THE DYNAMICS OF US LABOR FORCE ATTACHMENT*

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ABSTRACT

We analyze the dynamics of labor force attachment in the US by studying patterns of transition behavior for individuals matched month-to-month using data from the new Current Population Survey. Specifically, we examine transition behavior for four labor market states: employment, unemployment, marginal attachment ("wanting work" but not searching), and non-attachment ("neither searching nor wanting work"). Our methods test whether various degrees of attachment among the non-employed are behaviorally distinct and illuminate the nature of dynamics among a broader set of labor market states than is usually examined. Results from the unconditional transition rates over time suggest that the breakdown of the non-employed into three categories is a useful approach that is supported by the data. These results are confirmed and enhanced by estimation of a number of multinomial models of labor market dynamics, and by estimation and testing within a duration modeling framework that allows for dependence. Moreover, these findings are consistent with earlier results found for longer time-periods using Canadian data, although the present work adds significantly to these results by showing that neither seasonality nor duration dependence issues confound this evidence.

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I. Introduction

This objective of this paper is to analyze the dynamics of labor force attachment in the US. More generally, the paper also seeks to address issues relating to the appropriate definition of unemployment and non-participation, definitions that have been partly a matter of tradition or custom and partly the subject of empirical analysis, although it is worth noting that such definitions do nonetheless differ internationally (e.g., between Canada and the US) and are on occasion revised even within a national economy.

Questions concerning the appropriate breakdown of non-employment time and how to model the dynamics of such non-employment spells are important for several reasons. First, to the extent that considerable attention is paid to magnitudes such as the unemployment and the labor force participation rates, their definition is fundamental.[1] Second, although it is usual in much economic analysis to interpret the unemployed as engaged in optimal job search behavior and non-participants as engaged in household production (at a corner solution with respect to market participation), some evidence suggests that the distinction between the two states may not in fact be clear cut. Hall (1970) and Clark & Summers (1979) argue that such a distinction may be difficult to sustain when, for example, multiple changes of classification occur within a single non-employment spell.

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[1] While unemployment rates are usually measured following ILO guidelines, there is some variation internationally, e.g., in deciding what constitutes a sufficient degree of job search. The US follows a different policy regarding "passive" job search than does Canada, for example. There is more variation in the set of supplementary measures of unemployment reported in different countries, however. The set reported for Canada was revised (Statistics Canada 1999), following revisions to the Labour Force Survey effective 1997.

Relatedly, Lucas & Rapping (1969) have queried the empirical content of the job search question that forms the basis of most unemployment classifications, given that nothing is specified in that question about job characteristics (including the wage). Third, the distinction between unemployment and non-participation may be harder to interpret in the context of recent flow-based models of labor markets (e.g., Hall 1983, Blanchard & Diamond 1992) where "waiting" for now openings to appear may be a better description of much optimal non-employment behavior than the active "job search" envisaged in an earlier generation of models. Empirically, agents who fail to find a match from the initial stock of vacancies and who wait for new openings to be generated may be classified as non-participants, even if they are unemployed in the flow model of labor markets. Finally, the analysis of unemployment and non-participation durations, their cyclical behavior, and questions concerning potential true duration dependence in such spells, are all fundamentally affected by decisions about how to draw the distinction between the two non-employment states.

This paper begins an empirical investigation of these issues for the US, using recent data from matched surveys from the new CPS. It builds on our earlier work with Canadian data (Jones & Riddell, 1998, 1999a, 1999b), although at the outset we note that the US data has some important advantages for this set of questions, including detailed non-employment status for each survey month and a panel structure that goes beyond the matched pairs of surveys employed in our previous work. Finally, it is worthy noting that the degree of labour force attachment in the US, particularly the "marginal" attachment of persons who would usually be classified as out of the labour force, appears large on a comparative international basis, so there is a *prima facie* case for investigating the behavior of this group more closely.

II. Framework for analysis

The statistical framework we employ to assess whether two (or more) non-employment states are behaviorally distinct is based upon work by Flinn and Heckman (1983). Using the NLSY, they tested whether unemployment and out of the labor force were distinct states for white male high school graduates, work that was subsequently extended by Gönül (1992). In both papers, the analysis compared the behavior of those classified as unemployed (U) with those classified as non-participants (O). While informative for some groups, we suspect that for the population as a whole, the non-participant category contains many persons with essentially no current labor force attachment and we have little doubt that the behavior of many in this O group is distinct from that of the unemployed. Central questions of measurement and policy, such as whether unemployment should be defined based on some sort of reported job search, or a reported desire for work, are concerned with subsets of the O and U categories, such as non-searchers who report that they desire work. To tackle such questions empirically requires data in which search behavior and the desire for work are identified.

The first part of the empirical analysis can be described in the context of a Markov model of transitions among labor force states, although we address a framework with potential state dependence subsequently. Initially at least, we address potential heterogeneity within the O category by envisaging four states: employment (E), unemployment (U), marginal attachment (M), and not-attached-to-the-labor force (N). The first two states correspond exactly to those measured in the

CPS, while the latter two states represent a division of the non-participation group (O) into two components, M and N. Although there are a range of possible definitions of marginal attachment, our primary focus is on individuals who did not search for work but who reported that they desired work. The residual not-attached state (N) is hence made up of persons who *neither* searched for *nor* desired work.

We consider labor market dynamics represented by a 4×4 transition matrix P where the ij element p_{ij} is the probability of an individual being in state j in the next period given that the individual is in state i in the current period:

$$P = \begin{pmatrix} pEE & pEU & pEM & pEN \\ pUE & pUU & pUM & pUN \\ pME & pMU & pMM & pMN \\ pNE & pNU & pNM & pNN \end{pmatrix}$$

In this Markov context, marginal attachment and not attached would be behaviorally identical states if pME=pNE and pMU=pNU. If true, such equalities would imply that the 4 state Markov model was equivalent to a 3 state model based on the conventional measures of labor force activity (E, U and O): the reported desire for work would then convey no information regarding labor force attachment beyond that provided by reported job search.

In contrast, it might be that the conventional job search requirement for unemployment is too narrow, and that the marginally attached are not behaviorally distinct from the unemployed, in which case pUE=pME and pUN=pMN. If these conditions hold, unemployment would more sensibly be

measured based on a reported desire for work rather than on job search. The desire for work is then the key criterion and no additional information is conveyed by reported job search.

Finally, it may be that neither of these restrictive conditions is supported by the data, with the marginally attached representing a distinct group with behavior between that of the unemployed and the non attached. This may supply rationale for statistical agencies to report unemployment, marginal attachment and non-attachment on a regular basis.

In a non-Markov framework, the rate of transition from one state to another might depend not just on the current state but also on how long the individual has already spent in that state.[2] Indeed, much research attention has been directed towards the study of the "true" effects arising frm such duration dependence, and towards the empirical separation of true dependence from the results of a process of sorting based on unobserved heterogeneity. While data limitations did not permit analysis of duration-related issues in earlier work, the present CPS data provides some durations (up to four months) that can in part address these questions. We tackle this empirically below.

III. Data Construction and Characteristics

This research employs a set of panels constructed from the new Current Population Survey that match households from one month to the next and then employ a matching algorithm based on

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[2] Equivalently, of course, one can redefine the states so that they incorporate the history of the process, while staying within a Markov model. Unemployed (one month) would then be distinct from Unemployed (two months), for example, and the resulting Markov transition matrix would have only a limited set of feasible transitions. We address this interpretation empirically below.

checks for legitimate changes (in some cases no change) in race, age, sex, marital status, education and veteran status to identify individuals within these matched households. This procedure is similar to that used in previous work (Card, 1996) with matched CPS data. (The Appendix details the matching process and summarize the nature of the panels.) The rotation group structure of the CPS whereby an individual is in the sample for four consecutive months, then out of sample for eight months, then in again for a further four months, means that we are able to generate panels of four consecutive months, together with a related panel for the same individuals for the same four months one calendar year later. Each panel ends up including about 6000-7000 matched individuals. We note that the availability of these data for all starting months permits investigation of seasonality issues in these labor force dynamics, something that was not possible with the March-April matches available in our earlier research with Canadian data. More importantly, we also note that this CPS panel structure goes far beyond the pairwise matching of two adjacent months that was employed in the earlier work, offering the potential for a richer picture of dynamics that includes duration dependence.

A second advantage of the new CPS, relative to both the CPS pre-1984 and many other datasets, is that information on marginal labor force attachment is available for each survey month.[3] For persons classified as not in the labor force, category O from the previous section, the marginal group (M) consists of individuals who answered "Yes" or "Maybe, it depends," to the question "Do you currently want a job, either full or part time?" and the balance of the O group comprises the non-

[3] Such information has recently been available in Canada as well, starting with the 1997 Labour Force Survey. Jones & Riddell (1999b) is a preliminary analysis of the first two years of these Canadian data.

attached (N). It may bear repeating that this question is subjective and not obviously linked to actual behavior, so one may harbor a legitimate skepticism as to whether responses are a good guide to future actions. Of course, something the same could be said of the usual job search question that is used internationally to divide the U and O groupings, especially given the absence of any specifics on wage, job type or working conditions. Our view at this stage is completely agnostic, looking to the empirical analysis to assess whether these responses in fact have useful content or not, rather than furthering a priori speculation.

At the outset, it should be noted that although we are able to generate panels for most four month periods since January 1994 through December 1996, there is a gap in the data in mid-1995. Technical factors associated with a change in the CPS geographic identifiers from the September 1995 public use file and associated confidentiality provisions meant that the BLS was obliged to change household identifiers after May 1995 so that the panels have a gap from May to September 1995.

Lastly, we note that the size of the marginally attached group in the US is substantial. Using the March files annually from 1976-1996, and using only the outgoing rotation groups in the final three years of this sample so as to be comparable with the earlier years (when marginal attachment information was available only in survey months 4 and 8), we find that the average number of marginally attached is about three quarters the number of the unemployed over this entire period. Using the post-1994 monthly data alone, the weighted counts of the percentages of the labor force that are U and M are graphed in Figure 0. Again, the average level of marginal attachment is a significant fraction of the unemployment rate, with the two series moving largely in tandem over this three year period.

Overall, the matching of sets of four consecutive months together with the detailed questions available in the new CPS on degrees of labor force attachment make this dataset unique in its capacity to address the central questions of this research.

IV. RESULTS

Transition Rates

We begin presentation of the results by examining the average month-to-month transition rates from the three non-employment states {U, M, N} into the four labor market states {E, U, M, N}. For this discussion, we base our results on the full sample of matched individuals between any two adjacent months, rather than the more stringent requirement (for panel membership) that individuals successfully match across four months, although the overall pattern of the results is identical in both cases. We label matched pairs of months by the origin month.

Figure 1 presents the three hazards into employment, and several features are apparent. First, the series are relatively stable month-to-month, suggesting that there is no overwhelming pattern of seasonality to contend with. This is especially true for the hazard for not-attached group, the largest of these three non-employment categories. Second, there is clear indication in every month that the ranking pUE > pME > pNE holds, with a striking separation between each pair of series. The hazard from unemployment ranges in the 0.2 to 0.3 interval while that from not-attached is always below 0.05, with the marginal group having an intermediate hazard between 0.1 and 0.2 for all of the matched months. However, it should be noted that these data do not place the marginal group as

much closer to the unemployed than to the not-attached, a finding that characterized the earlier work with Canadian data (Jones & Riddell, 1999, p7).

Figures 2-4 present the analogous empirical hazards into unemployment, marginal attachment, and not-attached, respectively. The hazards into unemployment are also fairly stable and display a similar clear separation in every month with pUU > pMU > pNU. For transitions into the marginal state, the smallest of the non-employment states numerically, Figure 3 shows that monthly stability still obtains, with the ranking pMM > pUM > pNM. Interestingly, the on-diagonal element pMM hovers around 0.3, while the corresponding figure for pUU was closer to 0.5, showing the higher degree of instability in the Markovian dynamics associated with the marginal state. Finally, Figure 4 graphs the two series pUN and pMN, with the average transition rate from marginal to not-attached being high at around 0.4 in all months while the figure from unemployment is rather around 0.1. (To permit an informative scale for the graph, we omit the series pNN from Figure 4: this hazard has a very stable value around 0.93.)

Overall, we conclude from this first look at the monthly rates of transition that the marginally attached groupappear to exhibit different unconditional behavior than the non-attached, falling clearly between the U and N categories in each month. The marginal group also appears a relatively fluid one, with only a one third probability of remaining in the same marginal group in the next month, and displaying in fact a greater chance of moving into not-attachment.

Breakdown of the Marginal Group

We next report on transition behavior for a breakdown of the marginal group. The sub-categories are based on responses to the question concerning the reason for not searching and are

made up of three groups: “discouraged workers,” who report not searching because they believe no work is available; those not searching for “personal” reasons, based on child card, family responsibility or health problems; and those not searching for “other” reasons. The hazards from these sub-categories into the four states {E, U, M, N} are denoted d, p and o, respectively, and are graphed in Figures 5-8.

The hazards into employment display some differences by marginal sub-category, with the transition rates from “personal” being the lowest and with the discouraged worker group usually being intermediate between the other two, while the series graphed in Figure 6 show that the discouraged sub-category have the highest rate of transition into unemployment. All three groups tend to remain marginally attached with a month-to-month probability of around 0.3, with little to separate the sub-categories in this case, and the discouraged worker group usually has the lowest hazard of the three into the not-attached state (Figure 8). When compared with our earlier work on Canadian data, these four graphs show much less unconditional heterogeneity within the marginal group in the US, suggesting that, although the reason for not searching might be important in some cases, it does not carry the same significance as the question on a desire for work.

Pairwise Equivalence Tests

We next assess whether these results on the unconditional transition probabilities of moving from one state to another also hold conditionally. To do this, we estimate a multinomial logit model of the determinants of the hazards from one origin state to the four states {E, U, M, N} under consideration and, to test equivalence, we test whether or not we can pool two origin states. At this stage, note that these estimates are purely based on pairs of adjacent months and do not yet exploit

the panel structure of the CPS data. However, they correspond exactly to the tests that were feasible with our earlier Canadian data (Jones & Riddell 1999) and hence are useful both as a starting point and for purposes of international comparison. In each case, covariates are relatively parsimonious and include three variables for region, sex, marital status, age and two variables for education. In addition, each unrestricted model includes a dummy variable that takes the value 1 for one of the origin states and 0 for the other, together with interaction variables that multiply this dummy variable with each of the covariates. Thus, the unrestricted model allows all coefficients to vary between the two origin states while the restricted model omits both the dummy and the interactions, forcing all coefficient to be equal for the two origin states.

Table 1 reports the resulting test statistics for the equivalence of marginal (M) and not-attached (N). In every case, the null of equivalence is decisively rejected, consistent with the unconditional evidence apparent from Figures 1-4 above. Table 2 reports the equivalent results for testing equivalence of unemployment (U) and marginal (M) and again, although the sample sizes are noticeably smaller, we obtain the same decisive rejection in each case. Thus, these conditional results confirm the evidence from the graphs that these states appear to be distinct insofar as they predict different subsequent labor market behavior. Information about the desire for work is important as a supplement to job search information and significantly separates the marginally attached from both the unemployed and the not-attached groups.

We also wish to test equivalence for various sub-groups of the marginal category, along the lines of Figure 5-8 above. To date, however, the smaller sample sizes associated with these groups have meant that the results do not converge in some months. We hope to report these results in the next version of the paper.

Exploratory Analysis of a Larger Dynamic Model

We next address in an exploratory manner the use of the panel nature of these CPS data for the study of labor market dynamics. Consider a Markov model of transitions where we expand the set of states to accommodate dependence. In place of state E, for example, we envisage four potential employment states, E1, E2, E3 and E4 according to whether the current status in employment was preceded by 0, 1, 2 or 3 periods also in employment. Analogously, U1-U4, M1-M4 and N1-N4 denote the path-dependent measures of the three non-employment states.

Given this, the four month rotation structure from the CPS yields a transition matrix with 12 origin states (according to whether the current month is the first, second or third month in each of four states) and with 16 destination states, so we refer to this framework as the 12x16 model. Of course, this transition matrix is relatively sparse, having many zero restrictions, since (for example) the only way to reach destination state E3 is to have been in state E2 in the preceding month, something that only occurs on the paths EEEX and XEEE, where X represents any non-employment state. The first part of Table 3 summarizes these various possibilities, while the second and third panels give transition probabilities and sample sizes as an example of the results for the January 1994 panel. Note that, while some cell sizes are small, these results are largely consistent across the various panels so that some sample size improvement is possible by averaging across all the panels.

Several features of these results in Table 3 bear comment. First, the quasi-diagonal blocks (row U1 to column U2, row U2 to column U3, row U3 to column U4, and analogously for M and N) give some indication of the relative stability of these non-employment states. In unemployment, the tendency is for these diagonal elements to rise slightly, indicating an overall degree of positive

duration dependence in these unconditional data. For the marginal group, this effect is stronger still, so that, although the one period transition rate pMM is only around 0.3 (compared with 0.5 or greater for pUU, for example), the hazard from M3 to M4 is nearly 0.6, very close to the U3 to U4 rate of transition. Marginal attachment may be a relatively stable state for persons who have remained marginally attached for a month or two already. Lastly, the quasi-diagonals for both the not-attached state and employment also display a tendency to rise with longer duration in the state.

Second, the pattern of transitions out of the marginal state show a falling hazard into employment as duration in the marginal state lengthens (compare M1-E1 cell with M2-E1 cell, e.g.), a relatively flat rate of transition from M1, M2 or M3 into U1, and some signs of a rise in the hazard from marginal into not-attached as marginal duration is longer. Thus, as a spell of marginal attachment goes on, the hazard into employment tends to decline, unlike the fairly flat or rising pattern from U1, U2 and U3 to E1. Transitions to unemployment stay fairly constant, however.

Third, the unconditional pattern from the three unemployment origin states show signs of a falling hazard into both M and N. The marginal group is not therefore exclusively a synonym for longer term unemployed who have stopped searching, but who still want a job. Note, though, that the sample sizes in several of the cells for both U and M origin states are quite small, at least for this one month sample.

Fourth, the hazards out of the not-attached group tend to fall for all three other destination states as duration not-attached extends, with the probability of a transit from N1 to any of E1, U1 or M1 being roughly double the respectively probability of a transit from N3 to E1, U1 or M1. Not-attached is a stable state with a rising overall hazard associated with remaining in the state.

Duration Analysis of Spells in Various Labor Market States

We now address these issues relating to dependence and the durations spent in various labor market states by estimating a hazard model for the determinants of transitions out of these states. This approach again follows the early work of Flinn & Heckman (1983). The covariates employed are the same as for the period-to-period multinomial models reported above, and hence control for region, age, sex, marital status and education. Left censored spells under the null of equivalence or the alternative of non-equivalence are dropped, since we have no way of determining when such spells might have started, while right censored spells are included appropriately in the risk set. We employ a proportional hazard framework without parameterizing the underlying baseline and we estimate the model separately for each dataset defined by the initial month of the survey. With the gap in the data noted earlier, this yields 27 separate datasets. For each, we test the equivalence of M and N and (separately) the equivalence of U and M, assessing whether the hazard *into employment* differs significantly according to the two origin states. Controls are identical to the earlier multinomial logit models, allowing for variation by region, sex, marital status, age and education level.

The results of these tests are given in Tables 4 and 5. It is evident that the tests of equivalence are decisively rejected in every case. That is, these proportional hazard model results for the hazard into employment alone are quite consistent with the period-to-period multinomial results (into all the labour market states) discussed above. The three states, U, M and N, appear to be behaviorally distinct within this duration modeling framework.

V. Conclusions

This paper has addressed the dynamics of labor force attachment in the US by studying patterns of transition behavior for individuals matched month-to-month using data from the new CPS. Such data have the potential to shed light on whether various degrees of attachment among the non-employed are behaviorally distinct, as well as to illuminate the nature of dynamics among a broader set of labor market states than is usually examined. Our results, both in terms of the raw, unconditional transition rates over time and in a variety of specific models, suggest that the breakdown on the non-employed into three categories—unemployed, marginally attached ("wanting work" but not searching), and not-attached ("neither searching nor wanting work")—is a useful approach that is supported by the data. Moreover, these findings are consistent with earlier results found for longer time-periods using Canadian data, although the present work adds significantly to these results by showing that neither seasonality nor duration dependence issues confound this evidence.

In order to assess the robustness of these results further, we would like to extend this work in a number of directions. First, we are presently working on the incorporation of CPS data for 1997 and 1998 to bring the results up to date and to examine how these measures of marginal attachment behave in conditions of very low unemployment. Second, we plan to extend the duration models to allow for a variety of alternative specifications, rather than employing just the proportional hazard model as we have to date. Third, we will also examine the behavior of the duration model for the hazards into states other than employment, extending the exploratory work on the 12×16 model to the conditional framework of the duration approach. Lastly, the use of matched month-to-month

data naturally suggests that one need to think about the role played by measurement and reporting error (see, e.g., Hausman & Scott-Morton 1994, Poterba & Summers 1995, and Card 1996), and although we have no re-survey data available, it will be important to assess whether measurement error is critical for the results we have found to date.

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TABLE 1

MULTINOMIAL LOGIT RESULTS FOR TEST OF EQUIVALENCE

OF NOT-ATTACHED AND MARGINAL ATTACHMENT

Dataset	N	df	chi^2	p-value
Cps942	7726	27	707.0095	.000
Cps943	7561	27	867.7786	.000
Cps944	7808	27	781.1981	.000
Cps945	7702	27	759.7175	.000
cps946	7279	27	425.3753	.000
cps947	7238	27	703.6766	.000
cps948	7145	27	753.4097	.000
cps949	7035	27	633.5074	.000
cps9410	7309	27	616.1736	.000
cps9411	7520	27	688.5537	.000
cps9412	7309	27	517.599	.000
cps951	7554	27	590.2288	.000
cps952	7594	27	863.4572	.000
cps953	7437	27	678.7475	.000
cps9510	6478	27	542.1036	.000
cps9511	6069	27	457.4733	.000
cps9512	5393	27	484.4459	.000
cps961	5985	27	520.0258	.000
cps962	5887	27	576.5177	.000
cps963	6110	27	527.3503	.000
cps964	5621	27	481.2885	.000
cps965	6072	27	471.8982	.000
cps966	5827	27	395.3166	.000
cps967	5872	27	434.9685	.000
cps968	5247	27	359.457	.000
cps969	6141	27	466.7458	.000
cps9610	5977	27	446.024	.000

TABLE 2

MULTINOMIAL LOGIT RESULTS FOR TEST OF EQUIVALENCE

OF UNEMPLOYMENT AND MARGINAL ATTACHMENT

Dataset	N	df	chi^2	p-value
cps942	1574	27	461.9738	.000
cps943	1630	27	503.0469	.000
cps944	1609	27	368.6894	.000
cps945	1431	27	404.6686	.000
cps946	1444	27	295.5645	.000
cps947	1436	27	275.7299	.000
cps948	1394	27	304.8416	.000
cps949	1352	27	363.2705	.000
cps9410	1267	27	345.0489	.000
cps9411	1346	27	417.5544	.000
cps9412	1213	27	363.9918	.000
cps951	1130	27	277.2019	.000
cps952	1456	27	348.7536	.000
cps953	1324	27	443.9015	.000
cps9510	1080	27	235.6081	.000
cps9511	964	27	258.2546	.000
cps9512	915	27	286.0617	.000
cps961	942	27	253.8748	.000
cps962	1074	27	208.5426	.000
cps963	1108	27	327.1885	.000
cps964	975	27	218.6745	.000
cps965	1008	27	237.5155	.000
cps966	1007	27	229.9468	.000
cps967	1036	27	245.2084	.000
cps968	973	27	209.0458	.000
cps969	1078	27	261.0422	.000
cps9610	998	27	288.5072	.000

TABLE 3

EXPLORATORY DYNAMICS OF THE 12 x 16 MODEL

from\ to	E1	E2	E3	E4	U1	U2	U3	U4	M1	M2	M3	M4	N1	N2	N3	N4
E1	-	ee---ee---ee	-	-	eu---eu---eu	-	-	-	em---em---em	-	-	-	en---en---en	-	-	-
E2	-	-	eee-eee	-	eeu-eeu	-	-	-	eem-eem	-	-	-	een-een	-	-	-
E3	-	-	-	eeee	eeeu	-	-	-	Eeem	-	-	-	eeen	-	-	-
U1	ue---ue---ue	-	-	-	-	uu---uu---uu	-	-	um---um---um	-	-	-	un---un---un	-	-	-
U2	uue-uue	-	-	-	-	-	uuu-uuu	-	uum-uum	-	-	-	uun-uun	-	-	-
U3	uuue	-	-	-	-	-	-	uuuu	Uuum	-	-	-	uuun	-	-	-
M1	me---me---me	-	-	-	mu---mu---mu	-	-	-	-	mm---mm---mm	-	-	mn---mn---mn	-	-	-
M2	mme-mme	-	-	-	mmu-mmu	-	-	-	-	-	mmm-mmm	-	mmn-mmn	-	-	-
M3	mmme	-	-	-	mmmu	-	-	-	-	-	-	mmmm	mmmn	-	-	-
N1	ne---ne---ne	-	-	-	nu---nu---nu	-	-	-	nm---nm---nm	-	-	-	-	nn---nn---nn	-	-
N2	nne-nne	-	-	-	nnu-nnu	-	-	-	nnm-nnm	-	-	-	-	-	nnn-nnn	-
N3	nnne	-	-	-	nnnu	-	-	-	Nnnm	-	-	-	-	-	-	nnnn

TABLE 3

EXPLORATORY DYNAMICS OF THE 12 x 16 MODEL (continued)

from\ to	E1	E2	E3	E4	U1	U2	U3	U4	M1	M2	M3	M4	N1	N2	N3	N4
E1	-	.9623 .9653 .9654	-	-	.0110 .0114 .0121	-	-	-	.0049 .0040 .0041	-	-	-	.0217 .0193 .0183	-	-	-
E2	-	-	.9766 .9762	-	.0087 .0096	-	-	-	.0025 .0026	-	-	-	.0122 .0116	-	-	-
E3	-	-	-	.9788	.0086	-	-	-	.0022	-	-	-	.0104	-	-	-
U1	.2260 .2404 .2790	-	-	-	-	.5435 .5477 .5164	-	-	.1107 .0954 .0859	-	-	-	.1198 .1165 .1187	-	-	-
U2	.2079 .2692	-	-	-	-	-	.6050 .5814	-	.0873 .0565	-	-	-	.0998 .0928	-	-	-
U3	.2852	-	-	-	-	-	-	.5979	.0447	-	-	-	.0722	-	-	-
M1	.0827 .1097 .1067	-	-	-	.1437 .1694 .1838	-	-	-	-	.3106 .3532 .3360	-	-	.4630 .3677 .3735	-	-	-
M2	.0794 .0411	-	-	-	.1963 .1826	-	-	-	-	-	.3878 .4658	-	.3364 .3105	-	-	-
M3	.0241	-	-	-	.1325	-	-	-	-	-	-	.5904	.5663	-	-	-
N1	.0361 .0339 .0316	-	-	-	.0112 .0134 .0105	-	-	-	.0347 .0219 .0297	-	-	-	-	.9180 .9308 .9283	-	-
N2	.0181 .0193	-	-	-	.0063 .0063	-	-	-	.0155 .0118	-	-	-	-	-	.9601 .9540	-
N3	.0148	-	-	-	.0045	-	-	-	.0153	-	-	-	-	-	-	.9653

TABLE 4

DURATION MODEL RESULTS FOR TEST OF EQUIVALENCE

OF NOT-ATTACHED AND MARGINAL ATTACHMENT

FOR THE HAZARD INTO EMPLOYMENT

Dataset	N	df	chi^2	p-value
Jan-94	1483	8	406.5254	.000
Feb-94	1540	8	536.0313	.000
Mar-94	1730	8	628.6187	.000
Apr-94	1616	8	568.0381	.000
May-94	1741	8	510.2046	.000
Jun-94	1976	8	657.5825	.000
Jul-94	1839	8	582.9336	.000
Aug-94	1675	8	454.8228	.000
Sep-94	1457	8	482.6731	.000
Oct-94	1663	8	543.999	.000
Nov-94	1594	8	424.7961	.000
Dec-94	1494	8	476.2681	.000
Jan-95	1478	8	471.322	.000
Feb-95	1423	8	462.7822	.000
Sep-95	1334	8	406.5166	.000
Oct-95	1275	8	308.8455	.000
Nov-95	1109	8	357.2957	.000
Dec-95	1236	8	441.822	.000
Jan-96	1116	8	314.3923	.000
Feb-96	1107	8	397.1814	.000
Mar-96	1158	8	479.2825	.000
Apr-96	1393	8	550.5146	.000
May-96	1371	8	417.6509	.000
Jun-96	1509	8	495.5015	.000
Jul-96	1363	8	502.6733	.000
Aug-96	1356	8	419.9348	.000
Sep-96	1162	8	321.4004	.000

TABLE 5

DURATION MODEL RESULTS FOR TEST OF EQUIVALENCE

OF UNEMPLOYMENT AND MARGINAL ATTACHMENT FOR THE HAZARD INTO EMPLOYMENT

Dataset	N	df	chi^2	p-value
Jan-94	1489	8	482.4753	.000
Feb-94	1688	8	661.5581	.000
Mar-94	1778	8	696.8545	.000
Apr-94	1680	8	781.6538	.000
May-94	1707	8	666.4219	.000
Jun-94	1592	8	732.6499	.000
Jul-94	1478	8	680.8276	.000
Aug-94	1416	8	480.957	.000
Sep-94	1428	8	469.4688	.000
Oct-94	1715	8	499.4285	.000
Nov-94	1665	8	656.4839	.000
Dec-94	1646	8	647.7773	.000
Jan-95	1485	8	434.842	.000
Feb-95	1535	8	536.9775	.000
Sep-95	1287	8	386.5554	.000
Oct-95	1280	8	363.8064	.000
Nov-95	1189	8	400.8882	.000
Dec-95	1305	8	550.2842	.000
Jan-96	1131	8	382.5078	.000
Feb-96	1245	8	461.1194	.000
Mar-96	1319	8	524.2163	.000
Apr-96	1420	8	716.7671	.000
May-96	1282	8	569.3479	.000
Jun-96	1192	8	415.4106	.000
Jul-96	1136	8	435.6008	.000
Aug-96	1246	8	561.3435	.000
Sep-96	1084	8	311.0667	.000

Figure 0
Unemployment and Marginal Attachment in the US

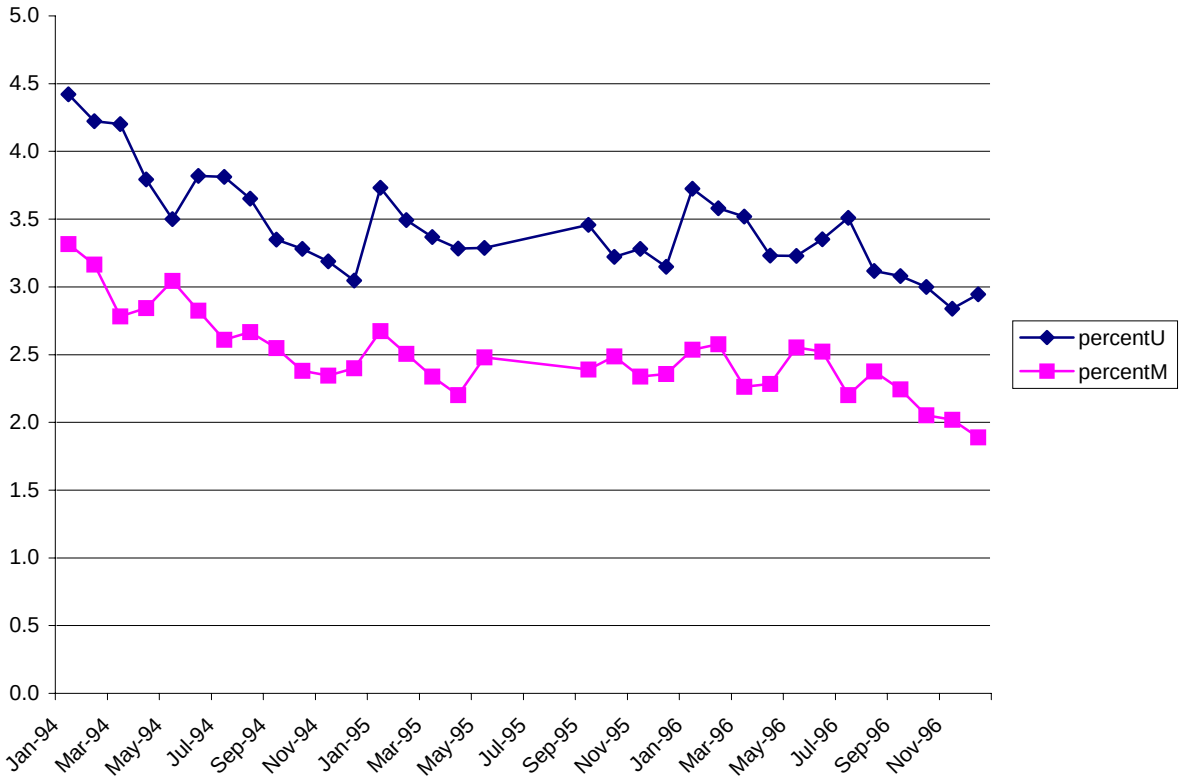


Figure 1
Transitions into employment

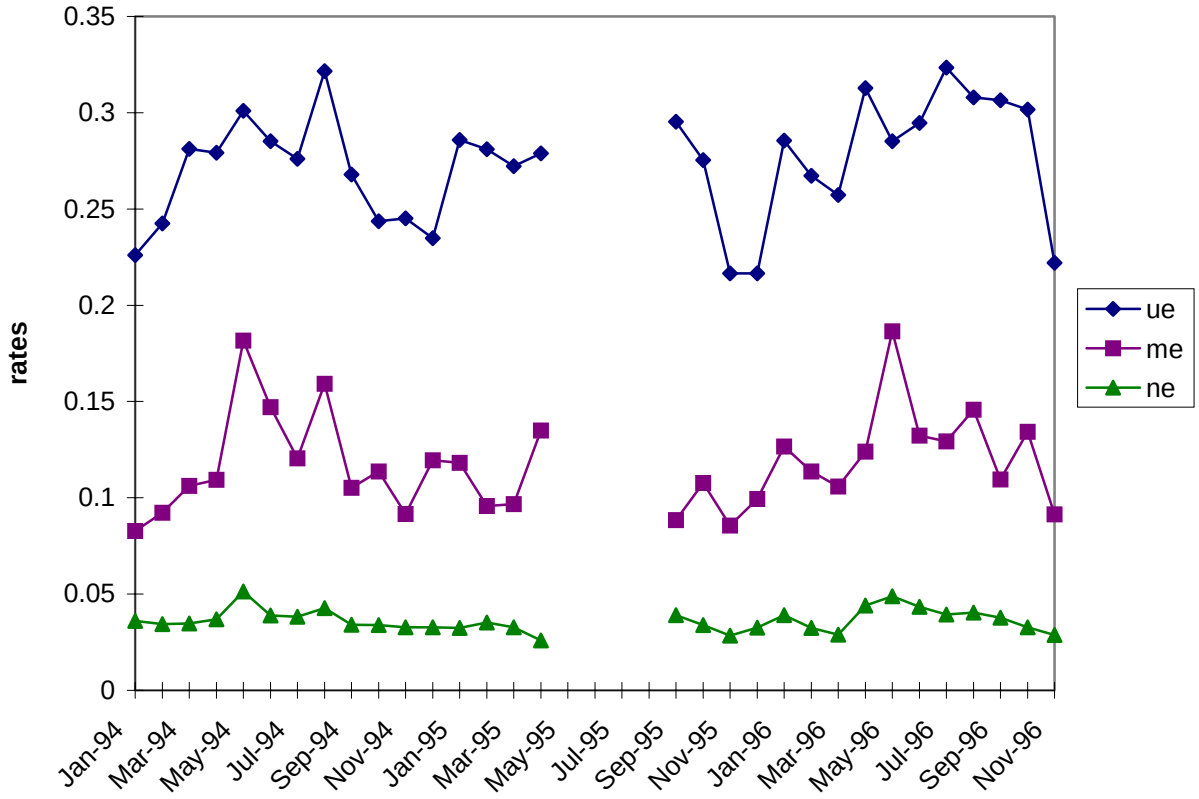


Figure 2
Transitions into unemployment

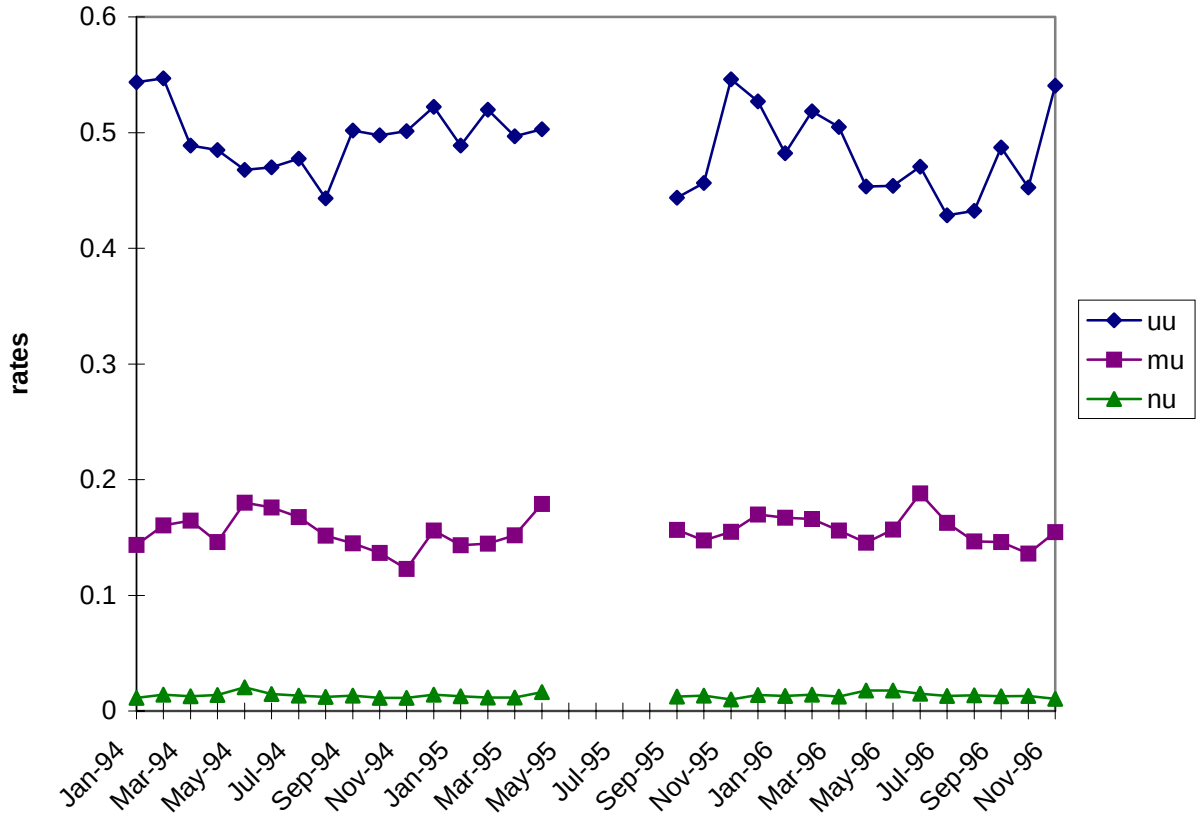


Figure 3
Transitions into marginal state

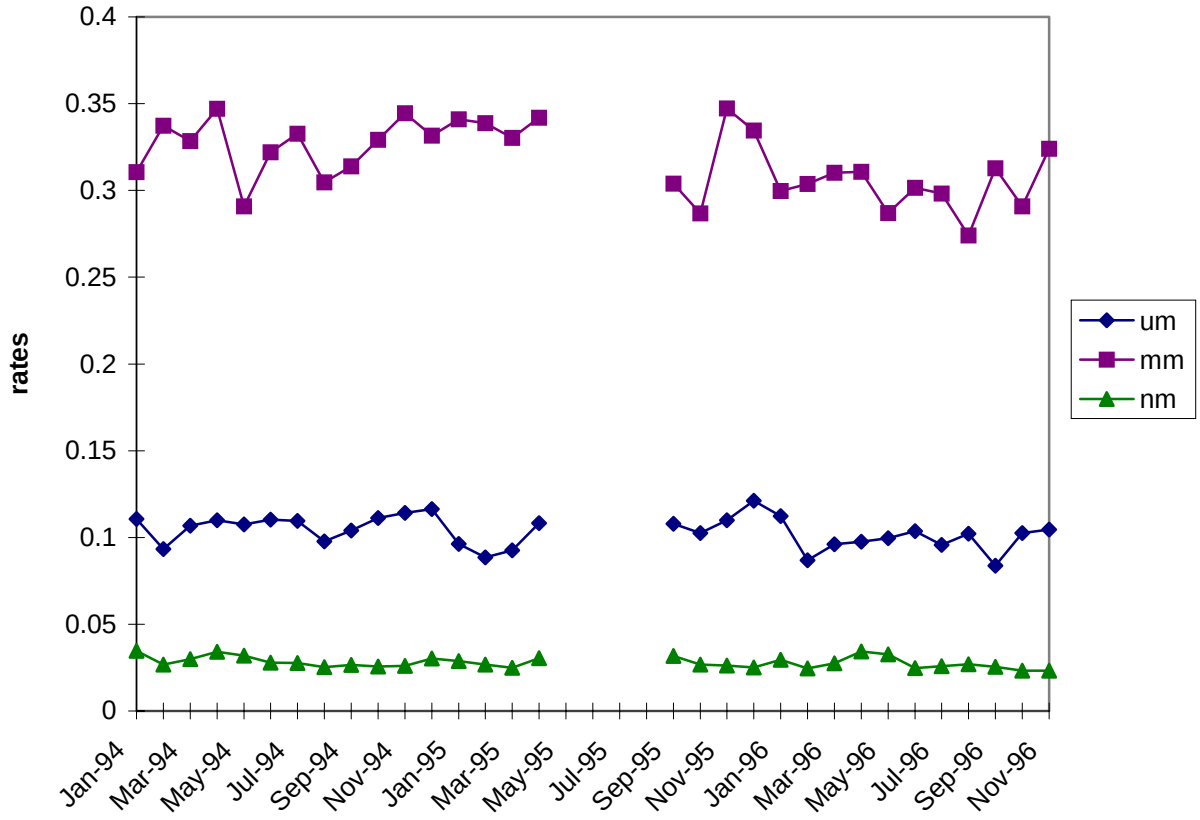


Figure 4
Transitions into not-in-labour-force

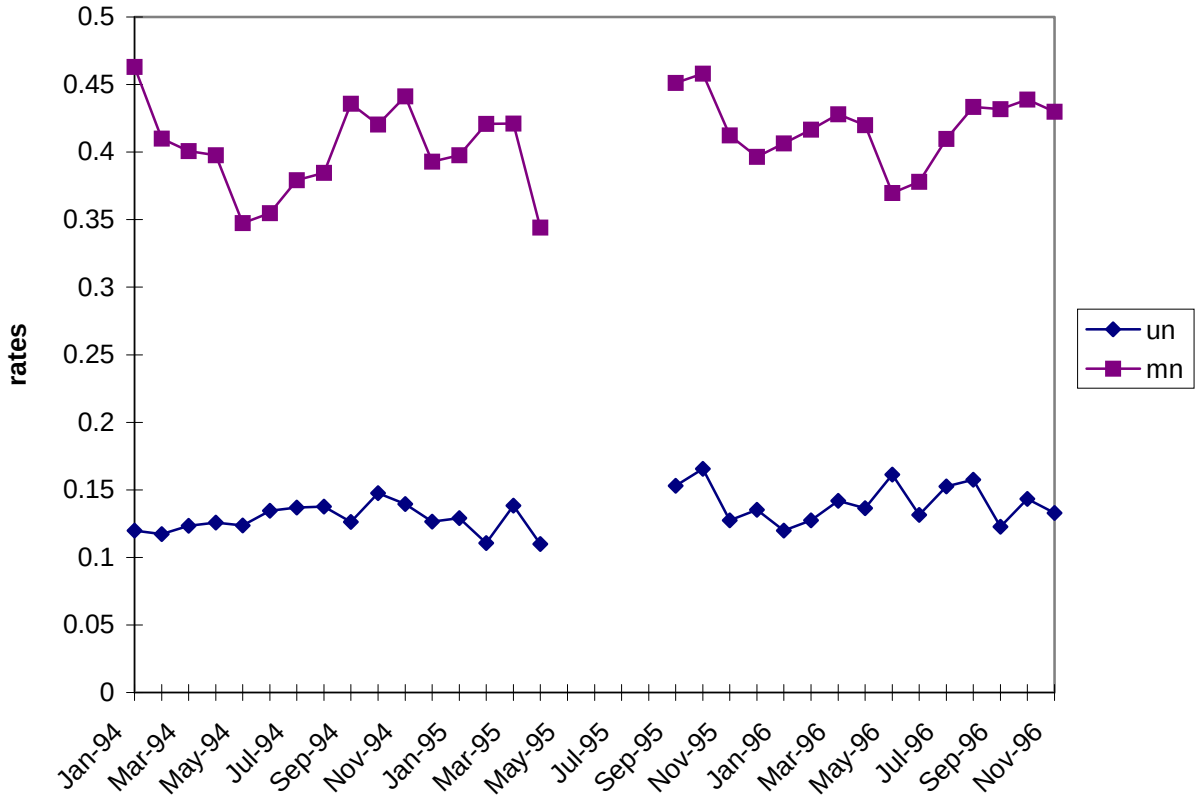


Figure 5
Transitions into employment

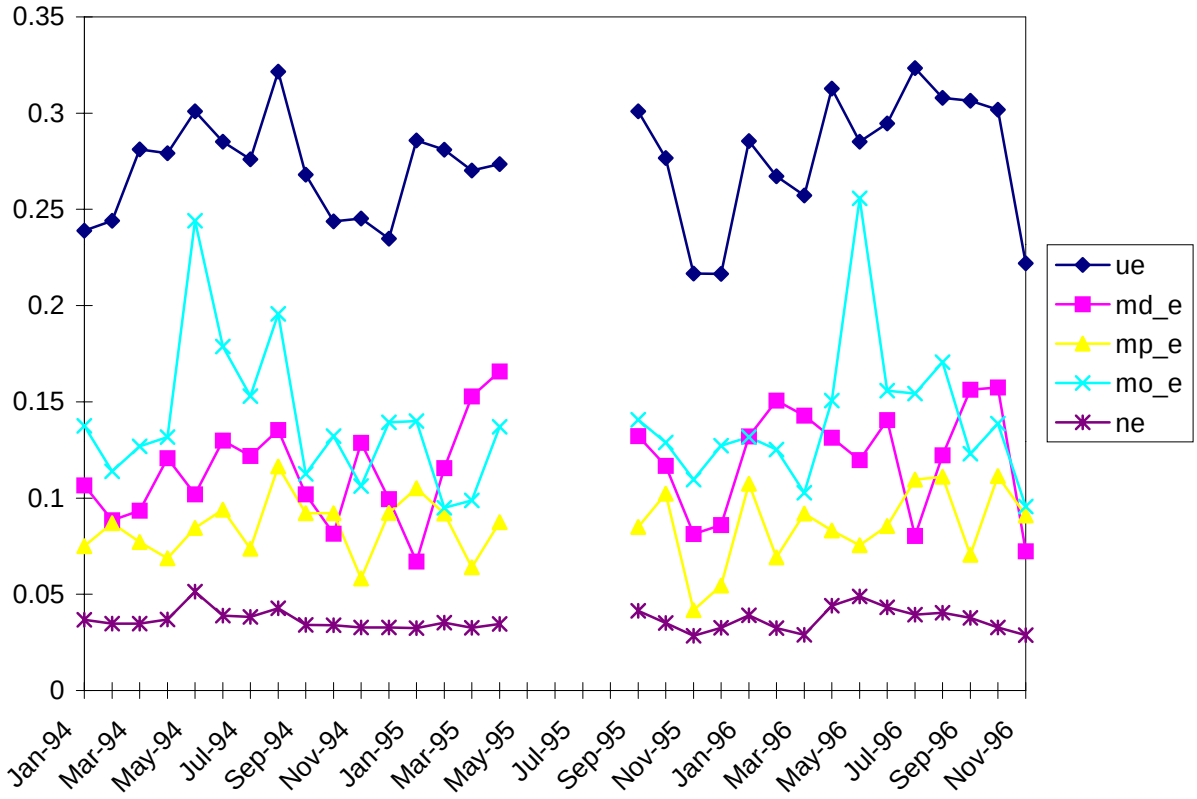


Figure 6
Transitions into unemployment

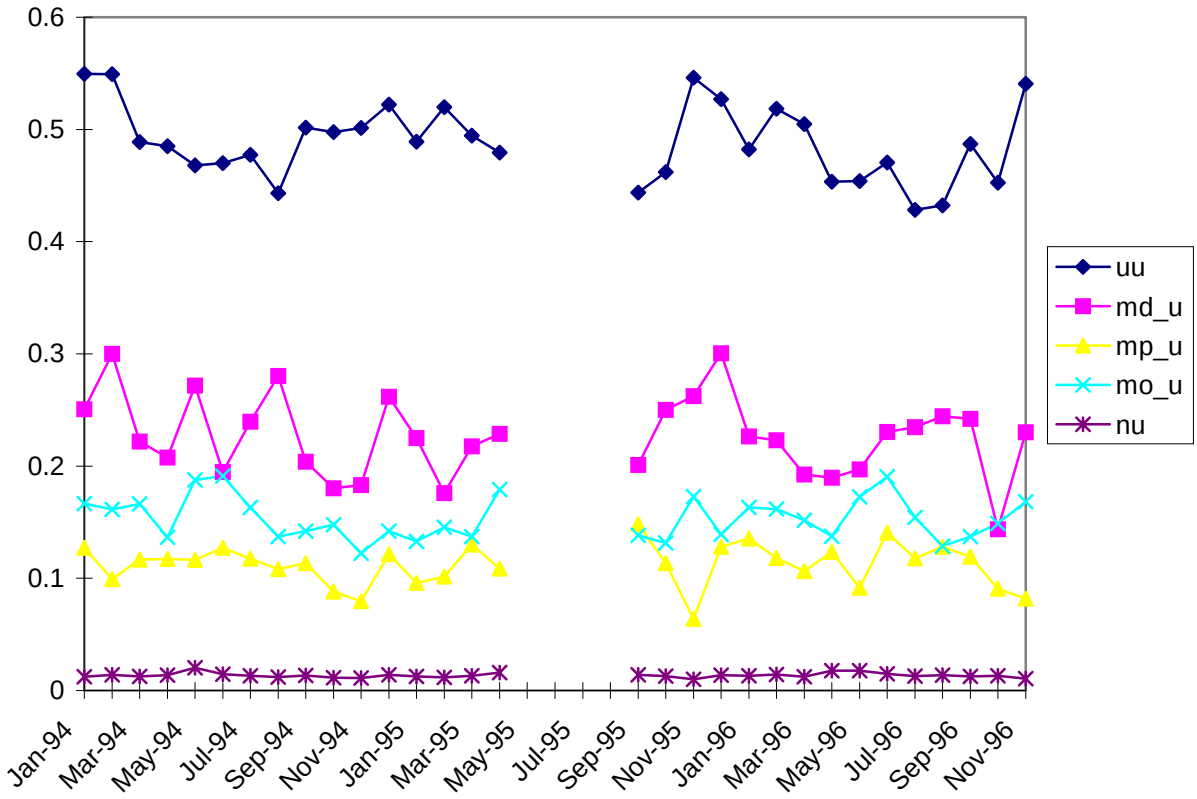


Figure 7
Transitions into marginal state

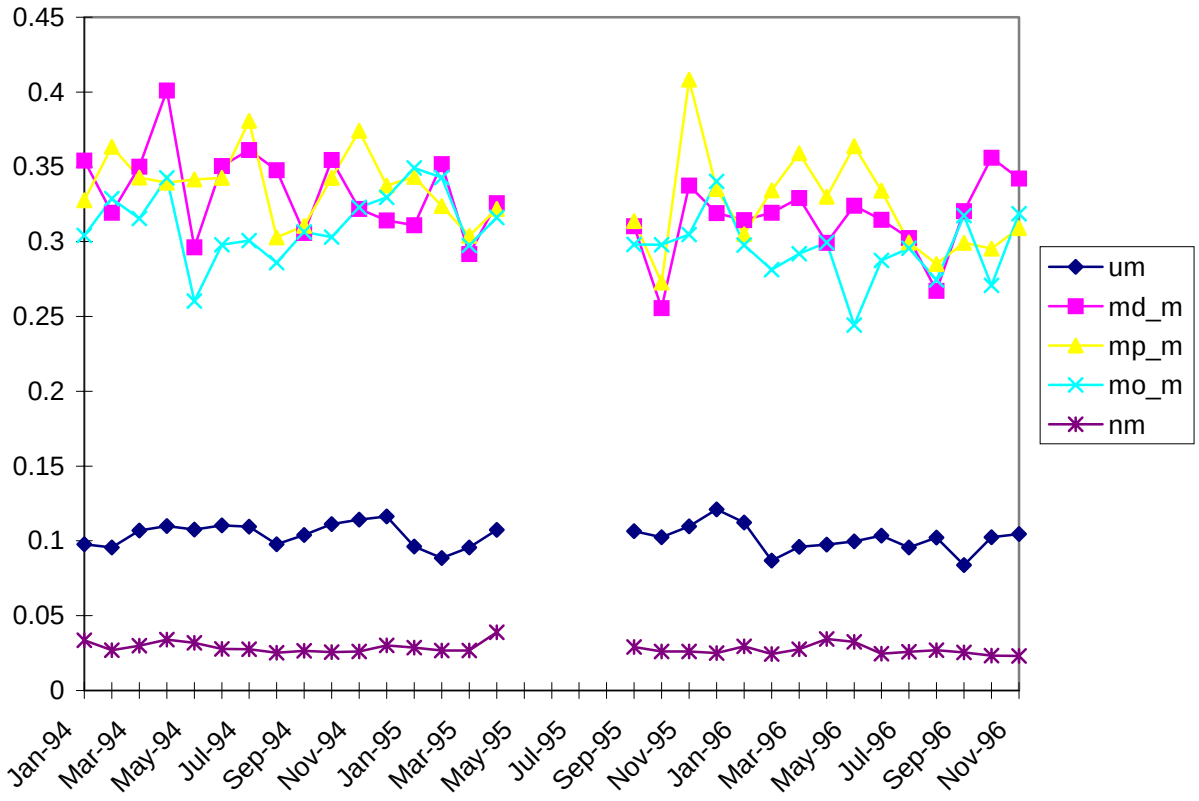
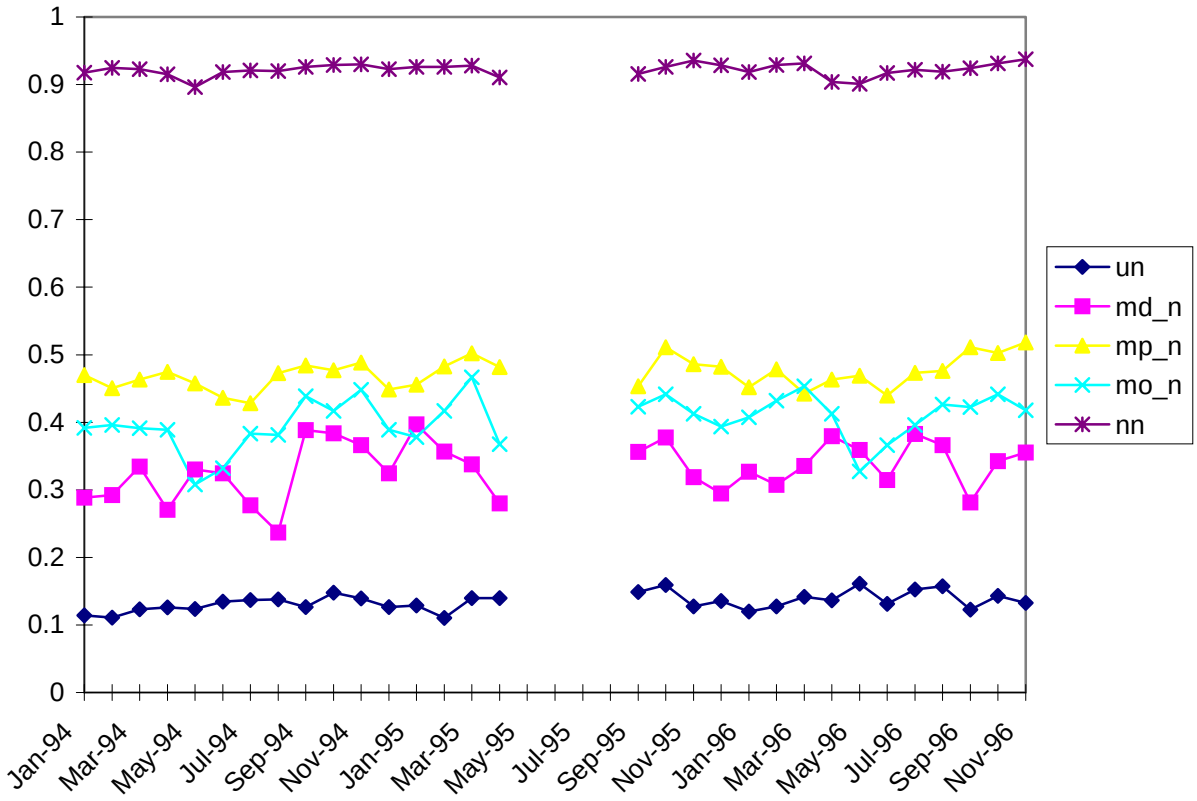


Figure 8
Transitions into out of the labour force



APPENDIX
DATA MATCHING AND MERGING

The datasets employed in this study are based on merged and matched monthly files from the Current Population Survey since January 1994. The adjacent monthly files are first merged and matched on household id, given the interview sequence number. Individuals within household are then matched based on sex, race, age, marital status, education variables and veteran status, as in the matching of the outgoing rotation group files reported by Card (1996), e.g. For some variables, no change is allowed from one month to the next, while for others, feasible changes (e.g. in age or marital status) are permitted. The tables below illustrate the effects of this algorithm for Panel A (survey months 1-4) and Panel B (survey months 5-8) for the 1994 data.

Panels A - Panel pairwise matches

	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
first data	19439	18946	19769	18940	18836	19000	18699	18951	18530	19294	19334	19341
second data	19164	18867	19513	18983	18810	19004	18708	18938	19158	19307	19305	19406
Merge 1	17854	17438	18241	17872	17630	17815	17513	17680	17399	18192	18263	18266
missing on sex	1600	1578	1563	1379	1439	1361	1336	1333	1373	1298	1486	1522
sex	172	214	179	188	178	203	171	225	181	189	168	193
race	147	152	204	166	215	216	190	264	197	241	215	52
age	207	227	234	260	235	265	208	237	259	276	237	424
marital status	6	9	7	2	10	8	8	15	9	7	12	15
educ 1	35	12	11	6	21	65	18	2	53	21	22	13
educ 2	198	19	17	17	26	172	25	17	193	24	20	16
veteran status	0	0	1	0	0	1	1	0	0	0	0	1
remaining	15489	15227	16025	15854	15506	15524	15556	15587	15134	16136	16103	16030

Panels A - 2 mth panels with 3rd mth

	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
merge data	15489	15227	16026	15854	15506	15524	15556	15568	15134	16136	16103	16030
added data	19126	18908	19504	18804	18748	18984	18688	19561	19152	19202	19358	19325
merge 2	14974	14805	15637	15268	15051	15054	15066	15091	14674	15718	15762	15592
missing on sex	0	0	0	0	0	0	0	0	0	0	0	0
sex	113	88	127	142	131	98	89	124	99	94	108	117
race	35	33	38	31	51	61	51	41	28	46	41	32
age	91	98	159	131	108	105	121	102	99	129	103	112
marital status	9	7	9	5	7	7	8	6	6	7	7	11
educ 1	10	1	12	4	35	6	3	43	6	3	6	33
educ 2	2	2	1	6	152	6	3	207	11	7	1	159
veteran status	0	1	0	0	1	2	0	1	0	0	0	0
remaining	14714	14575	15291	14949	14566	14769	14791	14567	14425	15432	15496	15128

Panels A -3 mth panels with 4th mth

	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
merge data	14714	14575	15291	14949	14566	14769	14791	14567	14425	15432	15496	15128
added data	19150	18778	19344	18736	18687	18941	18576	19484	19060	19211	19268	19136
merge 3	14295	14232	14796	14547	14178	14297	14370	14263	14079	15050	15118	14661
missing on sex	0	0	0	0	0	0	0	0	0	0	0	0
sex	87	76	104	80	89	118	79	78	65	62	84	71
race	31	22	42	29	23	51	31	37	22	22	22	24
age	77	81	97	67	91	67	74	66	78	57	89	66
marital status	10	7	5	5	4	5	4	6	6	12	3	10
educ 1	2	1	3	31	5	2	30	1	0	2	40	0
educ 2	3	6	3	183	13	3	152	14	5	2	139	5
veteran status	1	1	1	0	1	1	0	0	0	0	0	0
panel size	14084	14038	14541	14152	13952	14050	14000	14061	13903	14893	14741	14485

Panels B - pairwise matches

	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
first data	19623	19661	19936	19775	19217	18955	19432	18921	19022	19020	19069	19260
added data	19556	19693	20000	19775	19211	18920	19416	18933	19085	19081	19035	19488
merge 1	18549	18521	18895	18912	18196	17886	18329	17778	18066	18134	18092	18277
missing on sex	1676	1579	1555	1364	1440	1454	1515	1384	1355	1418	1598	1531
sex	177	197	187	210	218	183	161	149	164	153	139	175
race	78	85	55	92	75	99	55	125	77	122	69	44
age	164	203	231	208	215	156	218	232	193	160	181	253
marital status	7	10	12	7	12	18	10	6	7	6	7	14
educ 1	45	2	6	6	4	36	4	6	47	5	8	12
educ 2	194	8	8	3	5	160	12	6	215	3	12	16
veteran status	0	1	0	0	0	2	0	0	0	0	0	0
remaining	16208	16436	16841	17022	16227	15778	16354	15870	16008	16267	16078	16232

Panels B - 2 mth panels with 3rd mth												
	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
merge data	16208	16436	16841	17022	16227	15778	16354	15870	16008	16267	16078	16232
added data	19554	19693	19993	19648	19152	18868	19424	18926	19114	18968	19083	19420
merge 2	15670	15964	16437	16468	15704	15248	15867	15401	15672	15822	15700	15815
missing on sex	0	0	0	0	0	0	0	0	0	0	0	0
sex	70	90	106	134	109	88	112	97	99	88	90	82
race	35	46	24	39	28	43	50	44	38	33	19	28
age	79	112	93	106	114	66	94	80	118	98	97	105
marital status	7	5	7	7	11	7	6	3	4	11	8	11
educ 1	7	0	2	2	32	5	1	33	10	1	1	39
educ 2	6	8	3	6	175	11	4	200	11	6	7	161
veteran status	0	0	2	1	2	1	0	1	0	0	0	0
remaining	15466	15703	16200	16173	15233	15027	15600	14943	15392	15585	15478	15389

Panels B - 3 mth panels with 4th mth												
	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94
merge data	15466	15703	16200	16173	15233	15027	15600	14943	15392	15585	15478	15389
added data	19638	19579	19800	19610	19080	18898	19410	18915	19067	19058	19040	19337
merge 3	15122	15293	15683	15785	14809	14631	15264	14667	15079	15309	15140	15031
missing on sex	0	0	0	0	0	0	0	0	0	0	0	0
sex	55	77	87	67	63	91	72	82	73	64	88	67
race	20	36	26	17	23	33	27	34	28	23	19	21
age	59	78	78	66	73	60	62	52	61	75	70	54
marital status	5	4	1	8	14	2	7	1	11	12	8	7
educ 1	1	0	2	24	0	0	33	4	0	0	22	5
educ 2	3	4	4	177	10	7	233	5	6	5	148	10
veteran status	0	0	0	0	3	2	1	1	0	0	0	0
panel size	14979	15094	15485	15426	14623	14436	14829	14488	14900	15130	14785	14867