



# Australian labor market dynamics across the ages<sup>☆</sup>

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## ABSTRACT

Transition probabilities between four labor market states (full-time employment, part-time employment, unemployment and inactive) for three age groups (the young, mature and old) are calculated using monthly gross flow data for Australia from October 1997 to May 2012. We determine the responses of the different groups to phases of the business cycle by estimating four unobserved common dynamic factors that drive the age group transitions. Job-finding and job-losing factors were significantly affected by the business cycle variable. Impulse responses to a business cycle shock show that both job-finding and job-losing matter, with the former more important. Part-time job flow responses are more important cyclically than full-time ones. In business cycle downturns, the young have a disproportionate difficulty finding and keeping all jobs, the mature unemployed have more difficulty finding full-time work, and the old have difficulty keeping full-time work.

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## 1. Introduction

We consider age heterogeneity in gross flow data for Australian labor markets. We calculate transition probabilities, or hazard rates, between four labor market states (full-time employment, part-time employment, unemployment and inactive) for three age groups (the young, 15–24, the mature, 25–54, and the old, 55 plus) using monthly gross flow data for Australia from October 1997 to May 2012. Disaggregation in the age dimension allows a comparison of trends and an analysis of the responses of the different groups to phases of the business cycle. The results of such an analysis are useful for designing the details of macroeconomic and labor market policies over the business cycle, and for understanding the evolution of labor market aggregates.

With twelve transitions between four states for three age groups, we develop a thirty six differential equation system from three sets of twelve equations, based on the model of intra-period transition probabilities proposed by (Shimer, 2012). In this paper, we address age demographics, but not gender for two reasons. First, the data for transitions is sparse for the old age group, and this problem intensifies with a gender breakdown. Second, if we had to add a gender breakdown, the number of equations and parameters to estimate would double from an already very large number. Since it is difficult to get a clear picture of what is going on at such a high dimension, one major contribution of this

paper is the construction of a dynamic factor model that substantially reduces the dimensionality to a workable level. From the thirty six observed endogenous variables, we estimate four unobserved dynamic labor market factors—job-finding, job-losing, and labor market participation-in and participation-out the labor force. These factors are identified from relevant transition probabilities across the age groups. We explore how these factors are related to business cycle activity, and we find (as expected) that the job-finding and participation-in factors are significantly procyclical, while the job-losing and participation-out factors are significantly countercyclical. We then simulate the estimated model to establish the effects of a shock to the business cycle variable on the actual people transitions between the four labor market states for the three age groups.

A critical question that we address is whether business cycle fluctuations affect job-finding or job-losing, and then how these in turn affect labor market transitions for the various age groups. We also consider the relative importance of part-time and full-time employment fluctuations over the business cycle.

Our model is applied to Australian data because it is a typical developed economy with a flexible labor market and a rich source of relevant statistics,<sup>1</sup> and thus provides an excellent application for our

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<sup>1</sup> The Australian Bureau of Statistics conducts a monthly survey of the Australian labor markets based on a representative sample that covers about 0.18% of the Australian population. Each household stays in the sample for eight months and then leaves the sample permanently. The data is used to calculate and publish numbers on employment, unemployment and participation by age, sex, education and industry in catalogue numbers 6202.0 and 6291.

innovative modeling approach. Our sample includes two downturns in the Australian economy. The first began at the end of 2001 and persisted for about two years, while the second began towards the end of 2008 and began to stabilize at the end of the sample. These downturns affected the estimated dynamic labor market factors, and in turn the transition probabilities and gross flows between labor market states.

Using a representative monthly business cycle variable – the aggregate employment-to-population ratio – we show that, through the significantly procyclical job-finding factor, the business cycle effect on transition probabilities from unemployment into full-time and part-time jobs was strong for the young and mature, but relevant only into part-time work for the old. For the young and mature, the probability of full-time job-finding was not significantly associated with exits from the inactive state, while for the old this effect was significant. Through the significant and countercyclical effects of the business cycle on the job-losing factor, we find that the probability of all job-losing is significant for all ages, except for exits from part-time jobs by the mature. The participation-in factor was acyclical, while the transition probabilities associated with the participation-out factor were surprisingly significantly procyclical. We suggest that this last result may be because they are likely to be voluntary separations driven by household income fluctuations.

While these results for the business cycle effects on transition probabilities are interesting, they do not provide sufficient information about the gross flow quantities of actual people in the three age groups between the four states. As a major contribution, we recover this quantity information by simulating the estimated model for transition probabilities with a positive shock to the business cycle variable, reporting the deviations from the gross flow means of our sample. For job-finding, we find that the predicted gross flows into full-time and part-time jobs rise most for the mature, followed by the young. This result is unsurprising, given the relatively large size of the mature cohort. But given the relative size of the young group, their responses are disproportionately large. Part-time employment responds more significantly than full-time employment to business cycle shocks. While job-losing is also important in the business cycle, job-finding is much more of an issue. Part-time employment fluctuations are more important than full-time ones, with the young disproportionately represented in changes in part-time jobs.

The next section surveys the literature on gross flows, and is followed by an explanation of the problems faced in dealing with gross flow data, how we resolved them and calculated the transition probability matrix. We graph the probabilities and discuss their key features. In Section 4, we present and estimate our dynamic factor model, and in Section 5, we provide impulse responses to understand the effects of a business cycle shock on the transitions between labor market states, and we discuss the policy implications of these results. The final section gives some concluding comments.

## 2. Literature review

A substantial literature exploring gross flow data in labor markets in different countries has developed. Earlier studies mainly focused on actual gross flows in the United States. Some of these, such as [Poterba and Summers \(1986\)](#) and [Abowd and Zellner \(1985\)](#), suggested procedures that correct some defects in the reported US gross flow data. Others aimed at utilizing distinctive features of gross flow data to better understand the dynamics of the labor market. For instance, [Blanchard and Diamond \(1990\)](#) employed US gross flow data from 1952 to 1988 to examine the joint behavior of unemployment, employment and vacancies, and then used this information to explore the sources of shocks in the US labor market. At the same time, [Davis and Haltiwanger \(1992\)](#) focused on establishment-level employment changes to understand the connection between job reallocation and worker reallocation in the US manufacturing sector.

A recent stream of the literature focused on transition probabilities, exploring whether job-finding or job-losing is more important for unemployment dynamics over a business cycle in general, and in recessions in particular. The results seem to be mixed. For instance, using the US data for the last 50 years, [Hall \(2005\)](#) argued that unemployment was mostly affected by job-finding and that recessions involved minor flows of workers out of jobs. He also found a nearly constant separation rate, while the job-finding rate had high volatility at business cycle and lower frequencies. [Shimer \(2012\)](#) introduced a more appropriate method of constructing hazard rates that accounted for the likelihood of intra-period flows. He found that fluctuations in the US employment exit probability were quantitatively irrelevant in the 1990s and 2000s. [Elsby et al. \(2009\)](#) extended [Shimer's \(2012\)](#) main analysis but contrary to [Shimer's \(2012\)](#) conclusions, found an important role for increased inflows to unemployment as well. [Fujita and Ramey \(2009\)](#) used US gross flow data to analyze the business cycle dynamics of separation and job-finding rates and concluded that fluctuations in the separation rate explained between 40 and 50% (and even more when dynamic interactions were allowed) of fluctuations in unemployment.

There have been several studies involving gross flow data for other countries as well. For instance, [Burgess and Turon \(2005\)](#) explored the nature of unemployment dynamics in the UK, showing that the changes in unemployment over the 1990s and 2000s were mostly driven by inflow shocks. [Gomes \(2012\)](#) also used UK data for 1993 to 2010 to examine the size and cyclicity of the flows and transition probabilities between employment, unemployment and inactivity. He decomposed the contributions of job-finding and job-separation rates to fluctuations in the unemployment rate, finding that the job-separation rate had been as relevant as the job-finding rate in this period. There have been some multi-country studies using data on OECD countries, such as [Elsby et al. \(2013\)](#) and [Ernst and Rani \(2011\)](#). The former paper estimated the rates of inflow to and outflow from unemployment for fourteen OECD economies and decomposed unemployment variation into the contributions accounted for by inflow and outflow rates. The decomposition showed that both inflow and outflow rates contributed substantially to within-country variation in unemployment. The latter study also used data for fourteen OECD countries but its main focus was on exploring the effects of different fiscal and labor market policies on unemployment inflows and outflows. [Petrongolo and Pissarides \(2008\)](#) examined the contributions of inflows and outflows for unemployment in the United Kingdom, France and Spain. In general, they found that outflow rates from unemployment played the larger role, except in a few episodes. In the long recovery from 1993 until 2008, they explained that these economies had features close to the steady state so that even where it may be easy to lay off labor, when the adjustments in labor are small and turnover is high, firms find it easy to adjust their job creation. [Rogerson and Shimer \(2011\)](#) examined how search frictions impacted on labor market flows using data on OECD countries. They found that search frictions played a significant role in understanding empirical labor market outcomes.

Earlier studies exploring Australian labor market flows include [Foster and Gregory \(1984\)](#), [Junankar and Kapuscinski \(1990\)](#) as well as [Fahrer and Heath \(1992\)](#). [Borland \(1996\)](#) reviewed data sources available for researchers interested in labor market flows in Australia. [Dixon et al. \(2004\)](#) investigated how net flows between employment, unemployment and not in the labor force in Australia between 1979 and 2003 were related to the unemployment rate. [Chua et al. \(2007\)](#) explored the determinants of entry and exit rates for the various labor market states. [Ponomareva and Sheen \(2010\)](#) utilized the model of [Shimer \(2012\)](#), extending it to four states by disaggregating employment into its part-time and full-time components. They found important gender differences in the cyclical responses of hazard rates. [D'Arcy et al. \(2012\)](#) presented stylized facts about labor market movements and considered how labor mobility has facilitated economic adjustment in Australia in the 2000s.

Few authors have addressed the importance of age demographics for cyclical labor market flows. [Blanchard and Diamond \(1990\)](#)

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