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MEN, WOMEN AND THE HIRING FUNCTION*

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Abstract JEL # J6

This paper examines the idea of ranking of groups and genders in terms of hiring probabilities. By incorporating a range of complementary data sources, measures of the three possible gross worker flows into employment, and the stocks of job seekers from which they come, are provided for both genders in the Australian labour market. We find a clear ranking of men over women in the hiring process. Indeed, in aggregate women appear to be effectively segregated from the male hiring market, whereas this is not true with males in the female hiring market. We also find that amongst males, employed job seekers are ranked above those unemployed and, in turn, above those not in the labour force. For women, the unemployed and employed are not found to be competing with each other, whilst those not in the labour force are ranked below the unemployed. We believe that this is the first study explicitly investigating these three major gross worker flows for women as well as men, enabling us to further explore the interdependent processes in the labour market by considering more fully the interactions across job seekers of different genders and from different labour market states.

Keywords: labour market flows, hiring function, gender and ranking

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Introduction

When trying to explain the behaviour of the great aggregate stocks in the labour market the traditional approach is to view these quantities as slow moving and sluggish. Indeed, the persistence of high levels of unemployment has been identified as one of the problems of the operation of the aggregate labour market in Australia in addition to a number of other OECD countries (OECD, 1994). Concentration upon the level of these stocks, however, serves to hide the dynamic behaviour which is taking place in the labour market. For example, there are three possible sources of gross worker flows into employment: from unemployment to employment; from job to job; and from not in the labour force (NLF) into employment. Whilst the level of unemployment in December 1986 stood at 655,000 people, over the six months previous to that date some 480,000 employees had become unemployed and 620,000 had left the state of unemployment for a job. Similarly, during those six months there were 1.78 million occasions of people moving from unemployment or outside of the labour force into employment and 1.64 million flows in the opposite direction, whilst the level of employment stood at 7 million. It has recently become possible to examine the empirical issues related to the movements in Australia using data on gross worker flows between labour market states published on a consistent basis since 1979. The first few months of data were analyzed by Gregory (1982). We now have enough observations to use this data in time series analysis and to examine the cyclical behaviour of the gross flows.

Much analysis of the flows from unemployment into employment has already been carried out (e.g., Blanchard and Diamond, 1989, Layard *et al*., 1991 and Burda and Wyplosz, 1994). There has been some work on the flow of those in jobs into new jobs and the possibility of the unemployed facing competition from this group (Burgess, 1993, and Van Ours, 1995). Mumford and Smith (1999) expand on this work by including the flow of those people NLF into employment. However, none of these studies have considered the possible interaction of men and women in the hiring process. Indeed, a major simplifying assumption made in the literature is to concentrate exclusively on the flows of unemployed males. There are often practical reasons for concentrating on males (usually dealing with insufficiency of data on those not in the labour force and the belief that this latter group is dominated by the behaviour of females who may face different constraints eg., Pissarides, 1986, Layard *et al*, 1991, Burda and Wyplosz, 1994). Nevertheless, given that females now constitute some 40% of the Australian labour force, it is important to be able to include them.

In this paper we incorporate a range of complementary data sources to provide measures of all three of these flows, and the stocks of job seekers from which they come, for both genders in the Australian labour market. In section I, we discuss our data sources and the implications of sampling limitations for our interpretation of the behaviour of the flows. In section II of the paper we consider how the flows into unemployment react to the business cycle, thereby establishing a series of stylized facts. We address the possibility of interactions across the flows into employment and examine the idea of ranking of groups and genders in terms of hiring probabilities in section III of the paper. In so doing, we will model hiring as dependent on a matching function in the number of job seekers and the number of vacancies with search effectiveness being allowed to vary across the gender of the seeker and across their initial labour market state (employed, unemployed or not in the labour force).

We are interested in whether or not there appears to be a fair share of jobs across these applicant groups, where fair shares in hiring can be considered as the result of *random hiring* or *no ranking*. In other words, when non-ranking employers are faced with multiple applications for a vacancy, they do not exhibit any consistent preference for a candidate from one pool of job searchers than another (Blanchard and Diamond, 1995). At the other end of the spectrum, employers may exhibit full ranking whereby job seekers from one group will only have their application considered if noone from the preferred group has applied for the vacancy. In between these two extremes lays a range of hiring outcomes that reflect the preferences of employers who are combining ranking and no-ranking elements when considering heterogenous applicants from recognisable groups (Blanchard and Diamond, 1994;433).

We concentrate on exploring the fair shares hypothesis in this paper. If there is no ranking in the hiring process, estimates of the shares of the component stocks of total searchers across the three share equations will be the same (Blanchard and Diamond, 1989;34). We also compare the results from our hiring function regressions with the stylized facts in section III and find that they are consistent in most cases. Conclusions and suggested avenues for future work are presented in the final section of the paper.

We believe that this is the first study explicitly investigating the three major gross worker flows for women as well as men, enabling us to further explore the interdependent processes in the labour market by considering more fully the interactions across job seekers of different

genders and from different labour market states.

I. The nature of the gross worker flows data

a) The gross flows data

The Australian Bureau of Statistics (the ABS) has published data on gross worker flows on an almost continuous basis since late 1979.[1] The data are derived from the Labour Force Survey of households and, in particular, the matched records of successive monthly surveys. The ABS surveys a sample of some 30,000 individual private and non-private dwellings each month. On the basis of this survey, each individual is assigned a labour market state for the week previous to the survey. The ABS then constructs estimates of the stocks of those employed, unemployed and not in the labour force. The construction of matched records between months is used to create flow data. The quality of these data is affected by a number of factors. First, each month one eighth of the sample is replaced and no matching of records of those affected is possible. Second, it is not possible for the ABS to match the records of those surveyed in non-private dwellings such as hotels, hospitals and other institutions. Third, there are the familiar problems of non-response and failure to match records of some who move location, etc. The net result is that only about 80% of survey responses are matched.

An indication of the likely effects of both the missing data problem and the classification error problem can be judged from the results presented by Abowd and Zellner (1985) and Poterba and Summers (1986) on US data. The Current Population Survey (CPS) data that they used is very similar in character to the ABS data used here. The matched records consist of some 75 per cent of the total survey who are interviewed on consecutive months, less 7.5 percent of those present in one month and missing in the second and a further 7.5 percent missing in the initial month and present in the second. Abowd and Zellner, and Poterba and Summers are able to use two additional pieces of information to adjust the raw flows data. First, they have information on the declared labour market state of those classified as missing in either the first or second month, which allows them to allocate missing data to the unadjusted flow series. The broad outcome of Abowd and Zellner's analysis is to make average adjustments to the gross flows of between -12 to 15 percent, due to the missing data problem. Second, they have re-interview data

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[1]The core data used in this section are currently published by the Australian Bureau of Statistics as Table 33. Estimates of Labour Force Status and Gross Changes (Flows) Derived From Matched Records in The Labour Force Australia, 6203.0. Some additional unpublished data were provided by the ABS. Unemployment stock data come from The Labour Force Australia.

on a subset of the total survey to analyze the problem of classification error. This re-interview data asked further questions of some interviewees concerning current labour market status. The responses were then compared with the original data and used to adjust the raw flows data. (It appears that these adjustments were mostly to the status reported by those who described themselves as being not in the labour force.) Abowd and Zellner made average adjustments of between 8 and 49 percent as a result of excluding spurious labour market transitions due to misclassifications.

The size of these adjustments suggests caution when interpreting results using the ABS data, since adjustments of the Abowd and Zellner type are not possible due to the absence of information on the missing data or classification error. In what follows we assume that any missing data is distributed randomly across flow types, in the absence of any additional information. Where the results of Abowd and Zellner suggest that problems may arise, these will be discussed below.

b) Job to job flows.

The one important flow not covered by the gross flows data is that between jobs. As there is no change in labour market status in going from one job to another, the LFS fails to pick up movements across jobs between interviews. Evidence for a number of countries suggests that such flows are substantial (OECD 1994) and that on average these flows are around 10% of employment (Davis *et al*, 1996). Here we estimate the size of these flows from the annual LFS survey question which covers current job duration for those currently employed excluding those who had no previous job in the year[2]. Assuming that the duration of such jobs is replicated across the year we obtain a rate of job to job movements over a year. This annual rate is then interpolated into a quarterly rate and, with the use of the quarterly employment stock data, a quarterly flow is obtained. This is clearly an approximate method for calculating this important flow, however, we feel that it is superior to alternatives in the literature. (For example, Blanchard and Diamond (1991) apply a proportion of the quit rate in US manufacturing to the total employment stock to obtain a job to job flow for the whole economy.)

We treat all jobs equivalently in this study regardless of whether or not they are part-

[2]The interruption of this survey has informed the choice of our data period.

time. This is because we are interested in the probability of being hired for a job searcher. We do not know what people's preferences are over the hours they work nor do we believe that seekers all prefer full-time employment. Nevertheless, we recognize that the growth in part-time employment in the Australian labour market may represent a rise in underemployment and that this is an obvious avenue for future research.

c) Long-term unemployed.

We also consider the possible role of the proportion of long-term unemployed as a potential determinant of the hiring rate. We define the long-term unemployed to be those unemployed for more than 12 months in their current spell. The arguments presented in Budd *et al* (1988) and rehearsed in more detail in chapter 7 of Layard *et al* (1991) suggest that the proportion of long-term unemployed in the total would have a negative effect on the hiring rate. This is because this proportion indicates the relative size of a group of unemployed persons whose outflow probability from unemployment is significantly lower than others because of the length of time that they have been unemployed for. The explanations for this outcome can be grouped under two headings; decreasing effectiveness of the unemployed to search out new jobs, and increasing choosiness of employers. The first could come from the demoralization of the longer term unemployed and the effects of longer duration of unemployment on the quality of workers skills and motivation to search for jobs. The second from employer perception of the quality of unemployed workers and, in particular, a negative view of the job skills of the longer term unemployed. A concurrent theme in the literature concerning the search effectiveness of the long term unemployment deals with changes in the relative quality of the unemployed (i.e., heterogeneity). For example, in a recession a large inflow of people into unemployment implies that there will be a greater variance in the quality of long term unemployed people. Alternatively, in a boom most of the good quality unemployed will have been hired leaving a comparatively disproportionately large number of bad quality people amongst the remaining long term unemployed. In response to the business cycle, this heterogeneity effect will work in the opposite direction to that typically expected from state dependence. Direct evidence on these issues is not generally available, however, we expect to find a lower search effectiveness from the long term unemployed in our empirical analysis.

d) Not in the labour force.

Whilst the states of unemployment and employment are clearly established by official definition,

there is a major definitional issue concerning those defined to be not in the labour force. As we will be modeling outflows from outside of the labour force it is important that we have a good measure of those in that state and looking for work. By contrast, there are strict availability and job search requirements that must be fulfilled in order for an individual who is out of work to be classified as unemployed by the ABS. In particular, it is required that the person concerned should want to work, be *currently* actively looking for work and be available to start work within seven days of the interview. This constitutes availability for work and active job search. Satisfying these criteria is also required by the Commonwealth Employment Service (CES) for those registering for unemployment benefits. However, the ABS/CES definition of the number of unemployed may well exclude a number of potential workers who happen not to exactly satisfy the criteria, but who we may wish to include in a wider definition of job seekers and, in particular, regard as the group of NLF seeking work.

In the group of non-workers which is classified by the ABS as not in the labour force, there is an identified group of people who want to work and are either actively looking for work but unavailable to start work immediately (within seven days) or not currently actively looking for work but who want to work and are able to start work within four weeks. This group is classified by the ABS as marginally attached to the labour force.[3] This group would appear to have search attributes which (although not satisfying the official descriptions of active searching and available for work) could be considered to make them job seekers under a wider definition[4]. We will use this group as our measure of the stock of job seekers.

As discussed earlier, the precision of the estimates of outflow rates from not in the labour force are particularly affected by the measurement error in the flows data identified by Abowd and Zellner (1985). In part this is because the stock measure of those NLF from the gross flows data is calculated as the residual after the employed and unemployed have been identified and includes those in institutions. This is not true for our measure of the marginally attached. We

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[3]The relative number of marginally attached women far exceeds that of men. In 1991 there was about twice as many women marginally attached women as unemployed, whereas there was about twice as many males unemployed as there was marginally attached.

[4]Some of the marginally attached are not currently actively searching because they are *physically* unable to work. We exclude them from our measure of NLF job seekers. We concentrate on those who are actively looking for work but are unable to start work within seven days and those who want a job but are not actively looking *and* are classified as discouraged job seekers, as those groups with characteristics which make them job seekers.

expect, therefore, that our use of the marginally attached as the relevant stock of searchers mitigates the impact of this measurement error on our estimates.

II. Gross flows and the business cycle

Next, we develop some stylised facts about the cyclical behaviour of hiring rates. It has been widely documented that the response of the labour market to business cycle shocks is asymmetric across the business cycle. We examine this idea by presenting the response of each of the hiring rates to the business cycle indicator generated by the shifting regime model of Hamilton (1989) (see also Acemoglu and Scott (1994)[5]. Estimates of the equations for the five outflow equations are given in Table 1. In each case we estimate the impact of the state of the business cycle (as generated by the Markov-switching model) on the outflow rate whilst including some dynamics of adjustment. Each of the equations is well-determined with little evidence of misspecification. The precision of the estimates of the α_1's for each outflow rate shows the significance of the state of the business cycle for all outflow rates into jobs. Next, we present calculations for the percentage increases (decreases) in the outflow rate, or hazard, associated with a high (low) state relative to their average rates based on the estimates in Table 1. More specifically, they are the deviation from the mean values of each of the flows resulting from a cyclical up or downturn. These results are given in Table 2. It seems that the three flow rates for both genders actually respond in quite different ways to the business cycle, although the asymmetry of behavior in high and low growth states is common to all.

Comparing across the gender groups, we can see that the relative swings in all three of the female flows across cyclical upturns and downturns are similar. This is not true for men; the swing in the movement from job to job flows is more than four times greater than the change in the NLF outflow. Male hiring from unemployment responds slightly less than that for females in upturns, whilst the fall off in hiring for this group in downturns is substantially larger for males than females. In contrast, the movement between jobs is affected much more for males than females in upturns and somewhat less in downturns. Finally, flows from NLF are much more

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[5]The model for the maximum likelihood estimates of the Markov-switching model for real GDP growth is: $\Delta y_t = \alpha_0 + \alpha_1 s_t + u_t$ and $\phi(L)u_t = e_t$ where Δy_t is quarterly change in log GDP (times 100), s_t is a latent dummy variable equalling 1 or 0, and $\phi(L)$ is a fourth-order autoregression. The transitions between high growth states (s_t=1) and low growth states (s_t=0) are governed by the probabilities: $P(s_t = 1 \mid s_{t-1} = 1) = p$ and $P(s_t = 0 \mid s_{t-1} = 0) = q$. Results are α_0 = -0.08 (0.45), α_1= 1.19 (0.21), p=0.92 (0.10), q=0.71 (0.16), φ_1=-0.14 (0.12), φ_2=-0.08 (0.10), φ_3=0.11 (0.10), φ_4=-0.13 (0.10), where standard errors are in parentheses. Log-likelihood: -94.77. Sample period: 1978q1 - 1991q4.

sensitive to the cycle for women than men. This summary of the cyclical behavior of the flows provides us with some stylized facts to be explored using a model of the hiring process.

III. The hiring function

The hiring function captures the possibility of a job seeker successfully leaving the pool of unemployed. In its simplest form (Budd *et al*, 1988, and Jackman *et al*, 1991), the hiring function says that the inflow rate into employment from unemployment is determined by the ratio of the stock of job searchers to the stock of vacancies. The process can be thought of in much the same way as that of a firm producing goods. Just as the firm requires inputs of capital (machines) and labour (workers) to produce output (of goods), the labour market uses the stock of available jobs (vacancies) and willing would-be-workers (job searchers) to produce matches (hires of workers to jobs). The hiring function for the sum of men and women can be written as:

$$M_t = f(S_t , V_t) \qquad (1)$$

where the flow of new job matches or hires (M_t) over period t is produced from a function of the number of available job seekers (S_t) and number of vacancies (V_t) at the start of the period. Extensive empirical work in the United States (Blanchard and Diamond, 1990) and the UK and other European countries (Burda and Wyplosz, 1994, and Burgess, 1993, amongst others) have provided support for a constant returns-to-scale Cobb-Douglas functional form, such as:

$$M_t = \gamma . S_t^{\alpha} . V_t^{1-\alpha} \qquad (2)$$

where the γ is a scale parameter capturing changes in the efficiency of the matching process (that would impact on all searchers equally). Implicit in this type of functional form is the assumption that an equiproportional increase in searchers and in vacancies will generate an equiproportionate increase in hires (an apparently reasonable assumption in a large market, Layard *et al*, 1994). Furthermore, when incorporated into a general equilibrium model, the matching function is required to exhibit constant returns-to-scale for there to be a balanced growth path for the economy (Pissarides, 1990).

Looking at the general matching function (1) in more detail, we can think of it as constructed from the following components. The total number of matches (M_t) is the sum of hires from employment or job to job flows (J_t), hires from unemployment (X_t) and hires from outside of the labour force (L_t). So:

$$M_t = J_t + X_t + L_t \qquad (3)$$

The sum of the stocks that produce these new job matches is the total number of job searchers

(S_t) which is the sum of unemployed job searchers (U_t), out-of-the labour force job searchers (N_t) and employed job searchers (EJS). There is no direct measure of the number of employed job searchers, we therefore approximate this stock with $\phi(E_t)$ which is a function ϕ of the current stock of employed persons (E_t). So:

$$S_t = \phi(E_t) + U_t + N_t \qquad (4)$$

This equation implies that all searchers have an equal relative chance of being hired regardless of their labour market status (in other words, they are perfect substitutes for each other in the hiring process). Obviously, this equal shares rule may not be true and indeed we would expect it not to be. It may be that the component groups of the total number of job searchers actually have differing search effectiveness for a given set of job vacancies. For example, the search effectiveness of each group may be a function of its reservation wage which may differ across labour market states (Mortensen, 1986, Layard *et al*, 1991;234). Also, we would expect that it may be influenced by a range of personal characteristics such as the duration of unemployment for the unemployed job seeker (Budd *et al*., 1988, and Blanchard and Diamond, 1994).

Thus, the true measure of effective job searchers may be:

$$\tilde{S}_t = \varphi(E_t) + s_u U + s_n N \qquad (4')$$

where s_u and s_n measure the search effectiveness of the unemployed and NLF job searchers relative to the employed job searchers, and the search effectiveness of the later group (the EJS) is normalized to unity (in other words, we are measuring search effectiveness relative to this group)[6]. Furthermore, we assume that s_n is a constant and s_u is decreasing in the proportion of the unemployed who are long-term unemployed. In our empirical work we measure S_t directly for the number of unemployed and not-in-the-labour force job seekers. This leaves us to model the function $\varphi(E_t)$ for employed job seekers. We assume that the main determinant of the decision to search as an employed person is the success of such job seekers in finding a new job in the previous period[7], thus we make employed search an explicit function $\varphi(E_t) = J_{t-1}$.

If all job vacancies are equally available to seekers subject to search effectiveness, we

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[6]If $\tilde{S}_t = S_t$ then all current job seekers have equal effectiveness.

[7]An alternative approach is to make $\phi(E_t)$ a function of total matches and unemployment as in Burgess (1993). In Mumford and Smith (1999) we find that our approach dominates for aggregated male and female data.

would expect that job seekers from any given group would receive a share of offers proportional to their share among the total number of job searchers.

Using the notation $M_t = M_t^f + M_t^m$ such that total matches are of females *f* and males *m*, this fair share rule is:

$$M_t^i / S_t^i = M_t / \tilde{S}_t \tag{5}$$

Consider, for example, then the determination of the hiring of unemployed females, X_t^f (i.e., $M_t^i = X_t^f$ and $S_t^i = U_t^f$ in equation 5):

$$X_t^f / U_t^f = M_t / \tilde{S}_t \tag{6}$$

Our premise here is that there is a general pool of vacancies, that there is a predetermined total number of matches whose determination we do not analyze, and that the matching process operates in such a way that the outcome may result in potentially unequal hiring rates across searchers from different labour market groups. Thus, we are conditioning on the total number of matches but allowing the data to identify the search effectiveness of each group of job seekers.

We proceed as follows. First, we rearrange equation (6) in terms of the outflow rate of females from, in this case, unemployment and take logs to give:

$$\log(X_t^f / U_t^f) = \log M_t - \log(\tilde{S}_t) \cdot \tag{7}$$

To test equation (7) in log-linear form we employ a Taylor series approximation[8] and estimate the determination of female unemployment outflows into jobs as:

$$\log(X_t^f / U_t^f) = \alpha_0 + \alpha_1 \log M_t + \alpha_2 \log U_t^f + \alpha_3 \log(N_t^f / U_t^f) + \alpha_4 \log(J_{t-1}^f / U_t^f)$$
$$+ \alpha_5 \log(N_t^m / U_t^f) + \alpha_6 \log(J_{t-1}^m / U_t^f) + \alpha_7 \log(U_t^m / U_t^f) + \alpha_8 \log(U_t^{LTf} / U_t^f) \tag{8}$$

Analogous expressions can be derived for hires from outside the labour force and from employment, for men and women respectively.

We would expect, given the discussion above, that $\alpha_1 = 1$ throughout implying all

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[8]For the simple case, aggregating males and females, the Taylor series approximation provides:
$\log(U_t + N_t + \varphi E_t) \simeq constant + \log U_t + \bar{N}/(\bar{U} + \bar{N} + \varphi\bar{E}) \log(N_t / U_t) + \varphi\bar{E}/(\bar{U} + \bar{N} + \varphi\bar{E}) \log(\varphi E_t / U_t)$

equations are for a share of total matches. The adding up restriction this implies dictates that we present results for five out of the six flow-share equations. (Given that inflows into employment are expressed as shares of total hires, one of the equations in the set is determined *a priori*. Under this restriction, the covariance matrix for the system of six equations will be singular. Consequently, given the existence of stock data for unemployed and NLF job searchers, we choose to rely on the five equations presented.) The remaining coefficients (α_2 through α_8) should reflect the importance of each of the relevant groups of searchers among the total pool of searchers (subject to the log-linearisation). In addition, if there is no ranking in the hiring process, the search effectiveness (implied by our estimates) of each group of job seekers should be identical across outflow rate equations (again, subject to the log-linearisation). Evidence to the contrary would be indicative of ranking in the hiring process. This is not to say that any one equation will capture the true relative differences in search effectiveness. It is not possible in practice to separate the demand and supply effects sufficiently to be able to distinguish between the impacts of search effort and the aggregate offer arrival rate for each group. However, differences across equations are indicative of hiring probabilities varying by job type and we interpret this as ranking in outcomes.

IV. Results

We have estimated each of the outflow equations on quarterly data over the period 1980q4 to 1991q4, this time period is restricted by our reliance on some unpublished data and the interruption of surveys upon which our data construction relies. Nevertheless, the length of the estimation period covers two major recessions and one extended period of expansion in the Australian labour market. Estimates of our preferred models are given in Table 3. These equations were all estimated by Ordinary Least Squares and include seasonal dummy variables as well as a constant. In general the estimates are well-determined and there is no strong evidence of model misspecification.

In each case our estimation has begun with unrestricted estimation of versions of equation (8). The restriction on that equation that $\alpha_1=1$ (i.e., that the dependent variable be the outflow rate relative to total hires) is not rejected for all cases. A consequence of this restriction is that the full set of six equations would be singular and so it is possible to only look at five out of six relative flows. Therefore we drop the job-to-job flow equations for males.

A more critical set of restrictions are those for the exclusion of various stocks of competing job searchers. In each case this set of exclusion restrictions is also not rejected. We give the relevant test statistic as the last line (z_5) in Table 3. The modeling of section III summarized in equation (8) suggests that the coefficients on the own-gender stock of job searchers associated with each individual flow should be equal to minus one. Estimates of these coefficients are given in the first row of Table 3. In general, they are close to one but there is evidence that outflows from NLF are sensitive to the stock of marginally attached perhaps suggesting some segmentation of the market for this group, both male and female.

The estimates in column 1 of Table 3 show that the important components of the stock of job searchers for unemployed male job seekers are (i) the other unemployed males, (ii) employed males, and (iii) the long-term male unemployment ratio[9]. Those job seekers who are (i) not in the labour force males, and (ii) all of the females do not provide effective competition for jobs for the male unemployed. Similarly, none of the female stocks are found to significantly impact on the hiring of males from outside of the labour force. Comparison of these results suggest a clear ranking for males over females in the hiring process, furthermore, males in jobs are ranked above those unemployed, as the unemployed are above those not-in-the labour market.

The interpretation of the results for women is much more complex. From column 2 of Table 3 we see that the hiring of unemployed females is only significantly affected by the numbers of male unemployed. The flow of women between jobs is negatively affected by all of the male stocks and by the stock of employed female job seekers. The flow from NLF females into jobs falls with more female unemployment, more females who are NLF, and with more employed male job searchers. These results do not suggest that females are preferred to males in the hiring process since all the female flows are significantly affected by at least one male flow. There is also not a full ranking across the female applicants: the employed and unemployed job seekers appear to be essentially independent of each other, whilst the NLF face significant competition from unemployed females[10].

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[9]Those unemployed for more than 12 months in their current spell. Although we do not focus on this issue in this paper, the negative coefficient on the male long term unemployed ratio only suggests that longer duration male unemployed have a lower outflow probability. We find no evidence of this for females.

[10]As discussed earlier, the number of marginally attached females is roughly double the number of unemployed females. Thus, whilst unemployed females are apparently preferred in the hiring process, the weight of the numbers results in more women from NLF being hired.

The construction of equation (8) shows that the coefficients on competing stocks are average proportions of this group of searchers in the total pool of searchers relevant to the particular outflow. In the case of fair shares we would expect these proportions to be the same across all five equations. The alternative restrictions referred to above demonstrate that fair shares can be rejected. As a consequence of this, and the deviation of the own stock coefficients from one, interpretation of the coefficient sizes is hazardous. We can say, however, that larger coefficient values on individual competing stocks of job seekers means they are more numerous in the stock of searchers relevant to the particular flow. Employed male job seekers are a substantial proportion of competing job seekers according to the estimates in all five columns of the table. The male unemployed are generally significant but less important as a proportion: all of the coefficients on this stock are smaller than those for employed males.

These hiring function results for men and women are consistent with many but not all of the relative cyclical behavior of flow rates presented in Table 1. For males, in upturns the greater cyclical sensitivity in flows into employment from those in jobs over those from unemployment and not-in-the-labour force is consistent with the ranking of these groups in Table 2. In downturns, flows from NLF are relatively unaffected, however, suggesting that some form of market segmentation may be playing a role. The relative cyclical behavior of female flows is similar for flows from each state. The lack of a direct ranking result for women from the hiring functions is consistent with this absence of significant differences in cyclical behavior.

Interestingly, there is one significant positive coefficient on a stock of searchers amongst our hiring rate estimates. An increase in male unemployment actually increases the flow of the female NLF into jobs. In the context of the hiring function, where an increase in the number of other job searchers would typically represent an increase in competition for vacancies, this is an *a priori* perverse result: we know from Table 2 that the total flow of NLF females into employment is strongly procyclical, therefore, the negative effects from the other stocks impacting on this flow should be larger in a downturn than the positive effect from the male unemployed. Indeed, this is the case. The very cyclically sensitive female NLF stock is having a major impact on the flow. Whilst the positive effect of male unemployment stock may be outweighed in the aggregate, it is nevertheless an important finding. It suggests that there may be a substitution effect taking place: as male unemployment rises more women from NLF are finding jobs. Whilst this substitution effect has not been found in the hiring function literature

before, there are a range of possible explanations within labour economics. For example, a positive cross-wage elasticity between a wife's labour supply and her husband's earnings has been well established in the labour supply literature (Killingsworth, 1986;137). Similarly, if the value of non-market work time for the NLF female job seekers is indeed negatively affected by a rise in male unemployment, the positive coefficient is also consistent with the search theoretic model due to a corresponding fall in the female reservation wage, an increase in the search effort of the female and/or a more binding liquidity constraint (Mortensen 1986;859-871).

IV. Conclusions.

In contrast to the fair shares rule common to the hiring function literature, we find a clear ranking of men over women in the hiring process, indeed in aggregate women appear to be effectively segregated from the male hiring market, whereas this is not true with males in the female hiring market. We also find that amongst the males, employed job seekers are ranked above those unemployed and, in turn, those not in the labour force. For women, we find that the unemployed and employed are not competing with each other, whilst those not in the labour force are ranked below the unemployed. The lack of a clear ranking amongst female job seekers from different labour market states is in accordance with the similar responses of their flows to the business cycle.

These results may appear to be counterintuitive given that over the expansionary period of the 1980s, employment of females rose relative to that of males. However, the relative hiring rate of females when defined as a proportion of the stock of searchers stayed constant and when defined as a proportion of the stock of employees actually fell. These two facts can be reconciled by observing that outflows of males from employment over this period also rose relative to those of females. In this paper we have analyzed hiring, job separations (and the implied increase in this for males) is an important area for future research.

The hiring function approach, suitably disaggregated, has made the relative position of male job seekers quite clear. For females, whilst it has revealed important interactions, the approach has demonstrated the need for further analysis, probably at the individual level, to explore the importance of the revealed substitution and segmentation effects.

Furthermore, in this paper we have sought to identify differences in hiring outcomes, we

have not attempted an explanation of why job seekers from different labour market states and different gender groups might have different hiring rates. The fundamental issue of why search effectiveness may differ across these groups remains unanswered - this is the obvious avenue for future research in this area.

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Table 1. Estimates of the Cyclical Behaviour of Employment Inflows

	Male			Female		
Coefficient	Unemployment	Employment	Not in Labor Force	Unemployment	Employment	Not in Labor Force
α_0	-0.16 (-3.04)	-0.0252 (-2.57)	0.0106 (0.32)	-0.1532 (-2.47)	-0.0285 (2.52)	-0.1280 (2.54)
α_1	0.87 (30.56)	0.0350 (3.43)	0.1161 (3.30)	0.0881 (2.80)	0.0430 (3.81)	0.1007 (3.70)
β_1	0.88 (11.86)	0.6305 (6.50)	0.4473 (3.20)	0.8508 (8.93)	0.6202 (6.54)	0.3255 (2.50)
β_2						0.5330 (4.04)
$\bar{R}^2$	0.78	0.75	0.8	0.69	0.78	0.86
s.e.	0.0649	0.0184	0.071	0.0649	0.0206	0.055
z_1	8.91	6.04	6.82	7.01	2.53	8.01
z_2	1.09	0.03	0.5	0.02	0.81	1.09
z_3	4.64	47.96*	0.63	0.05	28.7*	0.01
z_4	0.01	0.01	0.09	0.08	0.01	0.96

t-values in parentheses; z_1: Lagrange Multiplier test for up to 4th order autocorrelation distributed $\chi^2(4)$; z_2: Reset test for incorrect functional form distributed $\chi^2(1)$; z_3: Jarque-Bera test for normality distributed $\chi^2(2)$; z_4: test for heteroscedasticity distributed $\chi^2(1)$.

Model (e, unemployment): $\log(X_t/U_{t-1}) = \alpha_0 + \alpha_1\pi_t + \beta_1\log(X_{t-1}/U_{t-2}) + \beta_2\log(X_{t-2}/U_{t-3})$

where X_t : hires from unemployment over period t; U_t : stock of unemployed at end of period t-1; $\pi_{t-1} = E_{t-1}S_{t-1}$: the state of the business cycles in period t-1, according to the Markov switching model estimates.

Table 2. Cyclical responses of Employment Inflows.

Outflow rate from:	Output growth state	Male	Female
Unemployment	High	+11.8%	+12.5%
	Low	-61.4%	-46.5%
	Difference	73.2	59.0
Employment	High	+60.4%	+11.8%
	Low	-34.4%	-47.5%
	Difference	94.8	59.3
Not in the Labour Force	High	+4.7%	+18.3%
	Low	-16.3%	-52.7%
	Difference	21	71

In the high growth state GDP rises by 4.76% per annum, during low growth it falls by 0.32% per annum.

The values in this table are calculated as follows. The equilibrium or long-run solution of equation (A1) is : $\log(X/U)=\alpha_0/(1-\beta_1)+\alpha_1/(1-\beta_1).\pi$

For $\pi=1$ (an upturn), the average value of $\log(X/U)=(\alpha_0+\alpha_1)/(1-\beta_1)$

and for $\pi=0$ (a downturn), the average value of $\log(X/U)=\alpha_0/(1-\beta_1)$

Table 3: Outflow Rates into Employment

1. own outflow rate from unemployment			2. own outflow rate from not in labour force			3. own outflow rate from jobs	
	Male	**Female**		**Male**	**Female**		**Female**
own unemployment	-0.89 (-13.63)	-0.64 (-8.91)	own not in the labour force	-1.21 (-17.98)	-1.70 (-7.16)	own employed job searchers	-0.86 (-13.31)
own not in the labour force			male unemployment	-0.16 (-5.02)	0.18 (2.46)	other employed job searchers	-0.32 (-3.42)
male employed job searchers	-0.43 (-5.54)	-0.10 (-1.90)	female unemployment		-0.43 (-3.75)	male unemployment	-0.09 (-5.10)
male long term unemployed	-0.17 (-4.54)		male employed job searchers	-0.28 (-3.95)	-0.36 (-8.41)	male not in the labour force	-0.20 (-3.92)
$\bar{R}^2$	0.92	0.74		0.92	0.91		0.97
se	0.0445	0.048		0.0467	0.028		0.0219
z_1	6.76	3.97		9.79*	9.44		5.09
z_2	0.59	3.6		0.83	4.82*		0.27
z_3	0.75	14.91*		1.07	0.6		1.78
z_4	0.65	3.38		0.9	1.17		0.01
z_5	5.18 $\chi^2(4)$	4.41 $\chi^2(6)$		4.29 $\chi^2(3)$	0.07 $\chi^2(2)$		0.74 $\chi^2(2)$

t-values in parentheses. Each outflow rate is in logs of the (outflow divided by own gender dependent variable stock). Estimation period: 1980q4 - 1991q4. Equations include a constant, seasonal dummy variables and the restriction that $\log M_t=1$. Methods of estimation OLS. z_1: Lagrange Multiplier test for up to 4th order autocorrelation distributed $\chi^2(4)$; z_2: Reset test for incorrect functional form distributed $\chi^2(1)$; z_3: Jarque-Bera test for normality distributed $\chi^2(2)$; z_4: test for heteroscedasticity distributed $\chi^2(1)$; z_5: joint test of zero restrictions on the coefficient of the deleted variables (LM) distributed χ^2 with relevant degrees of freedom in parentheses in the row below.