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Some Aspects of Labour Market Flows in New Zealand 1986-2001

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Abstract

It is now commonplace to study labour market dynamics using flows data from labour force panel surveys. The analysis of labour market flows to and from the states of employment, unemployment and non-participation has received most attention. This paper considers some New Zealand aspects of these flows with particular reference to concepts, descriptive features, the behavioural responses implied by the Markov approach to modelling labour market transitions, a brief literature review and some preliminary econometric results on the trend and cyclical features of New Zealand's gross flows.

Keywords

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1. Introduction

Until the late 1980s, the macroeconomic analysis of labour market activity in OECD-type economies was centred almost exclusively on the end-of-period totals of people employed, unemployed or not in the labour force rather than on the flow of people to and from these states. The major exception was the United States where the availability of household panel data from 1950 led to papers and conference proceedings on labour market dynamics. (See, for example, Marston 1976 and Flaim and Hogue 1985). The subsequent availability of household panel data in many other countries has meant that dynamic labour market analysis is now commonplace. New Zealand's experience is typical. The publication of the Household Labour Force Survey in 1985, and the important contribution by Woolf (1989), led to papers using New Zealand flows data. (See, for example, Chapple *et al.* 1996, Grimmond 1993, Herzog 1996, Irvine 1995, Silverstone and Gorbey 1995 and Wood 1998).

What can we learn about the labour market from flows data that we cannot learn from end-of-period totals? First, and most significantly, flows data enable changes in employment, unemployment and non-participation to be modelled in terms of two series: inflows and outflows. Modelling labour market states in this way has the potential to discriminate among alternative explanations for employment and unemployment and to discriminate among alternative policies.

Secondly, labour flows data can be used to calculate a wide range of descriptive statistics from labour turnover and duration to 'steady-state' outcomes. Flows data can show, for example, whether an increase in the unemployment rate is due to an increase in the inflow rate, a decrease in the outflow rate or both. Aggregate perspectives (such as trend, cyclical and seasonal features) and disaggregated perspectives (such as regional, sectoral, gender and demographic changes) can also be obtained from flows data. These descriptive statistics are potentially very useful for forecasting and policy and for identifying sources of labour market change and

tightness. Bleakley *et al.* (1999, p.68), for example, have observed that different flows to and from unemployment can generate the same movement in the aggregate unemployment rate yet imply very different inflation forecasts.

Thirdly, flows data can give important insights into such issues such as labour market flexibility, trends in part-time employment, the identification of discouraged-worker and added-worker effects and whether unemployment and not in the labour force are distinct states.[1]

The econometric analysis of the most important benefit of gross flows data - the ability to model labour market states in terms of inflows and outflows - has taken two related approaches. One approach uses the labour market *transitions matrix* as the framework to model changes in employment, unemployment and non-participation. The other uses the labour market *flows matrix*. Section 2 outlines the differences between these approaches and illustrates some key features of New Zealand's gross flows data. Section 3 outlines the behavioural responses implied in the transitions data. It also includes a brief review of selected empirical work. The specification and estimation of some preliminary New Zealand transition equations to identify trend and cyclical influences is in Section 4. Section 5 concludes the paper and indicates the direction of further work.

2. Gross Flows Data

Each quarter, Statistics New Zealand conducts a Household Labour Force Survey (HLFS) involving some 32,000 people in 16,000 households. Households remain with the survey for eight consecutive quarters. Each quarter, one eighth of the households are rotated out of the survey and replaced by a new sample of households. Between quarters, an individual will experience at least one of nine possible labour market flows or transitions. Three flows reflect an unchanged

[1] See Schettkat (1996) for a further indication of the wide range of issues that can be studied using flows data.

status between quarters, namely, continuing employment, unemployment or non-participation (*EE*, *UU* or *NN*, respectively). Six flows reflect changes between the origin and destination states, for example, from employment in the previous quarter to unemployment in the current quarter (*EU*). At any given time, though, an individual is either employed (*E*), unemployed (*U*) or not in the labour force (*N*).

Flows Matrix Approach

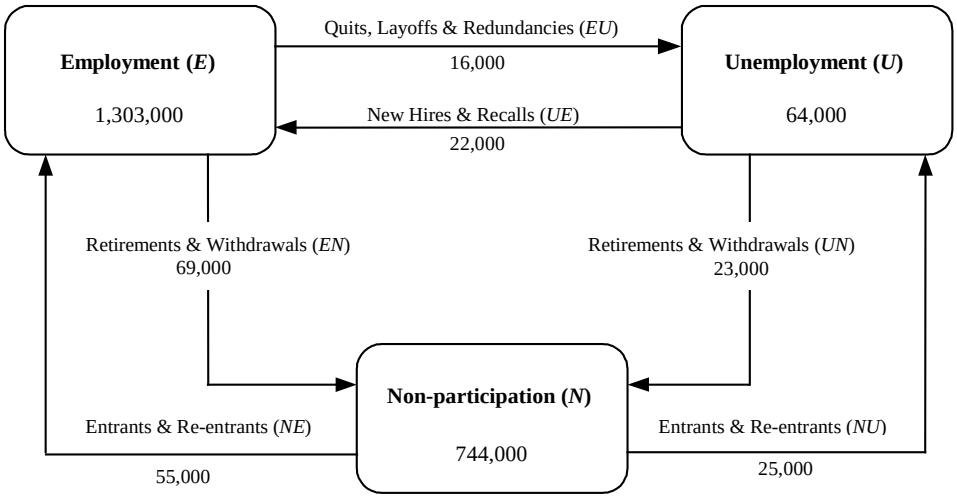
Table 1 is a matrix of the nine possible labour market gross flows for the period December 2000 to March 2001. They are also illustrated in Figure 1. The sum of the columns in Table 1 gives the gross flows totals for employment, unemployment and not in the labour force for the March quarter 2001 while the sum of the rows gives the corresponding totals for the December 2000 quarter. Due to survey rotation and revision, and factors such as households shifting and deaths, the gross flows (GF) totals for *E*, *U* and *N* typically range between 60 and 75 percent of their full sample, the Household Labour Force Survey (HLFS). Actual HLFS employment in March 2001, for example, was 1,803,000 persons compared to the matched sample total of 1,303,000 persons shown in Table 1.

Table 1. Matrix of Gross Labour Market Flows in New Zealand
Males and females, thousands, all ages, December 2000 to March 2001

Labour Force Status in December Quarter →	Labour Force Status in March Quarter ↓ *E*	*U*	*N*	Row Totals
E	1226 (*EE*)	16 (*EU*)	69 (*EN*)	1311 (E_{-1})
U	22 (*UE*)	23 (*UU*)	23 (*UN*)	68 (U_{-1})
N	55 (*NE*)	25 (*NU*)	652 (*NN*)	732 (N_{-1})
Column Totals	1303 (*E*)	64 (*U*)	744 (*N*)	2111

Note: The column totals for *E*, *U* and *N* represent 72, 59 and 75 percent, respectively, of the actual HLFS March quarter totals for employment, unemployment and non-participation.
Source: Statistics New Zealand, *Labour Market Statistics 2000*, Table 1.12 Gross Flows (updated).

Figure 1. Gross Labour Market Flows in New Zealand
Males and females, total number, all ages, December 2000 to March 2001



Note and Source: See Table 1.

Equation 1, using the notation from Table 1, shows that the quarterly changes in *E*, *U* and *N* are identically equal to the difference between their respective inflows (*I*) and outflows (*O*). This equation is the basis for the 'flows matrix' approach to the econometric analysis of labour market gross flows. (See, for example, Bellmann *et al.* 1995, Denton 1973, Smith *et al*. 1974, Storer 1994 and Theeuwes *et al*. 1990).

$$\begin{aligned} \Delta E &= E - E_{-1} = I_E - O_E = (UE+NE) - (EU+EN) \\ \Delta U &= U - U_{-1} = I_U - O_U = (EU+NU) - (UE+UN) \\ \Delta N &= N - N_{-1} = I_N - O_N = (EN+UN) - (NE+NU) \end{aligned} \qquad (1)$$

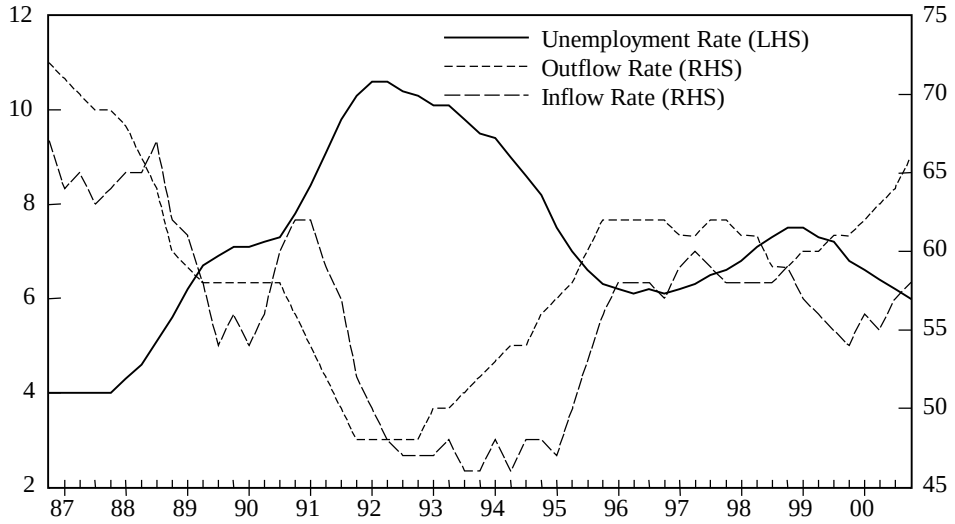
Using the unemployment data in Table 1 as an illustration, the change in the gross flows measure of unemployment (ΔU) between December 2000 and March 2001 is (in thousands):

$$\Delta U = (64 - 68) = (41 - 45) = [(16 + 25) - (22 + 23)] = -4.$$

The *net* change in unemployment of 4,000 people is the outcome of two 'large' *gross* changes: 41,000 inflows into unemployment (I_U) and 45,000 outflows (O_U). With respect to outflows, 45,000 people - or two-thirds of the 68,000 unemployed in December 2000 - changed their status just one quarter later to either employment (22,000) or to not in the labour force (23,000). This valuable information is not revealed by data on total, end-of-period, unemployment.

As a further illustration of information not revealed by end-of-period totals, Figure 2 plots the HLFS unemployment rate against GF inflow and outflow rates. The inflow rate is $(EU+NU)/U_{-1}$ and the outflow rate is $(UE+UN)/U_{-1}$. Figure 2 shows that unemployment between 1986 and 2001 was the outcome of different inflow and outflow combinations. The fall in unemployment between 1992 and 1996, for example, was caused primarily by an increase in the outflow rate. On the other hand, the 1999-2000 fall was caused by favourable movements in both the inflow and outflow rates. Although the unemployment rate did not change significantly between 1996 and 1998, gross flows data shows that, on average over this period, 60 percent of the unemployed changed their status between quarters.

Figure 2. Inflow, Outflow and Unemployment Rates 1986-2001
Four-quarter Moving Averages, Percent



Source: Statistics New Zealand.

Finally, in this section on flow levels, Table 2 illustrates cyclical differences in gross flows over two New Zealand business cycles. Several interesting features emerge. First, in every cycle, the average quarterly flows from unemployment to employment (*UE*) were *greater* than the flows from employment to unemployment (*EU*). In other words, in both stagnation and expansion, more people within the labour force flowed into work than away from work. This outcome implies that the overall increase in the unemployment rate between 1986 and 1997 was due primarily to labour force entry and exits, that is, to movements to and from not in the labour force. This is confirmed by Table 2 where the *EN* flow dominates the *NE* flow and *NU* dominates *UN*.

A second feature of Table 2 also relates to non-participation. While the quarterly $N \leftrightarrow E$ flows (*NE* and *EN*) are not too dissimilar in aggregate across two very different periods, the $N \leftrightarrow U$ flows (*NU* and *UN*) are significantly different when aggregated (37,000 persons during stagnation versus 53,000 during expansion). The increase in *NU*, as the economy improves, may reflect the improved prospects for employment (via unemployment, in the first instance) from

Table 2. Gross Flows over Two Cycles in New Zealand 1986-1997
Quarterly Averages, All Ages, Males and Females

	Peak-to-Peak	Peak-to-Trough (Stagnation)	Trough-to-Peak (Expansion)
	1986:3-1997:4	1986:3-1991:2	1991:2-1997:4
GDP	2.0 %	0.8 %	2.6 %
Unemployment Rate	7.2 %	6.3 %	8.1 %
Unemployment Rate	4 % (1986)	11 % (1991)	7 % (1997)
		Gross Flows (Persons)	
UE	23,300	20,100	25,900
EU	18,300	17,500	19,100
UN	21,700	17,100	25,200
NU	24,600	20,000	28,100
NE	50,700	51,300	50,000
EN	54,700	57,300	52,700

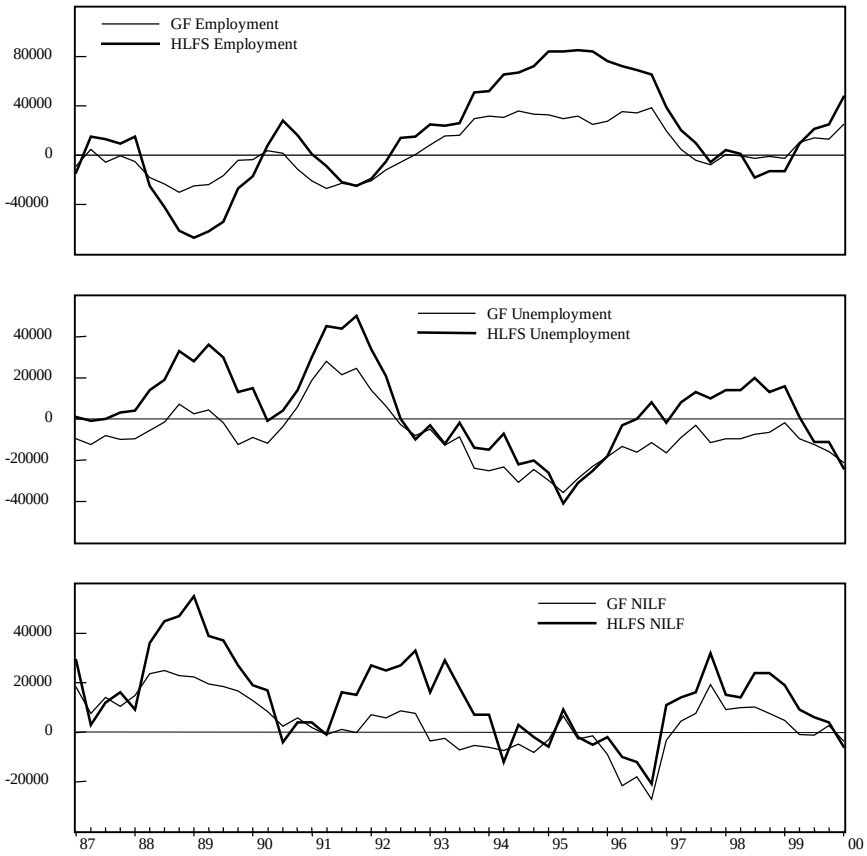
Sources: Statistics New Zealand (Gross Flows and Unemployment Rate), OECD *Main Economic Indicators* (GDP) and Brook *et al.* (1997).

previous non-participants. Similarly, the *increase* in *UN* during expansions may be the result of discouragement among previously unemployed workers, retirements and the improved opportunity for further education. All these features of Table 2 highlight the importance of non-participation in understanding labour market behaviour and economic performance. (See Jones and Riddell 1999).

The outcomes discussed above are subject to the potentially distorting effects of rotation group bias and classification error. These effects can overstate some flows and produce outcomes inconsistent with the full sample HLFS results. Rotation group bias occurs where the characteristics of the matched households (for example, age and gender) differ from the full sample while classification error is the result of incorrect data entry and the faulty recall by panellists regarding their labour market status. Classification error leads to spurious gross flows and, therefore, spurious transitions. If, for example, a person is initially classified correctly in period one as employed, incorrectly as unemployed in period two and correctly in period three as employed, two spurious flows or transitions have been recorded: $E \rightarrow U \rightarrow E$ rather than the 'no transition' record of $E \rightarrow E \rightarrow E$. There is evidence that classification error results in an overstatement of some of the movements between labour market states. The best-known study is by Abowd and Zellner (1985). Using United States data, they found that the flows between *E* and *U* were largely unaffected by classification error, while the flows to and from *N* needed to be reduced substantially.

Figure 3 compares cumulative changes in actual HLFS employment, unemployment and non-participation with their gross flows counterparts. Despite impressive partial correlations (0.92, 0.82 and 0.92, respectively), there is a clear tendency for changes in gross flows (GF) to under-state changes in the official HLFS measures. This is due not only to rotation group bias and classification error but also to changes in the size of the GF sample and to the absence of any 'rating-up' from GF to HLFS.

Figure 3. Changes in Labour Market States 1986-2001
Actual versus Gross Flows, Four Quarter Moving Averages, Persons



Source: Statistics New Zealand.

Transitions Matrix Approach

The gross flows data in Table 1 can be converted into transitions or 'flow rates'. Formally, the transition rate between, say, last quarter's unemployment and this quarter's employment (*ue*) is defined as the average probability of an individual moving from unemployment in the previous quarter to employment in the current quarter. Using this definition, the transition rate from unemployment to employment (*ue*) between December 2000 and March 2001 is the ratio of *UE* to total unemployment in the previous period (U_{-1}) or (*UE*+*UU*+*UN*), that is,

$$ue = \left(\frac{UE}{U_{-1}}\right) = \left(\frac{UE}{UE + UU + UN}\right) = \left(\frac{22}{68}\right) = 0.32 \quad \text{or} \quad 32\% \qquad (2)$$

The remaining gross flows in Table 1 can also be converted to transitions using the appropriate specification of equation 2. The outcome for all nine transitions is shown in Table 3. This specification is the basis for the 'transitions matrix approach' to the econometric analysis of labour market gross flows. (See, for example, Denton 1973, Keeley 1984, Marston 1976 and Smith *et al*. 1974. Subsequent contributors include Bellmann *et al*. 1995, Burda and Wyplosz 1994, Harris 1996 and Mumford and Smith 1999).

Table 3. Matrix of Gross Labour Market Transitions in New Zealand
Males and females, all ages, December 2000 to March 2001

Labour Force Status in December Quarter →	Labour Force Status in March Quarter ↓			
	E	*U*	*N*	Total
E	0.94 (*ee*)	0.01 (*eu*)	0.05 (*en*)	1
U	0.32 (*ue*)	0.34 (*uu*)	0.34 (*un*)	1
N	0.08 (*ne*)	0.03 (*nu*)	0.89 (*nn*)	1

Source: Table 1.

Reading across the diagonal in Table 3, the data imply that 94 percent of the people who were employed in December 2000, and 89 percent of non-participants, could expect to continue in that state in March 2001. Similarly, 66 percent of the unemployed could expect to move to either employment (32 percent) or to non-participation (34 percent). Expressed alternatively, for every 100 people who were unemployed in December 2000, 33 could expect a job by March 2001, 34 to remain unemployed and 34 to move out of the labour force.

The transitions in Table 3 are aggregated across genders and age groups. Transitions are likely to differ not only between males, females and age groups but

also between occupations, qualifications, full and part-time work, regions and ethnic groups. Table 4 compares several disaggregated transition rates. Several features emerge. First, the transition from unemployment to employment (*ue*) - the 'probability' of obtaining employment - is very similar across all groups at a quarterly average of around 30 percent. Secondly, males are more likely to stay in unemployment compared to females (40 percent versus 32 percent on average). Thirdly, young persons have, not unexpectedly, relatively more significant transitions between employment and not in the labour force. Fourthly, males and females differ relatively little in the transition from not in the labour force to employment (*ne*). Finally, within these transitions, 75 of the flows from unemployment to employment in 1986 were to full-time positions. By 2001, this had fallen to 60 percent.

Table 4. Labour Market Flow Rates 1986:1-2001:1
New Zealand, Quarterly Averages, Percent

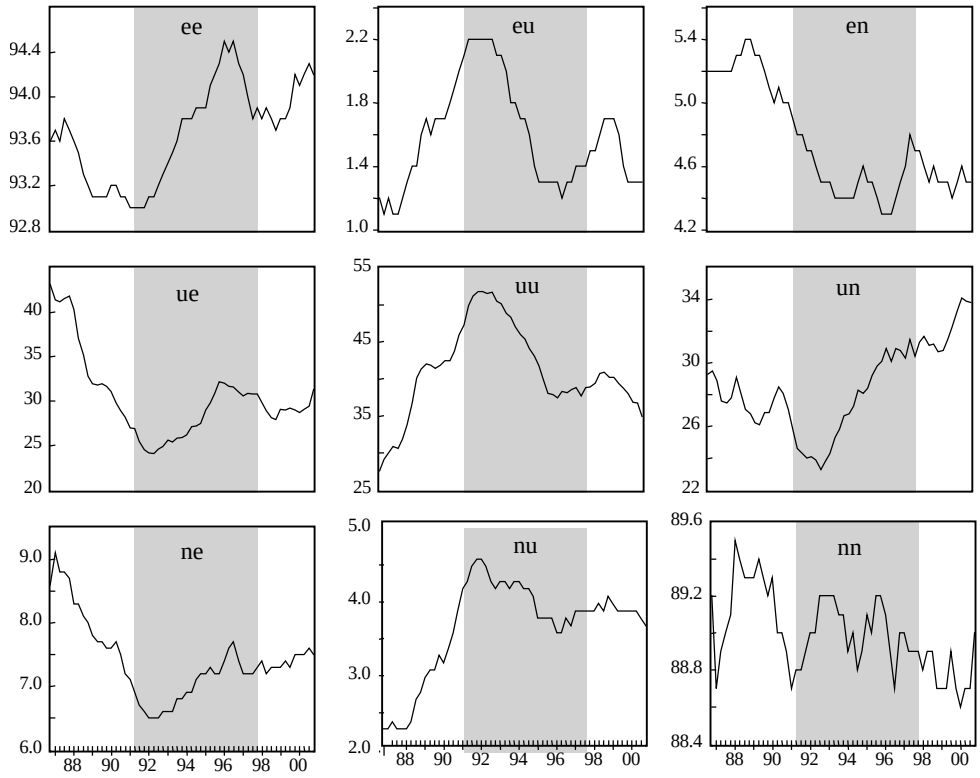
	All Persons and Ages	Males (All Ages)	Females (All Ages)	Young Persons (15-24)
eu	1.6	1.7	1.4	3.1
en	4.8	3.1	6.9	8.4
ue	30.9	30.1	31.9	31.9
uu	40.4	46.6	32.4	38.1
un	28.7	23.3	35.7	30.0
ne	7.4	7.8	7.3	17.1
nu	3.6	4.5	3.0	8.5

Source: Statistics New Zealand, Household Labour Force Survey.

Figure 4 shows time series charts for all nine transition rates in Table 3. Several features emerge from these charts. First, most of the series (apart from *nn*) appear to be either pro-cyclical (*ue, ne*) or counter-cyclical (*eu, ne*) and subject to seasonality. Secondly, at the peak of the recession that ended in 1991-92, the quarter-by-quarter 'retention rate' into continuing unemployment (*uu*) was 50 percent. This rate fell to about 35 percent at the peak of the 1992-96 boom. Thirdly, contrary to the conventional wisdom regarding the discouraged worker effect (that workers move to non-participation following unsuccessful attempts to

gain employment) the flow rate from unemployment to not in the labour force (*un*) actually fell in the recessionary period that ended in 1991-92.

Figure 4. Transition Rates in New Zealand 1986-2001
All Groups, Four Quarter Moving Averages, Percent



Note: Shaded area represents GDP trough-to-peak (1991:2 - 1997:4).
Source: Statistics New Zealand, *Labour Market Statistics 2000* (updated).

Finally, the transitions in Table 3 can be combined to give insights into the rate, duration and frequency of unemployment. If, for example, the flows to and from unemployment are equal, then the rate of unemployment (u) can be expressed in terms of the off-diagonal transitions in Table 3. This expression is shown as equation 3. (For further details, see Marston 1976 or Silverstone and Gorbey 1995).

$$u = 1/\left[1+\left(\frac{(ne+nu)ue+(ne)(un)}{(ne+nu)eu+(nu)(en)}\right)\right] \qquad (3)$$

Although this so-called 'steady state' rate of unemployment usually differs from the actual unemployment rate, due mainly to data bias, equation 3 'indicates where the labour market is headed if the current transition probabilities were to remain constant' (Keeley 1984, p.11). It implies - through the six off-diagonal transition rates - that there are potentially many influences on the rate of unemployment.

3. The Markov Process

The labour market transitions in Table 3 are based on the assumption that labour market behaviour can be described by a first order Markov process. In a first order Markov process, the probability of an individual's current outcome (say, employment) depends only on his or her immediately preceding outcome. In Table 1, for example, 1226 respondents out of 1311 (or 94 percent) identified themselves as employed in period *t*-1. A first order Markov process implies a probability of 0.94 (p_{ee}) that these respondents will be employed in period *t*. A similar argument applies to the other transitions in Table 3 which are now re-expressed as a 3x3 matrix of transition probabilities,

$$P = \begin{bmatrix} p_{ee} & p_{eu} & p_{en} \\ p_{ue} & p_{uu} & p_{un} \\ p_{ne} & p_{nu} & p_{nn} \end{bmatrix} = [p_{ij}] \qquad (4)$$

where *i* refers to the origin state (*t*-1) and *j* refers to the destination state (*t*) of *E, U* and *N*, respectively. Since the rows sum to unity, only six of the nine transition probabilities are independent.

Markov processes do not explain transitions over time. This task requires the specification and estimation of estimate relationships that could generate the transitions matrix (equation 4) and, as a result, the time series observed in Figure 4. We begin with a microeconomic perspective and the statement in Bellmann *et al*. (1995, pp.145-47) that the Markov probability of moving between labour market states is a function of the personal characteristics and the local economic

environment observed before any transition took place. Given that the dependent variable is the relative odds of moving into one of three categories (employed, unemployed or not in the labour force), multinomial modelling is the appropriate estimation technique. Compared to the linear probability model (LPM), the multinomial model meets the requirement that probabilities lie within the 0-1 range and the often more realistic assumption that behavioural responses are non-linear. The multinomial model also avoids the LPM problems of non-linearity of the disturbance term and heteroscedastic variance of disturbances. (See Gujarati 1995).

Formally, in the multinomial logistic model, the probability of an individual moving from the origin state to the destination state (from, say, unemployment to employment) is (following Long 1997, Chapter 6):

$$\Pr[y_i = m \mid \mathbf{x}_i] = \frac{\exp(\mathbf{x}_i \boldsymbol{\beta}_m)}{\sum_{j=1}^{J} \exp(\mathbf{x}_i \boldsymbol{\beta}_j)} \quad \text{where} \quad \boldsymbol{\beta}_1 = 0 \tag{5}$$

where $\Pr[y_i = m \mid \mathbf{x}_i]$ is the probability of observing outcome m given a vector of individual and origin state job characteristics $\mathbf{x}_i$ and parameters $\boldsymbol{\beta}_m$. Estimation is typically by maximum likelihood methods.

There have been both micro and macro-econometric studies of labour market transitions. Bellmann *et al.* (1995) and Theeuwes *et al.* (1990) are examples of a substantially micro-econometric approach. In the Bellmann study on the East German labour market, multinomial logit equations were estimated for the employment and unemployment transitions of men and women. Independent variables included age, marital status, educational attainment, region, industry, full or part-time employment and establishment size. Theeuwes *et al.* (1990) have a similar specification: transitions are a function of panel data relating to age, education, family situation, work experience, health, country of origin and degree of urbanisation.

New Zealand studies with a substantial microeconomic component include Grimmond (1993), Herzog (1996) and Irvine (1995). Grimmond analysed a range of labour market characteristics including gender, age, ethnic origin, qualifications, location and industry. He found that the labour market outcomes for men were considerably poorer than for women, qualifications appear to assist job retention and employability and Maori and Pacific Islanders have a high likelihood of becoming and remaining unemployment. Irvine also examined characteristics that might determine the probability of moving into employment (such as occupation sought, educational attainment and job search method) and how the effect of these characteristics has changed over time. Irvine found that part-time job seekers have a similar chance of finding work as full-time job seekers and that (for the period 1990-94) a person with both school and post-school qualifications was almost twice as likely to obtain employment in the following quarter than a person with no qualifications.

Herzog (1996) assumes that transitions are generated by a two-stage process: employment separation (voluntary or involuntary) and the related choice regarding labour force participation. The main influences on this process include worker characteristics (gender, age, ethnicity, qualifications and marital status), employment status (wage or salary worker, full or part-time worker or looking for another job), industry growth, seasonality and trend effects. Herzog's econometric mostly confirms earlier work on transitions. One particularly interesting, and perhaps controversial, finding relates to the impact of the Employment Contracts Act 1991. Herzog (1996, p.32) states that 'no evidence is provided to support the contention that layoffs, dismissals and redundancies increased following the implementation of the Act'.

Antolin (1999), DeBoer and Seeborg (1989), Denton (1973), Holmlund and Vejsiu (2001), Hughes (1992), Keeley (1984), Leeves (1997) and Williams (1995) are examples of a macro-econometric approach to the study of labour market

transitions. Apart from Denton and Hughes, they all use substantially the same core specification to consider issues ranging from gender and demographic differences in transition rates to the impact of changes in unemployment benefits on labour force participation. In each case, OLS or GLS is used to regress transition rates on seasonals, a time trend and a cyclical indicator (such as GDP growth, the unemployment rate, capacity utilisation and vacancies). Variations to the core specification include lagged dependent variables and variables to control for the Vietnam War and labour legislation changes. Denton uses multinomial logit modelling and Hughes uses cointegration analysis.

Among the country-specific findings, the discouraged worker effect is not supported (Keeley), the vacancy-labour force relationship may contribute to the non-linearity of the Phillips curve (Smith), the propensity of women to leave full-time employment has decreased (Williams), a greater variety of contractual arrangements had a favourable impact on employment (Antolin), unemployment dynamics in Australia match North American experience much more closely than European experience (Hughes) and the greater cyclical sensitivity of male-dominated industries than female-dominated industries explains the historic narrowing of the female-male differential in recessions (DeBoer and Seeborg).

New Zealand studies with a substantial macroeconomic component include Grimmond (1993, Chapter 3.1), Chapple, Harris and Silverstone (1996), Herzog (1996) and Wood (1998, Chapter 7). Grimmond (1993) considered trend and cyclical issues extensively in his monograph. He experimented with GDP, business confidence and capacity utilisation as cyclical measures. Despite the shortcomings of working with just 21 quarterly observations (1986-1991), he found cycles and lags in three transition rates (*eu, uu* and *nu*) and trends in six rates (*ee, eu, ue, uu, ne* and *nu*). Grimmond was unable to test for seasonality. Chapple *et al*. specify equations for inflows and outflows to unemployment for the period 1985-94. They find that a sales constraint and unemployment duration were the

dominant determinants of inflows and outflows rather than structural change. Herzog, however, reaches a different conclusion. After controlling for micro-economic influences and cyclical and seasonal factors, his econometric work shows that New Zealand's unemployment experience (1985-1994) was indicative of structural change. Finally, Wood builds a matching function model. He finds, for example, that flows from unemployment to employment are influenced by those already in employment (job-to-job flows or churning), by non-participants looking for jobs and by the long-term unemployed.

4. Preliminary Specification and Estimation

While labour market transitions may well be dominated by microeconomic considerations (such as education, age, marital status and location), they are not independent of macroeconomic considerations such as the stage of the business cycle and economic growth. The secular and cyclical aspects labour market transitions, then, should not normally be omitted from microeconometric studies. To overlook macroeconomic influences amounts to misspecification. With this theme in mind, we take a macroeconomic approach and study the trend and cyclical aspects of labour market transitions in New Zealand. It is preliminary work in the spirit of Deboer and Seeborg (1989), Grimmond (1993), Leeves (1997) and Williams (1995). Further work is indicated in our conclusions.

In equation 6, p_{ij} is the transition probability of moving from state i to state j, t is time (taking the value 1 in 1986:1), c is a measure of cyclical influence (tested using GDP growth, GDP gap, the unemployment rate and capacity utilisation), s represents seasonal dummies and ε is a random error term.

$$\ln p_{ij} = \alpha_0 + \alpha_1 t_t + \alpha_2 \ln c_t + \alpha_3 s_{it} + \varepsilon_t \qquad i,j=1,2,3. \tag{6}$$

Table 5 shows OLS regression results for trend and cyclical influences on New Zealand's transition rates by gender from 1986:1 to 2001:1. The unemployment

rate was found to be the most satisfactory cyclical indicator. Chow tests for a structural break around 1991-1992 (a cyclical trough and the introduction of the Employment Contracts Act 1991) is accepted clearly only for the male employment to unemployment transition (*eu*) and marginally for the female employment to not in the labour force transition (*en*). This finding tends to supports Herzog's (1996) view regarding the impact of the Employment Contracts Act

Table 5. Trend and Cyclical Influences on New Zealand Transition Rates
By Gender, All Ages, Quarterly, 1986:1-2001:1

	Dependent Rate	Constant	Trend	Cycle	DW	$\overline{R}^2$ (adj)
(a)	*Employment to Unemployment* (*eu*)					
	Males	-1.006	-0.0035	0.822	1.60	0.75
		(8.5)	(3.62)	(13.37)		
	Females	-0.904	-0.0058	0.672	1.69	0.75
		(7.7)	(5.92)	(10.97)		
	Unemployment to Employment (*ue*)					
	Males	4.592	-0.0015	-0.573	1.68	0.83
		(63.8)	(2.56)	(15.28)		
	Females	4.321	-0.0016	-0.442	1.69	0.77
		(60.1)	(2.71)	(11.8)		
(b)	*Employment to Not in Labour Force* (*en*)					
	Males	1.231	-0.0014	-0.084*	1.63	0.40
		(15.6)	(2.19)	(2.04)		
	Females	2.185	-0.0043	-0.081	1.64	0.73
		(41.1)	(9.73)	(2.93)		
	Not in Labour Force to Employment (*ne*)					
	Males	2.785	-0.0019	-0.322	1.90	0.77
		(39.7)	(3.22)	(8.81)		
	Females	2.45	-0.0005	-0.215	1.93	0.59
		(44.8)	(1.02)	(7.56)		
(c)	*Unemployment to Not in Labour Force* (*un*)					
	Males	3.572	0.0081	-0.400	1.79	0.72
		(39.2)	(10.74)	(8.43)		
	Females	3.646	0.002	-0.071	1.98	0.32
		(47.7)	(3.18)	(1.79)		
	Not in Labour Force to Unemployment (*nu*)					
	Males	0.250	0.0049	0.612	1.80	0.77
		(2.52)	(5.27)	(10.57)		
	Females	-0.206*	0.0045	0.622	1.54	0.79
		(2.07)	(5.46)	(12.1)		

Note: Seasonals not shown. *t*-statistics in parenthesis. * significant at 5 percent.
Source: Statistics New Zealand.

To keep the interpretation of Table 5 manageable and relatively brief, consider the following pairings: employment to unemployment transitions ($e \leftrightarrow u$), employment to not in the labour force ($e \leftrightarrow n$) and unemployment to not in the labour force ($u \leftrightarrow n$). The $e \leftrightarrow u$ transitions are almost identical for male and female *eu* trends while the cyclical influences are asymmetrical: those from *e* to *u* are stronger than those from *u* to *e*. Male cyclical responsiveness, however, is higher than female: an increase in the rate of unemployment - our cyclical indicator - leads to a more responsive movement of males into unemployment and females out of unemployment, and conversely.

With respect to $e \leftrightarrow n$ transitions, the *en* cyclical responsiveness of males and females is relatively weak. On the other hand, male and female cyclical *ne* flows are significant. Re-specification of the *en* equation should disclose the missing (micro) influences such as retirement and further education. With respect to $u \leftrightarrow n$ transitions, the *nu* male and female trend and cyclical are very similar: an increase in the rate of unemployment results in a very similar increase in the male and females transition from not in the labour force to unemployment (*nu*).

5. Conclusions and Further Research

The gross flows data from the New Zealand Household Labour Force Survey has been attracting increasing interest from academic researchers. Despite this research, and relatively easy access to the data, the results of this work have been almost totally neglected by New Zealand practitioners in their economic commentaries, forecasting activities and policy debates. This paper is intended primarily to remedy this omission.

Using quarterly flows data from 1986 to 2001, we have found, or confirmed, several aspects of labour market dynamics in New Zealand. First, unemployment is strongly dynamic. Even allowing for possible overstatement (due to rotation group bias and classification error), at least half the unemployed, on average, move

out of unemployment between quarters either to employment or to not in the labour force. Secondly, a mix of changes in the inflow and outflow rates has influenced the unemployment rate. Sometimes these changes have worked together in the same direction, sometimes in the opposite direction and sometimes singly. This result has useful implications for policy. Thirdly, there are significant unemployment to employment flows even during periods of stagnation.

Fourthly, flows to and from non-participation are important and this finding may hold the key to good labour market performance. Fifthly, disaggregation by gender, age, and employment status (that is, full-time or part-time) has highlighted differences that may be useful in determining the direction of policy (for example, assisting the unskilled). Sixthly, trend and cyclical influences appear to be similar for males and females although some of the cyclical elasticities differ significantly. The main trend difference includes the movements to and from employment to not in the labour force. The main cyclical difference is the movement from unemployment to not in the labour force.

Finally, a brief review of Markov modelling, and empirical results from a wide selection of micro and macro contributions on gross flows, revealed some interesting findings. New Zealand micro findings include the result that a person with both school certificate and post-school qualifications is almost twice as likely to obtain employment in the following quarter than a person with no qualifications. Part-time job seekers have a similar chance of finding work as full-timers. New Zealand macro findings include the controversial result that a sales constraint and duration were the dominant determinants of inflows and outflows to unemployment rather than structural change.

Future work could include a more detailed analysis of the dynamics of non participation, the reconciliation of gross flows outcomes of labour market states with the same outcomes from the Household Labour Force Survey, the multinomial

modelling of transitions (but including macro as well as micro influences), investigating gross flows as a leading indicator of labour market performance and inflationary pressures, simulation modelling whereby transitions are subjected to favourable and unfavourable shocks and investigating the relationships between job flows and worker flows.

References

Abowd, John M. and Arnold Zellner (1985) 'Estimating Gross Labour Force Flows' *Journal of Business and Economic Statistics* 3(3) July, pp.254-83.

Antolin, P. (1999) 'Gross Worker Flows: How Does the Spanish Evidence Fit the Facts?' *Labour* 13(2) June, pp.549-85.

Bellmann, Lutz, Saul Estrin, Hartmut Lehmann and Jonathan Wadsworth (1995) 'The East German Labour Market in Transition: Gross Flow Estimates from Panel Data' *Journal of Comparative Economics* 20(2) April, pp.139-70.

Bleakley, Hoyt, Ann E. Ferris and Jeffrey C. Fuhrer (1999) 'New Data on Worker Flows During Business Cycles' *New England Economic Review* July/August, pp.49-76.

Burda, Michael and Charles Wyplosz (1994) 'Gross Worker and Job Flows in Europe' *European Economic Review* 38(6) June, pp.1287-1315.

Brook, Anne-Marie, Sean Collins and Christie Smith (1997) 'The 1991-97 Business Cycle in Review' Reserve Bank of New Zealand *Bulletin* 61(4) December, pp.269-90.

Chapple, Simon, Richard Harris and Brian Silverstone (1996) 'Unemployment' in B. Silverstone, A. Bollard and R. Lattimore (eds) *A Study of Economic Reform: The Case of New Zealand*, Amsterdam: North-Holland.

Denton, Frank T. (1973) 'A Simulation Model of Month-to-Month Labor Force Movement in Canada' *International Economic Review* 14(2) June, pp.293-311.

DeBoer, Larry and Michael C. Seeborg (1989) 'The Unemployment Rates of Men and Women: A Transition Probability Analysis' *International and Labour Relations Review* 42(3) April, pp.404-14.

Flaim, Paul O. and Carma R. Hogue (1985) 'Measuring Labor Force Flows: A Special Conference Examines the Problems' *Monthly Labor Review* 108(7) July, pp.7-17.

Grimmond, David (1993) 'Labour Force Dynamics in New Zealand: A Preliminary Analysis' *Research Monograph 60*, Wellington: New Zealand Institute of Economic Research.

Gross, Dominique M. (1993) 'The Causes of Unemployment in France: A Flow Approach' *Applied Economics* 25(1) March.

Gujarati, Damodar N. (1995) *Basic Econometrics* 3rd ed, New York: McGraw-Hill.

Harris, Richard I.D. (1996) 'Estimating Unemployment Inflows, Outflows and Long-term Unemployment in Britain using the Cointegration Approach' *Applied Economics* 28(1) October, pp.1199-1212.

Herzog, Henry W. (1996) 'Job Loss and Labour Market Outcomes under Rapid Structural Adjustment: The Case for New Zealand' *Labour Market Bulletin* (1) pp.19-44.

Holmlund, Bertil and Altin Vejsiu (2001) *Labour Market Flows in Boom and Slump: Sweden 1987-2000,* manuscript, Economics Department, Uppsala University.

Hughes, Barry (1992) 'Trends and Cycles in Unemployment Gross Flows: A Preliminary Analysis' paper presented to the 21st Conference of Economists, Melbourne.

Irvine, Stuart (1995) 'The Transition to Employment: An Analysis of Gross Flows from the Household Labour Force Survey' in P.S. Morrison (ed) *Labour, Employment and Work in New Zealand 1994* Wellington: Victoria University of Wellington.

Jones, Stephen R.G. (1993) 'Cyclical and Seasonal Properties of Canadian Gross Flows of Labour' *Canadian Public Policy* 19(1) March, pp.1-17.

Jones, Stephen R.G. and W. Craig Riddell (1999) 'The Measurement of Unemployment: An Empirical Approach' *Econometrica* 67(1) January, pp.147-61.

Keeley, Michael C. (1984) 'Cyclical Unemployment and Employment: Effects of Labor Force Entry and Exit' Federal Reserve Bank of San Francisco *Economic Review* (3) Summer, pp.5-25.

Leeves, Gareth D. (1997) 'Labour Market Gross Flows and Transition Rates 1980-1992' *Economic and Labour Relations Review* 8(1) pp.110-27.

Long, J. Scott (1997) *Regression Models for Categorical and Limited Dependent Variables* California: Sage.

Marston, Stephen T. (1976) 'Employment Instability and High Unemployment Rates' *Brookings Papers on Economic Activity* (1) pp.169-203.

Mumford, Karen and Peter N. Smith (1999) 'The Hiring Function Reconsidered: On Closing the Circle' *Oxford Bulletin of Economics and Statistics* 61(3) pp.342-64.

Schettak, Ronald (ed) (1996) *The Flow Analysis of Labour Markets* London: Routledge.

Silverstone, Brian and Susi Gorbey (1995) 'Unemployment Dynamics in New Zealand 1985-1994' in P.S. Morrison (ed) *Labour, Employment and Work in New Zealand 1994* Wellington: Victoria University of Wellington.

Smith, Ralph E., Jean E. Vanski and Charles C. Holt (1974) 'Recession and the Employment of Demographic Groups' *Brookings Papers on Economic Activity* (3) pp.737-60.

Storer, P. (1994) 'Unemployment Dynamics and Labour Market Tightness: An Empirical Evaluation of Matching Function Models' *Journal of Applied Econometrics* 9(4) October/December, pp.389-419.

Theeuwes, Jules, Marcel Kerkhofs and Maarten Lindeboom (1990) 'Transition Intensities in the Dutch Labour Market 1980-85' *Applied Economics* 22(8) August, pp.1043-61.

Toikka, Richard S. (1976) 'A Markovian Model of Labor Market Decisions by Workers' *American Economic Review* 66(5) December, pp.821-834.

Williams, Donald R. (1995) 'Women's Part-time Employment: A Gross Flows Analysis' *Monthly Labour Review* 118(4) April, pp.36-44.

Wood, Julian S. (1998) 'A Gross Flows Analysis of the New Zealand Labour Market' MSocSc thesis, Hamilton: University of Waikato.

Woolf, Julie (1989) 'Gross Flows Estimates from the Household Labour Force Survey' *New Zealand Labour Force* (3) September, pp.32-42.