acceptance wage set by the worker will remain constant from period to period, meaning a constant probability of the job seeker accepting a vacancy that has been located. Thus under unchanging conditions, Barron's model trivialises to that of McCall. The individual job seekers have a constant probability of terminating search each period, and thus a constant expected duration of unemployment.

However, the reason Barron introduces the probability of locating a suitable vacancy is to allow him to comment on situations of changing aggregate demand. A falling off in aggregate demand is assumed to be typified by a decrease in the number of vacancies. When this occurs, the probability per period of locating a suitable vacancy decreases. The expected return

from additional search declines, meaning the optimal acceptance wage is lower than before. With the wage distribution steady this implies an increase in the probability of accepting a vacancy that has been located. As these two effects work in opposite directions, Barron's model does not indicate how the expected duration of unemployment will respond to changes in aggregate demand.

While the decision to terminate unemployment has been studied in detail in these models, the decision by individual workers to commence spells of unemployment has not been looked at to the same extent. Recall that Gronau extended his search model to employed workers and considered the possibility of quitting to search for a better job. However, not many have followed this lead, perhaps because of a belief that most quitters move immediately into another job rather than into unemployment. Thus Parsons (1973) has developed a theoretical model of quit behaviour over time, but has assumed that all quits are made to take up a new job, with search being undertaken while still employed. Mattila (1969) has developed a simple model in which quitting to become unemployed is allowed and from which certain behaviour hypotheses can be obtained. However, in a later paper (Mattila 1974) he retreats from this position in the light of empirical evidence and theoretical consideration and takes the approach that quit rates be viewed as having two components: a fairly small constant exogenous flow of quits into unemployment (those quitting impetuously after a fight with the boss) and a larger, endogenous flow of utility-maximizing workers who move directly from job to job.

In that the search models outlined so far only involve the supply side of the market (the behaviour of individual workers), it is not surprising that very few hypotheses as to the nature and behaviour of unemployment in a dynamic labour market are forthcoming. However, when these behavioural models of the supply side of the market are combined with models of the demand site (the behaviour of individual firms), some interesting implications are generated. We now turn to these broader models.

In a series of papers spanning several years, Holt and others (Holt and David 1966; Holt 1970a; Holt 1970b; Smith and Holt 1970) have developed a labour market model incorporating the imperfect information and search process of job seekers discussed above. By specifying how firms as well as job seekers behave, determinant results regarding the effect of changes in labour market conditions on the unemployment experience of individuals, and thus aggregates, can be obtained.

Consider first the search process of unemployed job seekers. These people are assumed to have imperfect information on which firms are offering suitable jobs, and the wage distribution of these jobs. Each period the individual job seeker faces a certain probability of detecting a vacancy in the line of work he is seeking and arranging an interview, at which the job must either be accepted or rejected. Under these circumstances, it will be optimal to establish an acceptance wage. Then if costs of search were constant per period of time unemployed, and if a worker faced a known probability distribution of wage offers for jobs that otherwise were identical, then a constant acceptance wage would be optimal.

However, for a number of reasons Holt expects that the wage acceptance level of workers will decrease with increasing duration of unemployment. All other factors aside, we would expect this declining acceptance wage to imply an increasing probability of the individual leaving unemployment as the duration of unemployment increases. But because the worker may be able to some extent detect the higher wage firms from the lower wage firms, and because employers may interpret extended unemployment as evidence that the worker lacks merit, this will reduce the probability of employment. Holt feels that these tendencies may cancel out, so that the probability of finding a job per period of time is nearly constant, or at least only changes slowly.

Before considering how this probability of job placement for unemployed workers changes with changes in labour market conditions, we need to consider how firms behave in the labour market. Holt's model has firms initially trying to recruit workers at low wages, but as the duration of these job vacancies extends firms realize they need to offer more to attract labour, and increase wages.

Thus we have wage offers increasing with the duration of job vacancies, and the acceptance wage declining with the duration of unemployment. A job placement occurs when a job seeker detects a vacancy in the line of work he is seeking and arranges an interview, and from this interview comes a wage offer that exceeds the job seeker's acceptance wage.

To consider how the probability of placement (and thus the duration of unemployment) varies cyclically, the probability of an unemployed job seeker being placed is broken into two parts. These are the probability each period of detecting a suitable vacancy and arranging an interview, and the probability that this interview will result in a wage offer above the worker's acceptance wage.

Consider a labour market containing a certain number of firms with each firm offering no more than one (and perhaps zero) job openings. Then, depending on the efficiency of search (the number of firms canvassed each period), there will be a certain probability of a job seeker detecting a particular job vacancy in the line of work he is seeking in any period. From this, the probability of detecting any job vacancy in the line of work he is seeking in any period will be the above probability multiplied by the total stock of vacancies. The probability that the interview arising from detection of the vacancy results in a job placement depends on the probability of a job offer that is higher than the worker's acceptance wage being made by the firm. Thus the probability that an individual unemployed job seeker will be placed in a job over any period is the product of three elements. These are

the probability that he will detect a particular vacancy over the period, the total stock of vacancies at the start of the period, and the probability that a wage offer received will be above his acceptance wage.

Holt assumes that the effect of an increase in aggregate demand is to increase the number of firms with a vacancy. The wage offer schedules of firms do not change, or if they do, they change for all firms and this change is detected by the workers who correspondingly alter their acceptance wage. Holt also assumes that over the cycle the efficiency of search fluctuates very little, so the probability of detecting a particular vacancy will not change significantly. Also, the probability of a placement resulting from an interview tends to remain constant over the cycle. This occurs because the duration of unemployment and the duration of vacancies could be expected to move in opposite directions over the cycle, with actual wage offers and acceptance levels moving in the same direction. Accordingly the proportion of wage offers exceeding acceptance levels is not expected to change much over the cycle.

Thus of the relevant factors, all that changes is the number of vacancies. The probability of an unemployed worker being placed in any period varies proportionally to variation in the number of vacancies. Workers are placed more readily in a boom purely because they have less trouble in detecting firms that are seeking workers. This implies that the expected duration of unemployment will display an inverse relationship with the number of job vacancies. Of course, not all those leaving unemployment are successful job seekers, and Holt qualifies the above result by saying that the number of drop-outs from unemployment will not vary over the cycle for primary workers, but may do so for secondary workers (somewhat offsetting the abovementioned effect).

assumed to form a subjective estimate of the mean of the wage distribution in the current period and use this as their acceptance wage. This acceptance wage will differ between individuals because of their different experience in the earlier periods, but will not vary systematically with the duration of unemployment. Given that inflation is fully anticipated, the acceptance wage on average will equal the true mean of the wage distribution.

Under these conditions, a certain proportion of the unemployed will find a satisfactory job each period, and cease job search unemployment to commence this job. However, over the business cycle when the rate of wage inflation changes, job seekers are assumed to not fully perceive this change. They will not on average correctly perceive the mean of the current wage distribution, and will on average set acceptance wages above or below this mean. Specifically, when aggregate demand increases at a faster-than-usual rate, the rate of price inflation in the product market increases, with this in turn causing an increase in the rate of wage inflation. To the extent that job seekers do not fully perceive this change in the rate of wage inflation, they will on average set their acceptance wage below the true mean of the current wage distribution. This means that a greater-than-normal proportion of job seekers will receive wage offers above their acceptance wage and leave unemployment. In this way, the probability of leaving unemployment rises and the average duration of unemployment falls.

Thus Holt and Mortensen put forward different mechanisms as to how duration of unemployment changes over the cycle. Holt concludes that the change in average duration of unemployment over the cycle results from a change in the proportion of job seekers finding vacancies, with the probability of this contact resulting in placement remaining constant. Mortensen concludes that the change in average duration of unemployment over the cycle results from a change in the probability of a contact with a vacancy resulting in placement, with the proportion of job seekers making contact constant. Drop-outs from unemployment are not considered.

In another paper, Mortensen (1970b) once again concentrates on flows from unemployment to employment and ignores inflows. Assume as before that the number of vacancies an unemployed job seeker can contact in one period is fixed over the cycle, so in this model also it is the probability of a contact resulting in a placement that varies over the cycle. However, in this model this variation does not rely wholly on job seekers not fully anticipating changes in the inflation rate. An additional mechanism is introduced. To do this, there is need to consider the skills the worker possesses, and the skills required by different jobs.

Assume skill to be one-dimensional and measurable. Each job vacancy requires some minimum level of skill. Let the wage offered be solely dependent on this minimum level of skill, with each opening requiring the same skill offering the same wage. Now workers have imperfect information on both skill requirements and wage offers of different jobs, but as wage offers will be the same for jobs of the same skill requirement, we need consider only skills. Given the worker's skill level, the worker will satisfy the minimum skill requirements for a certain proportion of jobs. The job with a minimum skill requirement exactly equal to the worker's skill level will be offering the worker's maximum attainable wage. The worker will set an acceptance wage somewhere below this level, this implying a skill requirement somewhat below the worker's skills. Thus the probability of a certain worker being placed in a job after random contact with a vacancy is the proportion of total jobs being offered that have a minimum skill requirement falling between the worker's actual skill level and the skill level implied by his acceptance wage. This probability will not vary with the duration of employment. The constant probability determines the expected duration of unemployment for the individual and, taken over all unemployed job seekers, the average duration of unemployment.

To determine how these probabilities of placement and thus average completed duration of unemployment vary cyclically, we need to consider how firms react to changes in demand. If in the short run there is a general increase in demand for the products of firms, each firm is assumed to lower the skill requirements attached to its vacancies and raise its wage offer. Job seekers know the relationship between skill requirements and wage offers. They presumably perceive changes in this relationship, and set their acceptance wage so that the same proportion of low skill jobs are excluded from acceptance. Accordingly we need not consider this general inflation of wage offers. However, the general lowering of skill requirements will mean that each worker will be eligible for a greater proportion of jobs and, *ceteris paribus*, display a greater probability of accepting a vacancy. But if job seekers perceive this general lowering of skill requirements, they will increase their acceptance wage (over and above any adjustments for inflation) to increase the proportion of low skill (and thus low pay) jobs they would reject. This would lower the probability of accepting a vacancy. Mortensen concludes that the net result of these two effects will probably be an increase in the probability of placement. However, he assumes that job seekers will not perceive the general lowering of skill requirements as they use the long run relationship between offers and qualifications as the basis for their decisions, so the latter offsetting effect will not be operative.

Thus as aggregate demand accelerates, unemployment falls due to an increase in the probability of individuals leaving the pool - the average duration of unemployment falls. This occurs because job seekers do not realize that general minimum skill requirements change over the cycle, so do not adjust their acceptance wages accordingly. So although we still arrive at the same result as obtained for Mortensen's first model (unemployment changes cyclically due to changes in the probability that contact with a vacancy will result in a job placement), the reasons (underlying assumptions) for this result are different.

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