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Employment dynamics and full-time job destruction in Australia

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1. Introduction

Several researchers have shown that labour markets in countries like Australia are in a constant state of flux (Davis and Haltiwanger, 1990, 1992; Borland, 1996). Specific jobs are continually created and destroyed as firms expand, adjust to changing labour force characteristics, restructure, contract or close. Over the last decade or so, a number of researchers have attempted to measure and describe the job creation and destruction processes in advanced economies (for example, U.S. studies by Blanchard and Diamond, 1990; Davis and Haltiwanger, 1990, 1992; Ritter, 1993, 1994; Davis, Haltiwanger and Schuh, 1996; U.K. studies by Konings, 1995; Blanchflower and Burgess, 1996; and Australian work by Borland, 1996). Most authors use manufacturing data to compute measures of job creation and destruction and jobs reallocation to study their evolution across the business cycle. The U.S. evidence indicates that gross job flows are both highly cyclical and asymmetric. Job destruction exhibits sharp increases during recessions, while job creation is less volatile and has been found to both counter- and pro-cyclical (Davis and Haltiwanger, 1992). However, Ritter (1994) found that the U.S. service sector displayed significantly less reallocation than manufacturing.

This process of job creation and destruction is mirrored by movements of workers between labour force states (employment, unemployment and not in the labour force). In this context, Ritter (1993) defines supply-side measures of labour market dynamics: gross job finding and gross job separation, and demonstrates that the dynamics of job creation and job finding are closely linked as are job destruction and job separation for the U.S. labour market.

Blanchard and Diamond (1990) attempt to explain this behaviour in terms of a segmented labour market model where primary and secondary workers are differentiated in terms of their relative labour market attachments. Primary workers enjoy stable work histories and rarely move between employment and the other labour force categories. Alternatively, secondary workers are typically unstable and are often moving between labour force categories, with frequent spells of unemployment. In this sort of model, it is usual to expect that firms adjust secondary job numbers and primary hours worked (hoarding skilled labour) when recession occurs. We would expect that secondary jobs growth should be pro-cyclical and exhibit larger fluctuation than primary jobs.[2]

Another strand of literature has shown that the behaviour of unemployment in several countries is highly persistent and non-linear. Mitchell (2001b) computes several persistence measures, which confirm that unemployment rates from 15 OECD countries exhibit high degrees of persistence following negative output shocks (see also Mitchell, 1993). Macroeconomic orthodoxy eschews active stabilisation because it assumes that demand shocks are transitory and do not impede progress along the supply-determined long run path (see Kydland and Prescott, 1980). Yet, the existence of high degrees of persistence is consistent with several studies that "have rejected the traditional view that output shocks have little or no permanent effect" (Campbell and Mankiw, 1987). This also questions the usefulness of the NAIRU as a reliable policy tool (for example, Akerlof, Dickens, and Perry, 2000). Non-intervention following a negative shock is very costly when the shocks are highly persistent. Further, marked cyclical asymmetries also dominate the behaviour of many macroeconomic time series including unemployment (Beaudry and Koop, 1993; Parker and Rothman, 1997 Skalin and Teräsvirta, 2002). Increases in unemployment occur suddenly (as spending collapses) but are then highly persistent. Mitchell (2002), using smooth transition autoregressive (STAR) and Current Depth of Recession (CDR) representations, and Mitchell and Muysken (2002) using CDR representations, both establish non-linearity in unemployment rates for Australia and The Netherlands. Standard macroeconomic models (incorporating NAIRU-determined supply components) which usually employ smooth functions with some allowance for persistence are thus highly questionable (Holly and Stannett, 1995).

The issue is important in the context of current monetary policy practice where most central banks manipulate short-term interest rates (inflation targetting) to ensure that inflation remains within a target range. Underpinning the shift from fiscal activism is a belief, held by many economists, that a unique (natural) level of economic activity exists (the Non Accelerating Inflation Rate of Unemployment or NAIRU) which is consistent with low inflation. NAIRU models largely ignore non-linearities. Given the evidence that unemployment is highly persistent and asymmetric these models underestimate the costs of inflation targetting. Disinflation policies impose greater costs than has been previously estimated using linear models, which themselves are prone to inaccuracies, like imprecise NAIRU estimation (Mitchell, 2001a, 2002).

There is also strong evidence of asymmetric employment behaviour across the business cycle in Australia. As economic activity slows, employment falls quickly and then rises slowly as economic growth ensues (Mitchell, 2001a). After finding that private investment, employment (and unemployment) in Australia demonstrate sharp cyclical asymmetries (switching between linear and non-linear episodes), Mitchell and Muysken (2003) proposed a simple model where demand asymmetries drive employment and unemployment asymmetries. Their model characterisises these demand impulses in terms of asymmetries in investment which is based on irreversibilities driven by endemic uncertainty. However, they also consider government spending and net export asymmetries to be relevant. The labour market is characterised by high and low skill segments with differing degrees of flexibility in hours and persons adjustment.

In this paper, we focus on the labour market processes of job creation and destruction to: (a) outline a model of full-time and part-time jobs reallocation; and (b) investigate the way in which different types of employment adjust to cyclical transitions. Our model stylises primary jobs as full-time and the secondary jobs as part-time. The demarcation is simplistic but does portray some of the essential characteristics typically associated with the segmented job categories. We examine graphical and econometric evidence for Australian data since 1978 which shows that during recessions, part-time employment for both males and females increases as full-time employment plummets. Male full-time employment has taken the brunt of adjustment in the last two downturns in Australia and this raises questions for the segmented typology.

The paper is laid out as follows. Section 2 studies employment trends by gender since 1978 while Section 3 examines the way in which recession (1982 and 1991 in Australia) impacts on these categories of employment. Section 4 provides more formal analysis of the cyclical regime shifts in employment growth using Markov-Switching estimation. Section 5 sketches a model of full-time and part-time jobs reallocation. Section 6 drills down further by examining gross labour flows data and uses this data to construct job finding and job separation measures which form the basis of a regression analysis of our model. Concluding remarks follow.

2. Full-time and part-time employment by gender

Like most OECD countries, Australia has experienced dramatic shifts between full-time (35 or more hours per week) and part-time employment over the last 25 years. The share of full-time male employment in total employment has declined from 61 to 47 percent since 1978 (see Figure 1a). By contrast, the female full-time employment share has remained steady over the same period (23 per cent in 1978 to 24 per cent in 2002). The declining male full-time share has been mirrored by large changes in the male and female part-time shares. Female part-time employment now accounts for 21 per cent of total employment (12.3 per cent in 1978) and 46 per cent of total female employment (34 per cent in 1978). Male part-time employment has steadily increased and now accounts for 8 per cent of total employment (3 per cent in 1978) and 15 per cent of all male employment (5 per cent in 1978) (see Figure 1b).

Average weekly part-time hours-worked have been relatively stable for both males and females since 1978. Males began at 16.2, dropped to 14.6 in 1990 and returned to around 16 hours per week by 2002. Females dropped to 14.6 in the 1982 recession and have trended upwards since to be around 15.8 hours per week in 2002.

In Figure 2, measures of employment deviations from trend are presented for males and females by full-time and part-time. The employment gap is computed as the difference between actual employment and the Hodrick-Prescott trend expressed as a percentage of actual employment in each category. The shaded areas are the peak-to-trough periods for each of the three recessions (see Appendix A). The movements in Figure 2(a) demonstrate that male and female full-time employment both move pro-cyclically around their respective trends. From Figure 2(b), while female part-time employment behaves similarly, male part-time employment exhibits counter-cyclical deviations around trend, particularly in the 1982 recession.

In Table 1, simple correlations between the various employment gaps and the GDP gap (constructed as the difference between actual GDP and its Hodrick-Prescott trend) confirm that male full-time employment and female employment in general are all highly positively correlated with the GDP gap measure. The trend deviation in male part-employment is negatively correlated with the GDP gap measure suggesting that in a downturn, male full-time employment gives way to rising male part-time employment.

To examine the behaviour of employment growth over the business cycle and to study the impact of the two recessions further, simple regressions were run for the period from 1978:2 to 2002:4 using quarterly data. The dependent variable was the employment gap defined above. The measure of the cycle was similarly constructed as the percentage deviation of GDP from trend. The regressions included two dummy variables, R1982 and R1991 which took the value of 1 during the period between peak and trough and 0 otherwise for the 1982 and 1991 recessions, respectively. The results are reported in Table 2. Standard diagnostic tests revealed no significant problems of specification. The long-run elasticity measures the cyclical sensitivity of the employment type to changes in the level of GDP around trend.

The results show varying cyclical sensitivities in trend deviations for male and female full-time and part-time employment. Male full-time employment is the most sensitive followed by female full-time employment. Female part-time employment is the least sensitive. Male part-time employment is counter-cyclical (and of marginal statistical significance). However, one should consider that the two major recessions which occurred during this period are described by separate dummy variables and may influence the observations on the cyclical impact.

The impacts of the two major recessions are diverse (we ignore the brief third recession in 2000 which had no significant impact). The 1982 recession impacted significantly on all employment types, except female part-time employment. The positive impact on male and female part-time employment suggests that firms used this recession to restructure male employment away from full-time work. In the 1991 recession, the impact is only statistically significant for male full-time employment, again negative. Overall, the results suggest that recessions do have some 'extra' impact on employment behaviour, especially full-time.

3. Impact of recession on types of employment

We constructed 'butterfly' plots to further examine the movements in full-time and part-time employment for males and females over the 1982 and 1991 recessions (see Figure 3). The plots begin 4-quarters before the peaks in GDP activity, then trace the behaviour from peak to trough and then 8-quarters following the trough (dating is explained in Appendix A). The shaded areas indicate the period between peak and trough in each of the cycles. The employment series are index numbers with the base coinciding with the peak GDP quarter.

Several points are relevant which reflect on the way in which the Australian labour market operates. First, during recessions there is a switch from full-time work to part-time work for both males and females resulting in a greater proportion of workers in short-duration jobs. This is accentuated for males. In the period immediately prior to each of the two peaks the full-time/part-time ratio is relatively stable for males and females. During the recession and subsequent recovery, the ratio rises rapidly before stabilising at the higher level with the underlying trend towards increased part-time work then reasserting itself.

Second, male employment adjustments appear to begin with part-time work increasing rapidly in the last quarter of the expansion and accompanied by a slowing, then substantial decline in full-time employment. In the 1991 recession, a similar pattern is evident. For females, the slowdown in part-time employment growth in late 1981 appears to lead the decline in full-time work. Both pre-date the contraction. By the second recession, the patterns were similar to males. The secular rise in part-time work gains pace just before the contraction and full-time employment falls sharply.

Third, full-time employment declines almost lockstep with the turn in GDP and many quarters elapse before a weak recovery begins. Part-time work, however, continues to increase as GDP moves from peak to trough, eventually also succumbing to the demand deficiency. In the recovery phase, the economy initially generates strong growth in part-time work.

Fourth, some economists argue that recessions are associated with "cleaning up" or in other terminology as "taking a pitstop" (see Perry, 1990). The "pitstop" model of recession suggests that managers take time during recessions to streamline their processes. However, Perry (1990) notes that declining productivity during a recession is contrary to this view. Employment also recovers very slowly following the trough as noted in our discussion of persistence and asymmetry. Perry (1990: 153) says that "If the amount of job creation and destruction is relatively constant in the temporary jobs, then the destruction is taking place in the long-duration jobs. This view provides a harsher picture of what happens during a recession than one would get if the change in job composition were ignored."

4. Markov models of employment growth

To examine the dynamic behaviour of employment growth more formally, we employ the Markov-switching autoregressive (MS-AR) modelling framework. Our motivation here is to further investigate whether recessions are 'special' episodes that not only lead to full-time job losses but also permanently change the full-time/part-time composition. The aim is to develop congruent models of male and female employment growth over the cycle allowing for shifts in regimes. Krolzig (1997) provides a full description of the MS-AR approach and model selection procedures (see also Mitchell and Muysken, 2003). Only a brief overview is presented here. Krolzig (1997: 11) says "the general idea behind this class of models is that the parameters of the underlying data generating process of the *observed* time series vector y_t depend upon the *unobservable* regime variable s_t, which represents the probability of being in a different state of the world." The MS-AR approach thus allows us to classify observations into discrete regimes and assess the uncertainty associated with this demarcation.

In principle, the MS-VAR framework allows for all parameters to be subject to regime-shifts. However, in practice, data limitations require a more circumspect approach (that is, to reduce the number of parameters of the Markov chain) and two popular models are: (a) the Markov-switching mean (MSM) model; (b) the Markov-switching intercept (MSI) model. In the work reported we also tested for stochastic shifts in the error variance (the so-called Markov-switching heteroscedastic model). In the MSM model, the regime change coincides with an immediate change in the mean of the time series, in contrast to the MSI model, which adopts the more plausible assumption that the mean shifts smoothly following a regime transition (Krolzig, 1997).

Following Hamilton's (1989) seminal work identifying regime shifts in U.S. output growth, contractions and expansions in the MS-AR approach are represented as switching regimes of the stochastic process generating the growth variable (in our case, the employment growth rate). The regimes are associated with different conditional distributions of the employment growth rate such that the mean will be negative in contraction and positive in expansion. Krolzig (2002: 6) shows that the estimation process assigns probabilities to the "unobserved regimes 'expansion' and 'contraction' conditional on the available information set which constitute an optimal inference on the latent state of the economy. Regimes reconstructed in this way area an important instrument for interpreting business cycles using MS-AR models."

The advantage of the MS-AR approach is that it can provide more information about the growth process than is available using the traditional dichotomy of expansion and contraction. While the identified MS-AR regimes have to be judged against their ability to correspond with the traditional demarcation of the cycle, models may have more than 2 regimes to determine, for example, different expansionary phases.

The four employment growth series (male, female, full-time, and part-time) computed as 100 times the first differences of the log of employment were analysed over 1979 (2) to 2003 (1). Augmented Dickey Fuller tests suggested that the unit root null could not be rejected for any employment series in levels. However, the null was rejected for each series at the 1 per cent level in logged first differences. We followed the specific-to-general approach outlined in Krolzig (1997, Chapter 7).

Male and female full-time employment growth

There are no clear asymptotic procedures available to determine the number of regimes M. Krolzig (1997: 129) outlines a strategy for simultaneously selecting the state dimension M of the Markov chain and the order p of the autoregression using "model selection procedures of the order of a univariate ARMA model." With some exploration and diagnostic evaluation, we arrived at preferred MSI(2)-AR(2) specifications for male and female full-time employment growth (see Table 3). In both cases, the MSI model outperformed the MSM specification. The MSI model diagnostics were also superior to the linear representations of each growth rate and the linearity tests consistently rejected the null of linearity. Only minor normality departures are indicated for males and females (see Table 4).

The two regimes are identified as contraction (regime 1) and expansion (regime 2) for both males and females. The business cycle dating algorithms (see Appendix A) were used to help in the model specification. A 3-regime model generated outcomes that were not consistent with the GDP 'dating' dynamics. The 2-regime model appeared to provide more concordance with the dating and had better diagnostic performance.

For males, the transition probabilities show that the regimes identified are highly persistent although growth periods display more inertia. Average recessions last 3 quarters and the average expansion lasts for around 31 quarters. The resulting regime probabilities and actual and fitted mean values are shown in Figure 4. The model captures the two recessions very closely.

While the female full-time diagnostics share similar qualities with the male result (see Table 4), the female regression was unable to reject the linearity hypothesis. On face value, the results for females indicate that the duration of recession is 4.3 quarters and that expansion lasts on average for 12.5 quarters. The resulting regime probabilities and actual and fitted mean values are shown in Figure 5. Female full-time employment is more often in regime 1 than is the case for male full-time employment. The chance of moving from expansion to recession is higher for females. Similarly, female full-time employment has a lower probability of switching to expansion once in recession. In general, male full-time employment recovers more quickly (switches back to expansion) relative to female full-time employment. The female model still captures the two recessions very well.

Male and female part-time employment growth

Contrary to the full-time situation, MSI(3)-AR(1) models emerged as the preferred representation for male and female part-time growth. Regime 1 corresponds to recession; Regime 2 slow growth and Regime 3 a period of rapid employment growth. The identification of different expansionary regimes highlights how this modelling approach can augment traditional cyclical dating demarcations. The regimes are more defined for females but males experience a stronger growth surge in Regime 3. The persistence of recession is lower for part-time employment growth. Female part-time employment growth endures within a particular regime for longer than male part-time growth.

The results highlight the differences in business cycle behaviour of part-time work compared with full-time employment and emphasise that there is a much higher probability that strong part-time employment growth will follow a recession.

Asymmetry Tests

To complete our understanding of the cyclical behaviour, we test for cyclical asymmetries in full-time and part-time employment growth rates for males and females. Sichel (1993) outlines two concepts of business cycle asymmetry: (a) deepness, and (b) steepness. In the business cycle context, deepness occurs when "troughs are deeper than the peaks are tall", whereas steepness occurs "when contractions are steeper than expansions" (Sichel, 1993: 225). A symmetric cycle indicates the absence of both sources of asymmetry. McQueen and Thorley (1993) add sharpness or turning point asymmetry to the taxonomy. Where sharpness is present, troughs are V-shaped and peaks are U-shaped. The formal definitions of the respective concepts of cyclical asymmetry are elaborated in Appendix B and Appendix C (see also Clements and Krolzig, 2002). The definitions are for a pro-cyclical time series.

With respect to male full-time employment growth, the Chi-squared test for non-sharpness generated a test statistics of Chi(1) = 8.1338 [Prob = 0.0043], which leads to the null being soundly rejected. For female full-time employment growth the Chi-squared test for non-sharpness generated a test statistics of Chi(1) = 1.6973 [Prob = 0.1926], which is consistent with the other findings of non-asymmetry for this type of employment. The formal asymmetry tests indicate that the asymmetry in full-time employment is driven by skewness in the growth of male full-time employment. Evidence of asymmetry could not be found in the part-time rates for both males and females. This is also consistent with the findings reported above.

5. A sketch of counter-cyclical job reallocation

In this section, we present a stylised model that provides some structure to the data analysis. Following Blanchard and Diamond (1990) we use a segmented labour market to explain counter-cyclical job dynamics. We characterise two types of jobs: primary and secondary in terms of full-time and part-time employment. The demarcation is based on the idea that full-time employment is typically associated with characteristics common among typologies of 'primary' jobs (positive hiring and firing costs, on-going training commitments, better wages, higher productivity, and stable work patterns). Conversely, workers in part-time employment are typically less well-paid, generate lower productivity, have less secure tenure and are predominantly in the 'less attached' demographic groups (women, teenagers). These characteristics are representative for 'secondary' jobs.

We confine our focus to cyclical behaviour. In particular, we investigate the dynamic implications of 'bumping down' full-time jobs into part-time jobs. The positive adjustment costs in creating and destroying full-time jobs, leads us to postulate that the creation of full-time jobs is a function of the change in capacity output Y^* rather than actual output Y:

$$JC_{FT} = \alpha \Delta Y^* \qquad \alpha > 0 \tag{1}$$

Firms prefer to maintain attachments with their full-time workers and will only begin to destroy these jobs when there is a marked decline in product market demand, which we will term a recession (defined here as a fall in the rate of capacity utilisation q below a threshold value q^*, where $q = Y/Y^*$. This is looser than the formal definition given in the Appendix A).

Full-time job destruction is thus:

$$JD_{FT} = (\alpha - \varepsilon)\Delta Y^* + \underline{\beta}\left(Y^* - Y\right) \qquad \underline{\beta} > 0 \text{ if } q < q^*, \underline{\beta} = 0 \text{ otherwise.} \tag{2}$$

where $(\alpha - \varepsilon)\Delta Y^*$ is its trend increase. A symbol is underlined when it is positive only during a recession (when $q < q^*$).

Full-time job reallocation becomes:

$$JRA_{FT} = JC_{FT} + JD_{FT} = (2\alpha - \varepsilon)\Delta Y^* + \underline{\beta}\left(Y^* - Y\right) \tag{3}$$

which increases during recession. The share of full-time job destruction in total full-time job reallocation, JD_{FT} / JRA_{FT}, is similarly counter-cyclical, signifying that job destruction dominates the gross job flows during recession.

Finally, the change in full-time employment is given as:

$$\Delta E_{FT} = JC_{FT} - JD_{FT} = \varepsilon \Delta Y^* - \underline{\beta}\left(Y^* - Y\right) \tag{4}$$

Hence full-time employment growth is pro-cyclical and $\varepsilon \Delta Y^*$ tracks its trend increase.

We assume that firms face relatively low adjustment costs when creating part-time jobs and use them to satisfy changes in immediate production requirements. Thus, the part-time labour market is subject to more immediate job creation and destruction. There is also a spill-over effect from the full-time labour market to capture firms who use recessions to restructure their workplaces by substituting part-time jobs for full-time employment, akin to the 'bumping-down' effect.

Part-time job creation is a function of actual output movements; a trend-like increase in line with capacity output; and a 'bumping-down' effect proportional to the difference between full-time job destruction and job creation, such that:

$$JC_{PT} = \phi\Delta Y^{*} - \psi(1-q)Y^{*} + \underline{\gamma}(JD_{FT} - JC_{FT}) \quad \phi,\psi > 0, \underline{\gamma} > 0 \text{ when } q < q^{*} \tag{5}$$

Part-time job destruction similarly reacts to declining production requirements, although there is no specific interaction with the full-time labour market:

$$JD_{PT} = \left(\phi - \delta\right)\Delta Y^{*} + \varphi\left(1-q\right)Y^{*} \qquad \varphi,\delta > 0 \tag{6}$$

where the trend increase is $\left(\phi - \delta\right)\Delta Y^{*}$.

Part-time job reallocation becomes:

$$\begin{aligned} JRA_{PT} &= JC_{PT} + JD_{PT} \\ &= \left(2\phi - \delta\right)\Delta Y^{*} + \left(\varphi - \psi\right)(1-q)Y^{*} + \underline{\gamma}\left[\underline{\beta}(Y^{*} - Y) + \varepsilon\Delta Y^{*}\right] \end{aligned} \tag{7}$$

Equation (7) indicates that part-time reallocation is counter-cyclical when $\varphi > \psi$, which seems plausible since observed job destruction is usually more volatile. Recessions have a counter-cyclical impact. Further, the share of part-time job destruction in total part-time job reallocation is counter-cyclical, although recessions then have a negative, pro-cyclical impact.

The change in part-time employment, given as:

$$\Delta E_{PT} = JC_{PT} - JD_{PT} = \delta\Delta Y^{*} - \left(\varphi + \psi\right)\left(1-q\right)Y^{*} + \underline{\gamma}\left[\underline{\beta}\left(Y^{*} - Y\right) + \varepsilon\Delta Y^{*}\right] \tag{8}$$

is clearly pro-cyclical and is accentuated by recessions.

The dynamics of the model are summarised in Table 5. The symbol '0/+' denotes a zero or weakly positive impact, whereas ++ indicates a strong positive impact. Although not included in our model, we allow for a weak impact of the utilisation rate on full-time employment in the subsequent empirical work. However, consistent with the *a priori* notions of a primary labour market, the impact of capacity utilisation should be much lower than its impact on part-time employment.

The dynamic labour market behaviour implied by our model is consistent with the stylised facts for job creation and job destruction in the U.S., as outlined in the introduction. Aggregate employment is pro-cyclical, job destruction is countercyclical, and the cyclical behaviour of job creation is unclear, in particular during recessions. Job reallocation is counter cyclical, and the rate of job destruction to job reallocation is also counter cyclical meaning that the recession impacts on full-time and part-time employment offset each other. This implies a higher volatility of job destruction.

6. Examining gross labour market flows

To explore the plausibility of this model, we use gross flows data provided by the Australian Bureau of Statistics (ABS) and assemble a range of measures of job separation and job finding which are supply-side analogues of the job destruction and job creation measures (see Ritter, 1993 for an explanation).

Overview

The ABS has published estimates of labour force status and gross changes (flows) derived from matched records of the Labour Force Survey on a monthly basis since February 1980. The labour force status categories are full-time employed, part-time employed, unemployed, not in the labour force and the data is available for males, married females, all females and persons. In this section we concentrate on three states: employed (E), unemployed (U) and not in the labour force (N) for persons aged 15 years and older. A good description of these data and the problems inherent can be found in Dixon (2001) and Mitchell and Muysken (2003).

Dixon (2001) notes that around 20 per cent of the population are not represented in the matched sample as a consequence of the exclusion of respondents in non-private dwellings, sample rotation and 'non-response' by persons in the survey in the previous month. As a consequence, Dixon (2001) shows (largely as a consequence of the exclusion of respondents in non-private dwellings, which include hotels and the like) that there is some under-reporting bias of persons who are unemployed and/or not in the labour force. Despite these problems, the response rate of 80 per cent is relatively favourable when compared to the response rate of 60 per cent that is reported by Blanchard and Diamond (1990) for the U.S. CPS gross labour flow data.

In this section, we use the monthly gross flows data corrected for seasonality. We also compare these flow data in period t with the stock data for employment (E_t), unemployment (U_t) and not in the labour force (N_t). These data are also taken from the monthly Labour Force survey published by the ABS.[3] We decompose total employment into full-time and part-time and use the published flows data at this level. Since the inertia for full-time workers is very high (97 per cent for males and 92 per cent for females on a monthly basis), it is interesting to focus on the part-time employment flows. The main characteristics of the relevant flow rates are summarised in Table 6.

On average, the male labour force flows are more variable than the corresponding female labour force flows. Apart from that inflow and outflow rates are more or less identical. The flows for part-time employment indicate that this labour market is very dynamic. The size of these flows is presented in Table 7. It is interesting to note that the flows from part-time employment to both unemployment and not in the labour force for males are almost as large as the corresponding flows from full-time employment, although part-time employment constitutes only 5-15 per cent of total male employment (beginning to end of sample).

Job finding and job separation

Most of the studies of job reallocation mentioned in the introduction have attempted to construct measures of job creation and job destruction (using methods in Davis and Haltiwanger, 1990) based on establishment data. One might conceive this as a demand side analysis of the creation and destruction of specific jobs. In this section, we attempt to provide further insights into the operations of the Australian labour market by exploring employment dynamics from the worker perspective. We define two supply-side measures of labour market dynamics: gross job finding (JF = UE + NE) and gross job separation (JS = EU + EN). Ritter (1993) shows for the U.S. labour market that the dynamics of job creation and job finding are closely linked as are job destruction and job separation. In terms of the gross flows data we computed these measures by taking into account flows into and out of full-time employment and part-time employment to the other labour force categories.[4]

Of relevance are the following questions:

- Do the series for job separation and job finding follow similar cyclical patterns to the job creation and job destruction processes documented in the literature?
- Is the net employment fall in recessions dominated by movements in job separation or in and job finding?
- Does job finding increase or decrease during the recession (in the U.S. it appears to increase)?

The male and female rates of job finding and job separation are shown in Figure 8 for the entire sample (1980 to 2002). The tentative conclusion is that the full-time employment for males exhibits counter-cyclical job reallocation with job separations dominating the recessionary periods. However, for part-time employment an entirely different picture is evident. For both males and females, the part-time flows activity intensifies during the contraction with job findings exceeding job separations. The part-time labour market for females is in a much larger state of flux than that the other employment markets.

The rates of job finding and job separation in the female part-time labour market are 4 or 5 per cent higher throughout the period. There are also lower rates of activity in the male part-time market than is evident in the full-time flows for females and males. Interestingly, the underlying trend for full-time males is upwards and the job separation and job finding rates, on trend now resemble those applicable to females although the recessionary episodes still impact more severely.

In Figures 9 and 10 we concentrate on the behaviour of the respective job flows series around the 1982 and 1991 recessions, respectively. In the 1982 contraction, job separations dominate the total job reallocations for male full-time employment and so job separations rise as a percentage of full-time male reallocations. The counter-cyclical job reallocations are consistent with our model. Both job finding and job separation flows display cyclical asymmetries (rising or falling fast and falling or rising more slowly). A similar pattern is found for full-time female employment with job separations dominating total job reallocations, albeit smaller in degree. This pattern is repeated for both females and males in the 1991 recession.

The part-time work patterns are very different. Males experience a rapid acceleration of part-time flows during both recessions with an increasing trend over the entire sample. Both job separations and job findings rise. For female part-time employment, recessions are characterised by job findings falling to be approximately equal to job separations. Otherwise a strong increasing trend dominates.

In Table 8, we show the summary statistics for the ratio of job separations to reallocations for males and females over the entire sample. The swings in male full-time work are striking relative to the ranges shown for the other gender/work categories. At the height of economic activity the ratio falls to around 0.37 per cent and full-time work is buoyant. At the depth of the recession, this ratio rises to its maximum value of 0.60 and full-time job destruction is rapid and substantial. Female full-time employment swings less than males but more than the two part-time categories shown. Male and female part-time employment behaves similarly. The adjustment in the labour market appears to be more focused on full-time employment retrenchment accompanied by substitution of part-time jobs rather than rapid changes upwards and downwards in part-time work with full-time work resistant to the cycle.

The evidence therefore is consistent with the view that recessions are bad for full-time employment opportunities and accelerate their overall declining share in total employment. There is no evidence to suggest that part-time work losses are the first buffer that firms use to adjust the declining activity. We adopt a cautious tone here because clearly our analysis cannot match the flows from one period to another. There is a general rise in both rates of job separation and job finding and the duration of each job created may be very short. The turbulence of this activity may be associated with very insecure work patterns. Further, the overlap between the full-time losses and the part-time gains may be associated with 'bumping down' patterns where more skilled workers lose their full-time jobs and take part-time work to tide them over. This pattern is highly disadvantageous to the low skill workers (see Carlson and Mitchell, 2003 for evidence of this effect).

As a final exploratory exercise, we use the computed job separation and job finding time series to test some of the major propositions from our model (see Section 5, Table 5). In Tables 9 and 10 the results are shown after regressing the logs of job finding and job separation, and job reallocation, on capacity utilisation (%GDPGAP) and recession dummies (R1982 and R1991) by gender and employment status, respectively. While only tentative analysis, the estimation results generally support our priors as formulated in Table 5. The utilisation rate impacts on male flows as expected although the impact on part-time male job creation is significantly negative. For females, a stronger positive capacity utilisation impact on part-time flows was expected but the results are statistically insignificant for all of the flows.

The 1982 recession exerts a much stronger impact than the 1991 recession (except for male full-time job finding) and Mitchell and Muysken (2003b) attribute this to a higher degree of hours-adjustment in the second recession. The negative impact on full-time job finding was unexpected, but at least it is dominated by the positive impact on job destruction. The positive impact of a recession on full-time job separation, compensated by part-time job finding is also consistent with the model's predictions. This impact is reflected in the positive impact of recession on job reallocation and the negative impact on the full-time components. Overall, the model has potential to represent the employment dynamics and further work is progressing.

7. Conclusion

In this paper we have begun an investigation into the recession dynamics of employment in Australia. The research was motivated by segmented labour market models that capture 'secondary' jobs as the first option for employment adjustment available to firms facing a recession. Primary jobs are seen as being 'hours-adjusting' rather than 'persons-adjusting', if at all, in such models.

We show that these notions are not consistent with stylised facts on full-time and part-time employment. To capture these stylised facts, we present a simple model of full-time job creation and destruction which generates countercyclical job reallocations and employment growth, while the cyclical impact on both variables for part-time jobs is indeterminate. The share of full-time job destruction in total full-time job reallocation is countercyclical.

We find that full-time male employment consistently bears the burden of adjustment in the two major recessions in Australia since 1978. Part-time employment continues to grow as economic activity plummets. The evidence suggests that firms restructure their workplaces by substituting part-time jobs for full-time employment. Moreover, firms appear to offer part-time employment to meet their current production requirements because they face relatively low adjustment costs. Our findings, and the stylised explanatory model, thus present a different perspective on how primary and secondary labour markets operate.

Since we observe a general rise in both rates of job separation and job finding, the duration of each job created may be very short. The turbulence of this activity may be associated with very insecure work patterns. Further, the overlap between the full-time losses and the part-time gains may be associated with 'bumping down' patterns where more skilled workers lose their full-time jobs and take part-time work to tide them over. This pattern is highly disadvantageous to low skill workers.

Finally, we note that the segmented labour market literature assumes a functional relationship between primary and secondary labour market segments in the face of flux and uncertainty with respect to aggregate demand changes and positive adjustment costs. The primary labour market was conceived as being an efficient mechanism to facilitate dynamic training efficiencies where firm-specific skills predominate. The findings in this paper suggest that this conception must be reconsidered. The question that has to be asked is whether the functions previously thought to be best served by fixed (primary) employment provision have changed or whether firms have found different ways of fulfilling them.

Appendix A: Business cycle dating

The business cycle is dated by defining a recession as a decline in GDP that lasts for two or more quarters (Mitchell, 2001). Some disagreement exists in the Markov-switching (MS) literature about business cycle dating, specifically as to how MS models correspond to the dating approach defined above. While the MS approach employs a different method of sequestering the data into regimes there is clearly a need to relate the regimes identified back to *a priori* concepts and other indicators of economic activity to ensure they are meaningful (Harding and Pagan, 2002).

The dating is applied to Australian GDP data and the results are shown in Table A1 below. Mitchell (2001a) shows a full historical account of Australian business cycle dating from 1959. We are only concerned with the post 1978 period as the male and female full-time and part-time data is only available for that time span.

Table A1 Dating Australian Business Cycles - 1978 to 2002.

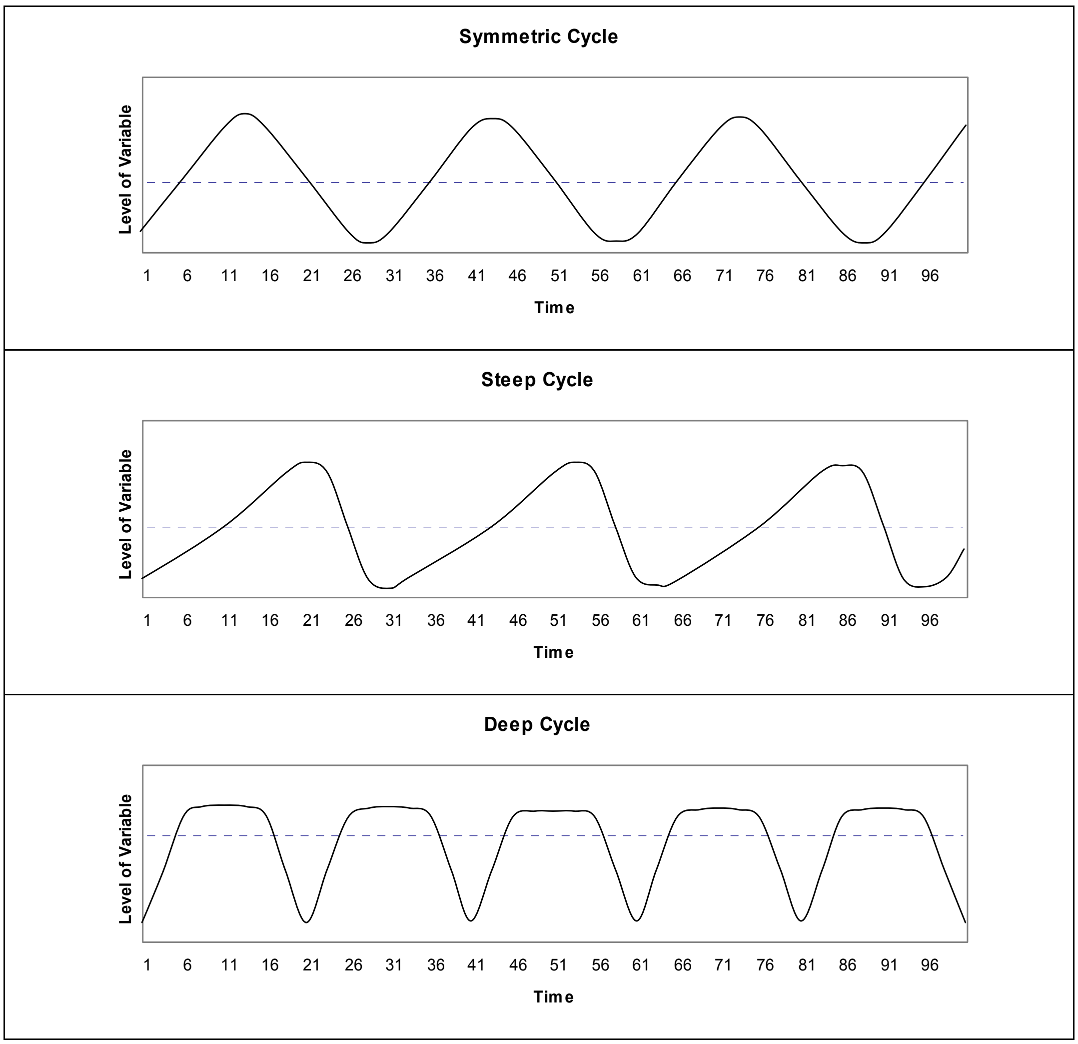
Peak	Trough	Contraction
December 1981	March 1983	5 quarters
September 1990	September 1991	4 quarters
September 2000	December 2000	1 quarter

Source: ABS AUSSTATS National Accounts.

Appendix B: Asymmetries in Business cycle behaviour

The three concepts are shown for a trendless procyclical time series in Figure A1. McQueen and Thorley (1993) add sharpness or turning point asymmetry to the taxonomy. Where sharpness is present, troughs are V-shaped and peaks are U-shaped. The formal definitions of the respective concepts of cyclical asymmetry are shown in Table A2 (see also Clements and Krolzig, 2002). The definitions are for a pro-cyclical time series.

Figure A1 Symmetric and asymmetric cycles for a trendless pro-cyclical time series



These diagrams are based on Sichel (1993: 226, Figure 1). In the case of a counter-cyclical time series like the unemployment rate, steepness manifests as rapid and large increases in the unemployment rate and slow declines as the economy improves. Deepness manifests as very high and sharp peaks occurring coincident with the trough of the cyclical variable.

Table A2 Definitions of steepness, deepness and sharpness

Concept	Description	Condition	Skewness Outcomes
Deepness	"Troughs are deeper than peaks are tall" (Sichel, 1993: 225) "… it should have fewer observations below its mean or trend than above, but the average deviation of observations below the mean or trend should exceed the average deviation of observations above" (Sichel, 1993: 227) Relates to relative levels around the mean or trend.	The process $\{x_t\}$ is said to be non-deep (non-tall) *iff* x_t is not skewed. Thus: $E\left(c_t-\mu_c\right)^3=0$	Negative skewness indicates deep contractions: $E\left(c_t-\mu_c\right)^3<0$ Positive skewness indicates deep expansions: $E\left(c_t-\mu_c\right)^3>0$
Steepness	"Contractions are steeper than expansions" (Sichel, 1993: 225) "Sharp decreases in the series should be larger, but less frequent, than the more moderate increases" (Sichel, 1993: 228) Relates to relative slopes or rates of change.	The process $\{x_t\}$ is said to be non-steep *iff* Δx_t is not skewed. Thus: $E\left(\Delta c_t\right)^3=0$	Steep contractions $E\left(\Delta c_t\right)^3<0$ Steep expansions $E\left(\Delta c_t\right)^3>0$
Sharpness	Troughs are sharp and peaks more rounded (McQueen and Thorley, 1993). The switch from contraction to high growth is more likely than a switch from high growth to contraction.	The process $\{x_t\}$ is said to be non-sharp *iff* the transition probabilities to and from the two outer regimes are identical. In a two regime model, for example, this requires $p_{12}=p_{21}$.	n.a.

Source: Clements and Krolzig (2001: 5), Sichel (1993) and McQeen and Thorley (1993).

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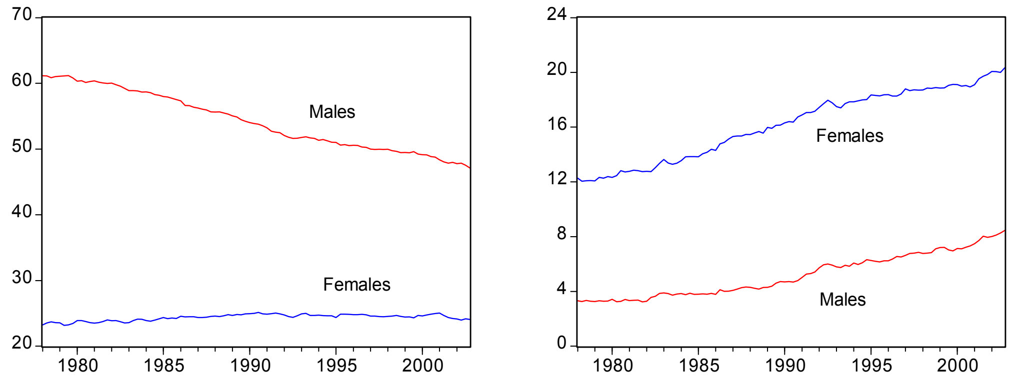
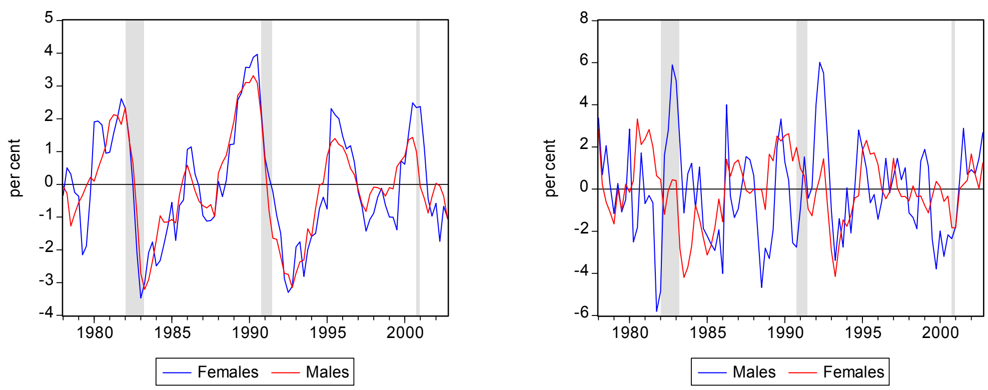
Figure 1 Male and Female employment shares in total employment, 1978-2002



(a) full-time shares in total employment (b) part-time shares in total employment

Source: ABS, Ausstats.

Figure 2 Measures of employment deviations from trend.



(a) Full-time deviation from trend (b) Part-time deviation from trend

Note: see text for derivation.

Table 1 Correlations between measures of employment and output cycles

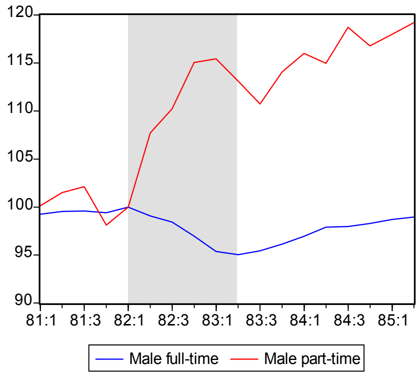
		Female employment gap Full-time	Female employment gap Part-time	Male employment gap Full-time	Male employment gap Part-time	GDP gap
Females	Full-time gap	1.00				
	Part-time gap	0.48	1.00			
Males	Full-time gap	0.87	0.62	1.00		
	Part-time gap	-0.32	0.26	-0.31	1.00	
	GDP gap	0.52	0.27	0.70	-0.33	1.00

Table 2 Cyclical sensitivity of male and female employment, 1978:2 to 2002:4

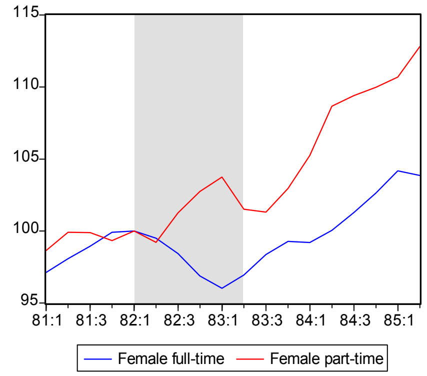
	Males – deviation from trend		Females – deviation from trend	
	Full time	Part time	Full time	Part time
AR(1)	0.83	0.45	0.81	0.70
	(23.6)	(4.89)	(15.6)	(10.0)
%GDPGAP	0.24	-0.29	0.25	0.17
	(6.60)	(1.85)	(3.90)	(2.19)
R1982	-0.48	1.96	-0.80	0.24
	(2.40)	(2.16)	(2.20)	(0.50)
R1991	-0.89	-0.12	-0.63	-0.04
	(4.30)	(0.12)	(1.55)	(0.08)
LR sensitivity	1.41	-0.52	1.32	0.57
R^2	0.94	0.82	0.35	0.58

t-statistics in parentheses. AR(1) is the lagged dependent and the constant is not reported. LR sensitivity is the coefficient on %GDPGAP divided by 1 minus the AR(1) coefficient.

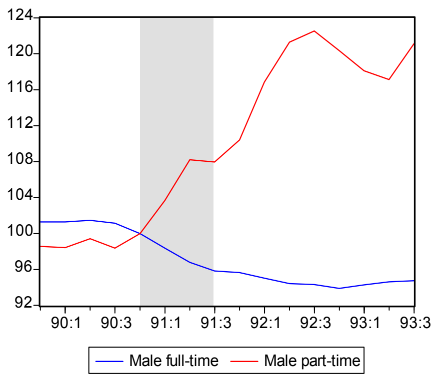
Figure 3 Full-time and part-time employment for males and females over 3 recessions



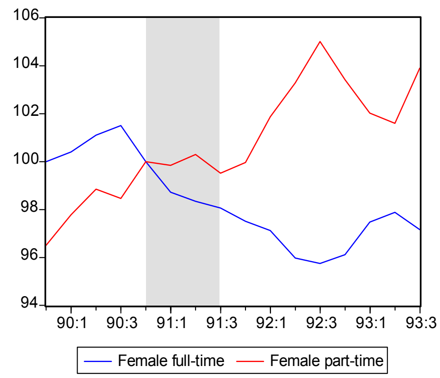
(a) Males 1981:1 to 1985:2



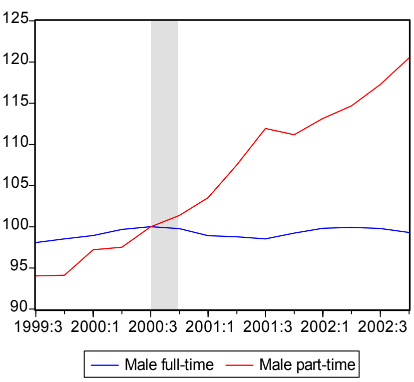
(b) Females 1981:1 to 1985:2



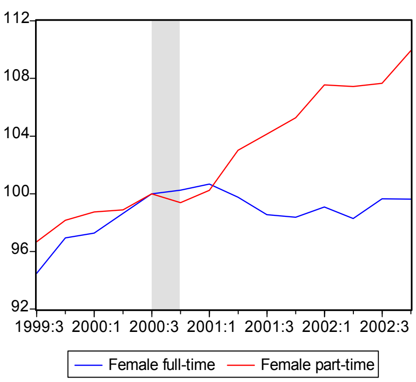
(c) Males 1989:4 1993:3



(d) Females 1989:4 1993:3



(e) Males 1999:3 2002:4



(f) Females 1999:3 2002:4

The peak-trough periods are defined in the Appendix A.

Table 3 Results for male and female full-time and part-time employment growth

	Full-time		Part-time	
	Males	Females	Males	Females
	MSI(2)-AR(2)	MSI(2)-AR(2)	MSI(3)-AR(2)	MSI(3)-AR(1)
Intercept (regime 1)	-0.0091 (5.40)	-0.0042 (1.32)	-0.0304 (5.35)	-0.0102 (1.56)
Intercept (regime 2)	0.0021 (4.09)	0.0068 (3.42)	0.0086 (3.22)	0.0087 (5.29)
Intercept (regime 3)			0.0411 (10.8)	0.0183 (7.29)
AR (-1)	0.2872 (3.02)	0.1309 (0.99)	0.0185 (0.16)	-0.1337 (1.25)
AR (-2)	0.1675 (1.89)	0.0211 (0.18)		
AR (-3)				
AR (-4)				
Transition Probabilities:				
p11	0.6647	0.7664	0.2320	0.4502
p12	0.3353	0.2336	0.0161	0.0284
p13			0.7519	0.5214
p21	0.0323	0.0799	0.0924	0.0471
p22	0.9677	0.9201	0.7253	0.9444
p23			0.1822	0.0085
p31			0.0231	0.0157
p32			0.6773	0.0927
p33			0.2996	0.8917
Probability of Regime 1	0.0878	0.2548	0.0863	0.0609
Probability of Regime 2	0.9122	0.7452	0.6516	0.5988
Probability of Regime 3			0.2622	0.3403
Duration Regime 1 (qtrs)	2.98	4.28	1.30	1.82
Duration Regime 2 (qtrs)	30.99	12.52	3.64	18.00
Duration Regime 3 (qtrs)			1.43	9.23
Obs in Regime 1	8.7	23.7	8.1	5.7
Obs in Regime 2	84.3	69.3	61.6	52.1
Obs in Regime 3			24.3	36.2

t-statistics are in parentheses next to coefficient estimates.

Table 4 Diagnostics for standardised residuals, Probability Values

	Male Full-time	Female Full-time	Male Part-time	Female Part-time
Portmanteau(8): Chi(6)	0.3098	0.1997	0.1852	0.5269
Normality: Chi(2)	0.0029	0.0008	0.6506	0.6332
Heteroscedasticity: Chi(4)	0.5215	0.8264	0.7115	0.5455

Figure 4 Actual and fitted mean values and regime probabilities - male full-time.

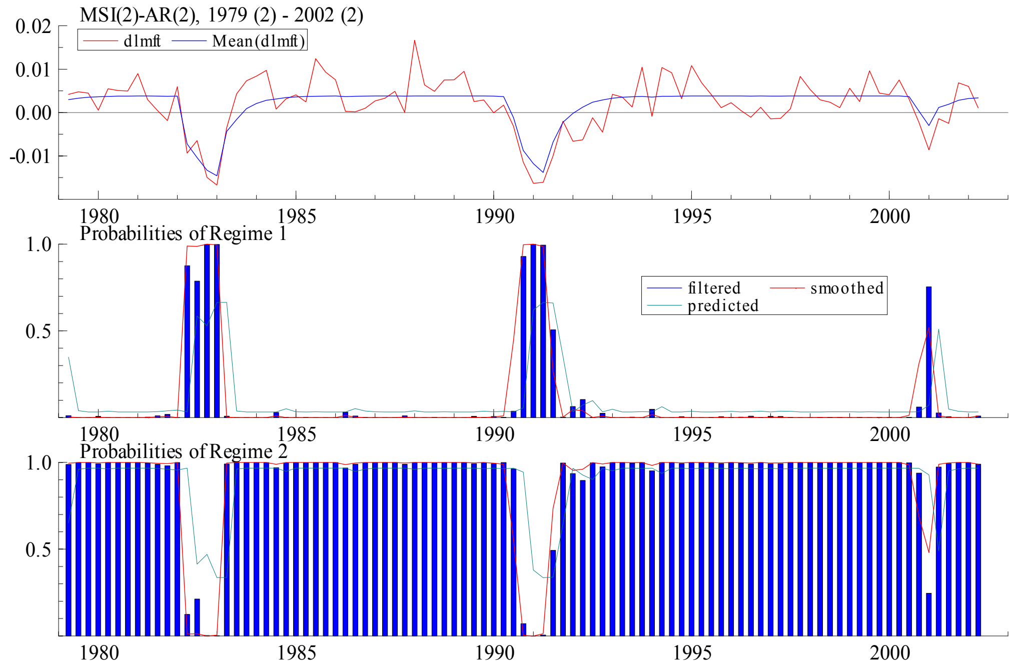


Figure 5 Actual and fitted mean values and regime probabilities - female full-time.

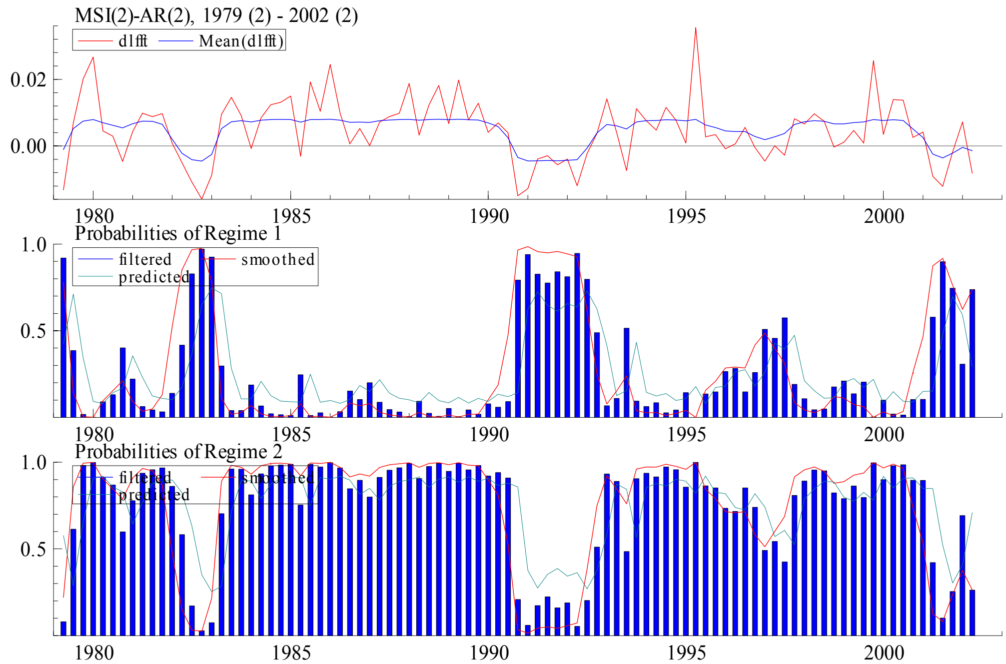


Figure 6 Actual and fitted mean values and regime probabilities - male part-time.

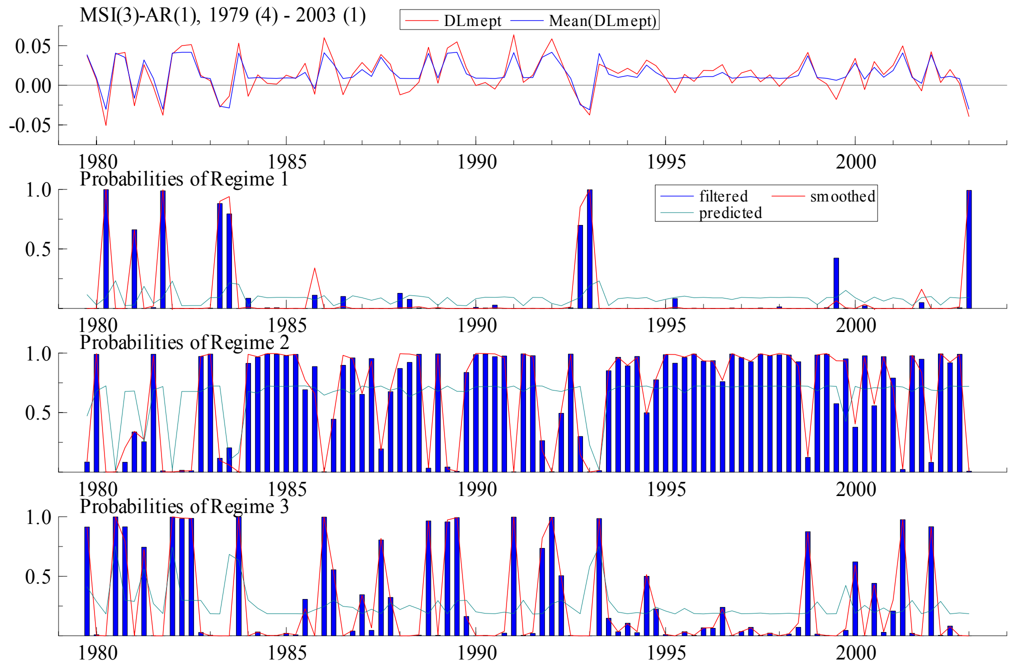


Figure 7 Actual and fitted mean values and regime probabilities - female part-time.

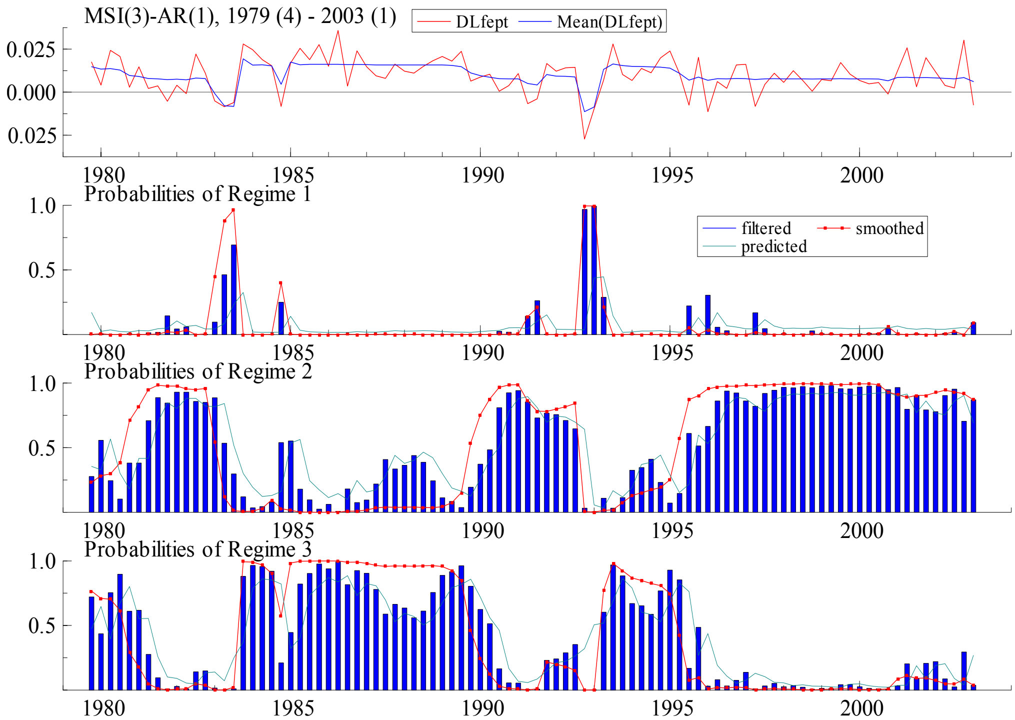


Table 5 Dynamics of full-time and part-time job creation and job destruction

	Full-time		Part-time	
	Utilisation rate	Recession	Utilisation rate	Recession
Job creation	0/+	0	+	+
Job destruction	0/-	+	- -	0
Job reallocation	0/-	+	-	+
JD / JRA	0/-	+	- -	-
ΔE	0/+	-	+ +	+

Table 6 Average flow rates to and from part-time jobs, by gender, 1980 to 2002

	Males		Females	
	Inflow from	Outflow to	Inflow from	Outflow to
Full-time	0.22	0.24	0.07	0.08
Part-time	0.60		0.79	
UE	0.05	0.04	0.03	0.02
NILF	0.12	0.12	0.10	0.10

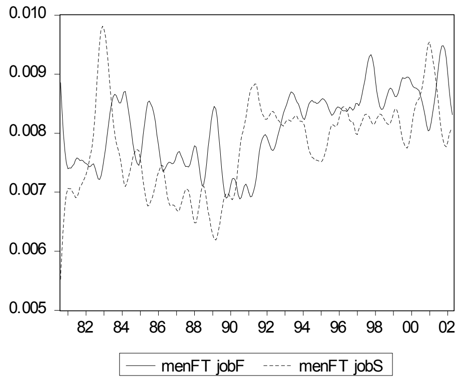
Source: ABS, The Labour Force, Australia.

Table 7 Average monthly flows in persons to unemployment or not in the labour

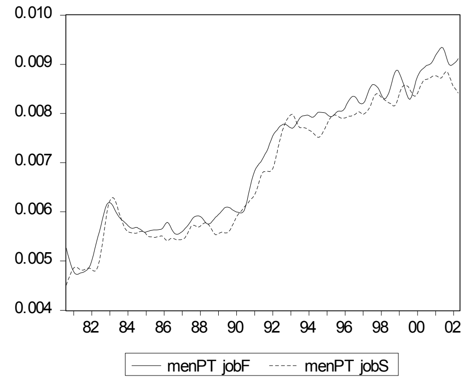
	Males		Females	
	UE Inflow from	N Inflow from	UE Inflow from	N Inflow from
Full-time	30	20-40	10	30
Part-time	20	35	10-25	65-90

Source: ABS, The Labour Force, Australia. Each flow has been multiplied by 1000. The ranges are taken at the beginning of the sample (1980) and the end (2002) as indicative of the variation in behaviour of these particular flows.

Figure 8 Male and female job finding and job separation rates, 1980 to 2002.

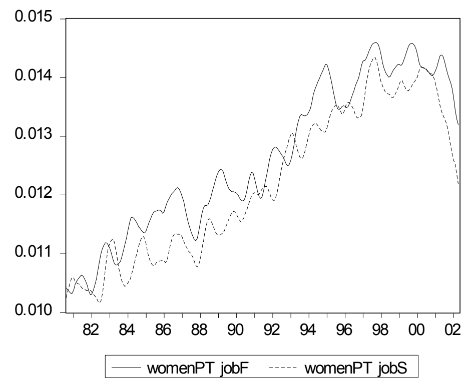


(a) Male full-time JF and JS



(b) Male part-time JF and JS

(c) Female full-time JF and JS



(d) Female part-time JF and JS

Figure 9 Male and female job finding and job separation, 1981:1 to 1985:2

(a) Males - full-time JF and JS

(b) Males – part-time JF and JS

(c) Females - full-time JF and JS

(d) Females – part-time JF and JS

Figure 10 Male and female job finding and job separation, 1989:4 to 1993:3

(a) Males - full-time JF and JS

(b) Males – part-time JF and JS

(c) Females - full-time JF and JS

(d) Females – part-time JF and JS

Note: All Flows are in thousands of persons per month.

Table 8 Shares of job separation in total reallocations, male and females [JS/(JS + JF)]

	Males		Females	
	Full-time	Part-time	Full-time	Part-time
Mean	0.49	0.49	0.48	0.49
Standard Deviation	0.044	0.014	0.014	0.024
Maximum	0.60	0.52	0.55	0.52
Minimum	0.37	0.45	0.43	0.45

Table 9 Male JF and JD regressions, 1980:1 to 2002:2

	JF	JD	JF	JD	JRA	JRA	JD/JRA	JD/JRA
	FT	FT	PT	PT	FT	PT	FT	PT
%GDPGAP	0.00	-0.02	-0.01	-0.02	-0.01	-0.01	-0.39	-0.21
	(0.17)	(2.36)	(2.80)	(3.86)	(2.39)	(3.69)	(1.16)	(1.49)
R1982	-0.16	0.26	0.07	0.03	0.03	0.04	9.89	-1.02
	(3.20)	(5.46)	(2.71)	(0.95)	(1.58)	(2.07)	(4.45)	(1.06)
R1991	-0.18	0.19	0.01	0.01	0.03	0.03	9.07	-0.59
	(3.71)	(3.81)	(0.50)	(0.36)	(1.65)	(1.29)	(4.01)	(0.61)
Trend	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.00
	(12.3)	(15.2)	(49.8)	(33.1)	(15.5)	(32.3)	(1.37)	(0.21)
R^2	0.75	0.77	0.97	0.95	0.97	0.99	0.34	0.14

t-statistics reported in parentheses, constant term not reported.

Table 10 Female JF and JD regressions, 1980:1 to 2002:2

	JF FT	JD FT	JF PT	JD PT	JRA FT	JRA PT	JD/JRA FT	JD/JRA PT
%GDPGAP	0.02	0.01	0.00	0.01	0.01	0.00	-0.19	-0.08
	(3.82)	(1.95)	(1.13)	(0.06)	(1.63)	(0.08)	(0.95)	(0.51)
R1982	-0.06	0.14	0.02	-0.02	0.02	0.01	5.41	0.99
	(1.69)	(3.33)	(0.82)	(0.53)	(0.92)	(0.34)	(4.01)	(0.91)
R1991	-0.05	0.06	0.04	-0.04	0.02	0.00	3.97	1.99
	(1.44)	(1.29)	(1.35)	(1.34)	(0.77)	(0.07)	(2.86)	(1.81)
Trend	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01
	(21.9)	(21.9)	(31.7)	(30.1)	(17.9)	(20.5)	(2.53)	(0.82)
R^2	0.89	0.87	0.94	0.93	0.97	0.97	0.22	0.06

t-statistics reported in parentheses, constant term not reported.

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[1] The authors are Professor of Economics and Director of the Centre of Full Employment and Equity, The University of Newcastle; and Professor of Economics and Director, CofFEE-Europe, respectively.

[2] This view has also been expressed in Mitchell and Muysken (2002b).

3 Mitchell and Muysken (2002c) developed a method to reconcile sample with population and stocks with the gross flows data based on the rotating matched sample and the monthly labour force survey data.

[4] In order to achieve consistency after seasonal corrections and to correct for rotation biases, we scaled the job finding and separation flows such that they were consistent with the changes in stocks resulting from the rotating sample data. These stocks revealed similar dynamics to those exhibited in the stock data from the Labour Force survey.