TRANSITIONS INTO PUBLIC HOUSING AND EMPLOYMENT OUTCOMES: A PANEL ANALYSIS

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Abstract:
This paper examines the impact of public housing subsidies on employment outcomes using the 1999-2005 public housing administrative data from Western Australia. The existing public housing literature presents two opposing arguments on the impacts of public housing on employment. Public housing can have a positive impact by providing security of tenure. On the other hand, neighbourhood and stigma effects and the withdrawal of housing subsidies as income increases can depress work effort. It is often difficult to accurately measure the impact of public housing on employment because public housing is correlated with unobservable factors that may discourage employment. This study addresses this issue by using a quasi-experimental approach in which individuals who entered public housing within the timeframe form a treatment group that can be compared to a control group consisting of public housing applicants who did not enter public housing within the timeframe. We find that transition into public housing has a positive net impact on employment outcomes, and the impact is twice as high for males as it is for females. We attempt to unbundle this positive impact into a welfare trap effect and a housing stability effect. Where a welfare trap exists, individuals depress their labour supply while on the public housing wait list in order to maintain eligibility for public housing. A housing stability effect improves the employment outcomes of individuals once they have been allocated a public housing property.

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1. Introduction

Public housing has long been a vital component of social welfare policy in Australia and in most developed nations. The provision of adequate housing to low-income individuals who otherwise could not access it is important to ensuring such individuals can participate and function adequately in society. During the last two decades, the employment rates among working age public housing tenants have failed to keep up with the improvement evidenced in the overall working age population. Between 1982 and 2002, the employment rate of all working age persons rose from 67% to 72%. Overall, working age females enjoyed a significant rise in employment rate from 51% to 64% between 1982 and 2002. However, female public housing tenants' employment trend has remained flat at approximately 22% over the same period. Among all working age males there has been a small overall decline in employment rate from 84 to 81%, but a sharp decline in employment rate has occurred among males in public housing from 67% to 35% (Wood, Ong and Dockery, 2006).

The relative deterioration in employment among public housing tenants has coincided with a period of increased rationing of public housing stock. Financial support for public housing has dwindled, leading to a tightening of the eligibility criteria for entry onto public housing wait lists. In 2001 221,310 persons were on public housing wait lists, an increase of 9.4% over the 1991 wait list figure of 202,300 persons (Burke, 2002). On the other hand there has been an increasingly important role for direct subsidies in private rental housing in the form of Commonwealth Rent Assistance. The consequence is a public housing stock that has become increasingly rationed and allocated to those in greatest need.

Rationing is potentially significant in respect of employment outcomes for two reasons. First, applicants might reject offers of employment for fear of losing eligibility for public housing while on the wait list, or even reduce labour supply if this would help advancement on the wait list (Fischer, 2000 Yelowitz, 2001; Stiglitz, 2000). Because public housing stock is rationed, public housing applicants have to maintain their income levels below the public housing income limit to retain eligibility for public housing. Applicants are subject to an income review when a property is offered to them. The offer will be withdrawn if income exceeds eligibility limits. The requirement to maintain income below the eligibility limit may 'trap' applicants in an unwaged and welfare dependent state while on the wait list in order to maintain public housing eligibility[1]. The operation of a wait list system may therefore create extended periods of welfare dependence during which individuals are discouraged from seeking work. Second, work incentives can be blunted by the provision of housing subsidies in ways that increase effective marginal tax rates and reduce labour supply. Barrett (2002), for example, finds that sole parent pensioners who are public housing tenants in New South Wales and the Australian Capital Territory have a 32% lower exit rate from unemployment spells, and this is attributed to the higher public housing subsidies in these states.

On the other hand, public housing can have positive employment effects (Van Ryzin, Kaestner and Main, 2003). By providing housing stability in an affordable housing unit, public housing can assist employment prospects because of the responsibility and reliability that is implied by a permanent address, and avoidance of the disruptive effects of not having a permanent place to live. Furthermore, public housing programs in the United States

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[1] Once in a public housing unit eligibility criteria are not applied. That is state housing authorities do not ordinarily terminate tenancies because occupants' incomes have risen above eligibility limits. Typically rents will have risen to market levels once incomes have reached these levels, and since subsidies are then zero it is expected that tenants will exit voluntarily.

commonly have onsite services (e.g. childcare, training) that help support employment, and neighbourhood initiatives such as these are also to be found in Australia (Dalton and Ong, 2005).

In this paper we measure the net impact of transition into public housing on employment outcomes using the confidentialised public housing administrative records from the Western Australia Department of Housing and Works (DHW). We address the issue of endogeneity by employing a quasi-experimental approach. We find an overall positive impact. We conduct an exercise to unbundle this net impact – is it due to welfare traps that deter applicants from accepting employment offers while on the wait list, or is it due to the positive impacts that stability of housing circumstances has on labour market performance?

These questions are important from a policy perspective. One of the main objectives of the most recently concluded Commonwealth State Housing Agreement (CSHA) is to increase the economic participation of disadvantaged Australians. The agreement requires state and territory governments to reform the management of public housing in ways consistent with the promotion of economic participation among public housing tenants (Commonwealth of Australia Gazette, 2003). Despite the policy interest and the growing overseas research that explores the magnitude and direction of the impact of public housing on employment outcomes, to our knowledge, no known Australian studies have modelled the impacts of public housing on employment outcomes econometrically.

We turn in section 2 to a description of the institutional arrangements governing entry into public housing in Australia and Western Australia in particular. Section 3 describes the Western Australian DHW public housing data employed in our analysis. Section 4 describes our panel modelling approach. Section 5 contains our key findings and a final section concludes.

2. Institutional Arrangements Governing Entry into Public Housing

Housing assistance in the form of public housing is provided and managed by state and territory housing authorities. The CSHA is the main funding source for public housing. The CSHA is an agreement made between the federal, state and territory governments to provide funding for housing assistance for persons in need. The 2003 CSHA runs from 1 July 2003 to 30 June 2008. In 2003-04, the federal, state and territory governments provided funding of approximately $1.3 billion for housing programs, with the federal government contributing just under three-quarters of the total funding amount and the states and territories contributing the rest. The majority of the funding was spent on public and community housing (SCRCSSP, 2006). Although much of the focus of housing assistance measures has shifted to demand subsidies in the form of Commonwealth Rent Assistance over the past decade, it remains the case that a large number of individuals remain resident in public housing in Australia. As of 2005, the public housing stock exceeds 343,000 dwellings (SCRCSSP, 2006).

Public housing applicants must generally be Australian citizens or permanent residents and must not own residential property. All applicants must be living in the respective state or territory where the application is made (SCRCSSP, 2006).A key characteristic of public housing, and one that is particularly relevant to our analysis, is that it is rationed, with only a limited number of dwellings being available for eligible applicants. All state and territory housing authorities operate wait lists in order to prioritise access to public housing. As of

2005, over 200,000 applicants remain on public housing wait lists in Australia (SCRCSSP, 2006).

To initially qualify for public housing, the applicant household's income must be below an income limit threshold, which again differs by state and territory. The income eligibility limits that apply to wait list applicants in Western Australia are set out in table 1 below. As shown in the table, income is assessed on a household basis, and differs according to household size, region, and whether there are any disabled persons in the household. Since the year 2000, the Consumer Price Index (CPI) has increased by 21% and average weekly earnings have increased by 28%. However, the public housing income eligibility limit in Western Australia has not been increased over the same time period, indicating a fall in the real value of the income eligibility limit[2]. Hence, the real income levels of individuals who are eligible for public housing in Western Australia have fallen over the years.

Table 1: Public housing income eligibility limits in Western Australia, 2006

Household size	Weekly household assessable income			
	Metro and country		North-west/Remote	
	Single income	Dual[a] income	Single income	Dual[a] income
No disabled persons in household				
1	$390		$550	
2	$520	$600	$740	$850
3	$630	$720	$880	$1,010
4[b]	$730	$840	$1,030	$1,190
Disabled person(s) in household				
1	$490		$690	
2	$650	$750	$920	$1,060
3	$780	$900	$1,100	$1,260
4[c]	$920	$1,050	$1,290	$1,480

Source: WA DHW (2006)
Notes:
a. Dual income refers to an income earned by partners in paid employment and including government benefits, but not the base component of Family Tax Benefit Part A.
b. For households with no disabled persons, add $110 for each person after the fourth. For households with someone who is disabled, add $130 for each person after the fourth.

State housing authorities typically have more than one wait list with applicants sorted into different segments of need according to household type, preference for housing type and location. A priority wait list is operated in most states and territories for categories of acute housing need. Western Australia has a wait list based only on date of application and a priority list which is based on both the date of application plus priority criteria based administrative guidelines such as urgent medical condition, domestic violence, racial harassment or homelessness (WA DHW, 2006).

3. Data and Descriptive Statistics

The DHW public housing dataset is a panel dataset that tracks individuals from the date of first appearance on wait lists, through entry into public housing to exit to the most current point in time. The dataset is constructed from public housing administrative records from the Western Australia DHW and provides detailed socio-demographic and income information

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[2] Between March 2000 and March 2006, the CPI increased from 125.2 to 151.9 (ABS, 2007b). Between February 2000 and February 2006, average weekly earnings increased from $644.80 to $823 (see ABS, 2007a).

on Western Australia's public housing applicants and tenants during their wait list and public housing tenures.

The DHW public housing dataset, while state-based, possesses several distinct advantages over nationally representative panel datasets. First, panel studies are generally vulnerable to attrition bias because respondents cannot be traced or refuse to be interviewed. Analysis based on the DHW dataset is not vulnerable to these sources of attrition because public housing applicants and tenants are required to respond to questions from the DHW pertaining to their circumstances in order to maintain their position on the wait list or in public housing. Second, one of the weaknesses of national datasets is that they usually contain only a small number of public housing tenants that can limit robustness of estimates derived from such datasets. Third, the DHW dataset allows accurate identification of public housing applicants, allowing examination of the impacts of rationing of public housing stock on employment. This is not possible in national datasets. Spong and Ong (2005) conducted an audit of panel datasets potentially suitable for analysis of the causal relationship between housing assistance and economic participation, and concluded the DHW dataset has superior attributes that makes it more suitable for analysis than other panel datasets presently available in Australia[3].

The DHW data timeframe is from 1 January 1999 to 30 November 2005, that is, it contains information on applicants and tenants who entered the wait list between 1 January 1999 and 30 November 2005. For tenants (applicants) still in public housing (still on the wait list) at the end of the data timeframe, the term 'current' refers to 30 November 2005. For tenants (applicants) who exited public housing (who exited the wait list) before the end of the timeframe, the term 'current' refers to the exit date from public housing (application withdrawal date).

Individuals in the dataset undergo at least one of the following types of transitions within the data timeframe:
- Entry into public housing and exit from public housing within the timeframe;
- Entry into public housing within the timeframe, still in public housing at the end of the timeframe;
- Entry onto the wait list and exit from the wait list within the timeframe without ever entering public housing;
- Entry onto the wait list within the timeframe, still on the wait list at the end of the timeframe[4].

For groups 1 and 3, the most recent observation is at the point of exit from public housing and the wait list respectively. For groups 2 and 4, the most recent observation is censored on 30 November 2005. The following table reports the total number of wait list and public housing entries and exits in each year. At the end of the data timeframe, 65,643 wait list applicants remained on the wait list and 48,173 tenants were still in public housing. Over 32,000 entered and subsequently exited public housing in this timeframe.

Table 2: Number of wait list and public housing entries and exits, by year

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[3] Other panel datasets surveyed include the Survey of Employment and Unemployment Patterns, General Customer Survey, Jobseeker Data Set, Household, Income and Labour Dynamics Australia Survey and the Labour Force Survey. See Spong and Ong (2005) for details.

[4] The description is give in terms of number of transitions and not number of individuals because each individual can experience one *or more* types of transitions within the timeframe, that is, an individual can be classified under more than one group within the timeframe. The numbers of transitions are based on all individuals regardless of age.

	1999	2000	2001	2002	2003	2004	2005[a]
Wait list entries	31,805	33,105	31,997	34,188	32,812	32,265	29,015
Wait list drop outs	7,327	13,013	17,156	21,114	20,295	19,662	18,951
Public housing entries[b]	6,178	10,500	13,228	14,909	15,565	15,154	12,070
Public housing exits	944	3,199	6,076	8,449	10,251	10,512	7,023
Still on wait list on 31 December[b]	31,805	52,455	62,651	69,061	68,714	68,146	65,643
Still in public housing on 31 December[b]	6,178	15,734	25,763	34,596	41,712	46,615	48,173

Source: Authors' calculations from DHW public housing data 1999-2005
Notes:
a.   In the case of 2005, data is available only until 30 November.
b.   This includes entries into existing public housing households without any time spent on the wait list. For example, consider a single female public renter living by herself. If she gets married and her spouse moves into her home, he is entering an existing public housing household without having spent any time on the wait list.

The ability to observe individuals who dropped off the wait list and those still on the wait list at the end of the data timeframe (groups 3 and 4) is a critical advantage to the analysis in that we are able to observe the full range of applicants within the data timeframe, including those who drop off the wait list.. This minimises the risk of sample selection bias in our analysis. For example, an applicant may drop off the wait list without entering public housing (in group 3) because s/he is employed and has sufficient income to secure a better alternative in the private housing market before being offered public housing and has therefore lost eligibility for public housing. If such an applicant were excluded from the sample, the analysis would over-estimate the extent of unemployment experienced by individuals on the wait list[5].

The data is confidentialised; each individual is tracked by a unique customer identification number and each household is tracked by a unique household number. Variables include gender, position in the household, date of birth, disability types, Aboriginality[6] and regions. Western Australian public housing stock is scattered throughout ten regions. The metropolitan regions are the North, South and South-east metropolitan regions[7]. The non-metropolitan or country regions are Great Southern, South-west, Goldfields, Midwest-Gascoyne, Pilbara, Kimberley and Wheatbelt regions[8]. Given the panel nature of the dataset, it is possible to identify the size and structure of each applicant and tenant household at any point during the data timeframe. Hence, it is possible to observe changes in household size and structure through time. A data weakness is that human capital variables, such as educational qualifications, is not available.

Reliable analysis of employment outcomes requires that employment status either be directly observable from the data, or that the data contains sufficient income source information that allows us to accurately identify individuals who are employed. While employment status is not directly observable from the data, the data contains information on over 100 income sources, enabling accurate identification of individuals receiving a wage or salary. Specifically, individuals in the data receiving a wage or salary, Community Development

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[5] However, once an individual drops off the wait list or exits public housing, s/he drops off the dataset as well.

[6] This is the only ethnicity variable available in the dataset. Details on country of birth may be reported by applicants for public housing. However, as this information is not fundamental to the administration of the program so not all applicants respond to this question.

[7] These are also known as the Mirrabooka, Fremantle and Cannington regions respectively.

[8] These are also known as the Albany, Bunbury, Kalgoorlie, Geraldton, Port Hedland, Broome and Northam regions respectively.

Employment Project wage or Disability Wage Supplement are treated as employed[9]. As hours worked are not recorded, we cannot distinguish between full time and part time workers.

The Department undertakes an income eligibility check of applicants at application and at property allocation, to ensure that public housing is offered to eligible persons. After property occupation, the Department reviews their tenants annually.. Tenants whose income has changed are also required to report their new income details to the Department (WA DHW, 2006). The data thus contains an abundance of income history variables that allows us to track the employment outcomes of applicants and tenants through time. Given the income review procedures of DHW, we can observe each individual's employment status at the date of entry onto the wait list, the date of entry into public housing, at the annual income review date, or when tenants voluntarily report changes in income. These events occur at different points in time for each individual. We assume that there is no change in employment status between reviews or voluntary reports of changes in income, and record employment status on 1 July each year as determined by reference to their employment status at the review date preceding 1 July.

The Department has in place rigorous income verification procedures that ensure that the income data collected on applicants and tenants are verified. Income details must be accompanied by documentary proof, such as wage slips from employers and benefit confirmation statements from Centrelink (WA DHW, 2006). Such procedures minimise the risk of both intentional and unintended reporting errors on the part of applicants and tenants, so the income data is reliable for analysis.

4. Method

A key methodological issue afflicting analysis of the impacts of public housing on employment is the issue of identification. Empirical identification refers to whether one can validly infer that the differences in an outcome variable are *caused* by differences in the relevant explanatory variables. In analysis such as this, empirical identification is often hindered by the following problems. First, there is the familiar omitted variable problem. Second, eligibility for public housing is determined by income, which will be correlated with labour market participation. As a result, it is often difficult to determine whether labour supply changes are *the cause or the effect* of residence in public housing.

To isolate the impact of entry into public housing on employment outcomes, we utilise a quasi-experimental framework in which we compare working age individuals who have entered public housing within the timeframe (the treatment group) with working age individuals who did not enter public housing within the timeframe (the control group). In our case, the treatment is therefore transition into public housing. If those in the treatment and control groups are randomly assigned it is safe to assume that any difference in their employment outcomes is due to entry into public housing (the treatment). Thus if the treatment were not delivered the outcomes of both groups would on average be the same. Any differences that do emerge with treatment can be attributed to the effects of that treatment rather than differences in the characteristics of the two groups. We exploit public

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[9] Disability Wage Supplement was introduced in 1994 to encourage disabled people to undertake paid work. The supplement is an additional payment made to the disabled individual who receives less than the award wage provided the disabled individual is unable to perform job duties at the appropriate level warranting payment of full award wages, (Parliamentary Library, 1997).

housing institutional rules that cause variation in housing assistance that are plausibly unrelated to employment outcome. In the present context, we follow Fischer's (2000) use of the rationing of public housing. There are more people eligible for public housing than there are vacancies. Eligibility requires satisfaction of income tests, and once these tests are met applicants enrol on wait-turn lists. Once applicants reach the top of the wait-turn lists they are offered a public housing property; administrators cannot select from the wait-turn lists those who have tended to have inferior employment records. As a consequence variation in housing assistance between applicants making transitions into public housing (treatment group), and applicants still on wait-turn lists (control group) are assumed to be uncorrelated with omitted or unobservable variables that shape employment outcomes.

Using the quasi-experimental framework, we are able to estimate a difference-in-difference model. Suppose the average pre-treatment value of the outcome variable for the treatment and control groups are $\overline{Y}_0^T$ and $\overline{Y}_0^C$ respectively, where T represents the treatment group, C represents the control group and 0 represents the time period before the treatment group receives treatment. The average post-treatment value of the outcome variable for the treatment and control groups are $\overline{Y}_1^T$ and $\overline{Y}_1^C$ respectively, where 1 represents the time period after the treatment group receives treatment. The average impact of the treatment is $\left(\overline{Y}_1^T - \overline{Y}_0^T\right) - \left(\overline{Y}_1^C - \overline{Y}_0^C\right)$. The formula measures a difference of differences, that is, the difference in post- and pre-treatment outcomes of the treatment group, relative to the *contemporaneous* difference in post- and pre-treatment outcomes of the control group. Such a quasi-experiment mimics the approach of medical and social psychology researchers who randomly assign clients between treatment groups that receive a drug or other form of assistance, and control groups that receive a placebo.

Difference-in-difference modeling has been used in various studies to isolate the impact of a normally endogenous treatment on outcome variables. Card and Krueger (1994) evaluate the impact of the minimum wage on employment. Their treatment group consists of fast food restaurants from New Jersey and the control group comprises a group of similar restaurants in Pennsylvania. The minimum wage was raised in New Jersey in 1992 but not in Pennsylvania. Differences in employment outcomes before and after the minimum wage hike in New Jersey was compared with differences in employment outcomes in Pennsylvania over the same time period. Surprisingly, the difference-in-difference estimate from Card and Krueger's (1994) study indicates that there was actually a small increase in employment rate in New Jersey *relative* to Pennsylvania despite the minimum wage rise in New Jersey.

Another example is Gruber (2000), who examines the impact of disability insurance benefits on labour supply. There are two different disability pension plans in Canada, the Quebec Pension Plan (QPP), which covers only the province of Quebec and the Canada Pension Plan (CPP), which covers the rest of Canada. In January 1987, the CPP benefits increased by 36 percent while the QPP benefits remained constant. The employment outcomes of individuals under the CPP before and after the increase in benefits are compared with the employment outcomes of individuals under the QPP over the same time period. The study estimated that the elasticity of labour force non-participation with respect to disability insurance benefits was between 0.28 and 0.36. Gruber (1994) and Edwards (2006) have used difference-in-difference models to examine the impact of maternity leave provisions on wages.

The difference-in-difference specification in traditional quasi-experiments can be written as:

$$Y_{iz} = f\left(\alpha + \beta T_i + \gamma z_i + \delta(T_i \cdot z_i) + \varphi X_{iz} + \varepsilon_{iz}\right) \tag{1}$$

where Y_{iz} =1 if individual i is employed at time period z, and z_i=1 if the observation is taken from the time period after the treatment group receives the treatment, and z_i=0 if the observation is taken from the time period before the treatment group receives the treatment. The variable z_i captures unobservables (fixed effects) specific to the time period z but common to all i. T_i =1 if the individual i is in the treatment group and 0 if i belongs to a control group. *X* is a vector of socio-demographic characteristics. We can interpret β as the treatment group specific effect (average permanent differences between treatment and control groups). The coefficient γ may be interpreted as a time trend common to treatment and control groups. Finally, δ is the difference-in-difference estimator, which isolates the impact of the treatment from average permanent differences between the two groups, time trend effects and socio-demographic characteristics.

Importantly, our quasi-experiment differs from the traditional quasi-experiments described previously in two significant ways. In traditional quasi-experiments, individuals in the treatment group all receive the treatment at the same time, and the control group can be observed over the same timeframe as the treatment group. In our case, the 'treatment'(transition into public housing) is received by people at different times. Furthermore, we have people dropping off the wait list before many in the treatment group have even entered public housing. It is therefore impossible simply divide the time periods of observations into two periods – before the treatment group receives the treatment and after the treatment group receives the treatment.

Given the differences between the nature of our quasi-experiment and traditional quasi-experiments, we estimate the following model specification:

$$Y_{it} = f\left(\alpha + \beta P_i + \sum_{j=2}^{T} \gamma_t YEAR_{ij} + \delta(P_i \cdot z_{it}) + \varphi X_{it} + \varepsilon_{it}\right) \tag{2}$$

where Y_{it} =1 if individual i is employed at time t and 0 otherwise. $YEAR_{ij}$ is equal to 1 if $t=j=2, \ldots T$, zero otherwise and captures unobservables (fixed effects) specific to t but common to all i. P_i =1 if at any time $t=1, 2,\ldots T$, the individual i has made a transition into public housing and 0 if i belongs to a control group of wait list applicants who do not make a transition into public housing by period *T*. The variable z_{it} =1 if for individual i period t occurs after the treatment (entry into public housing) has begun, and 0 if the period t occurs before the treatment has begun. Because treatment is never received by the control group, z_{it} =0 regardless of t for all individuals in the control group. *X* is a vector of socio-demographic characteristics. We can interpret β as the treatment group specific effect (average permanent differences between treatment and control groups). The coefficient γ may be interpreted as a time trend common to treatment and control groups. Finally, δ is the difference-in-difference estimator.

Individuals in the dataset can be either normal or transfer cases. Normal cases are individuals who apply for public housing from outside the public housing sector. Transfer cases are individuals already living in public housing, who have applied to transfer to another public

housing property[10]. The latter have the benefit of already having been allocated a public housing property. For example, they enjoy a housing stability that applicants from outside the public housing sector may not have. Moreover, they are on a 'transfer wait list', which is separate from the wait list for normal applicants from outside the public housing sector. Hence, the employment behaviour of transfer cases may differ from the employment behaviour of normal cases. Transfer cases have been excluded from the present analysis.

An important condition for any difference-in-difference analysis is that the selection variable assigning people between the treatment and control groups should be unrelated to the outcome variable (see Meyer, 1995). In our case the selection variable is the eligibility tests for public housing that are based on income and asset levels. An assumption here is that the rationing feature in public housing programmes ensures that both public housing tenants and applicants are likely to share the same characteristics because both must satisfy income and asset eligibility rules as well as reside in rental or rent-free housing when applying for entry onto wait lists.

Our sample comprises working age persons, that is, non-dependent persons aged 15 to under 65. To test whether our sample satisfies this condition, table 3 tests for significant differences in the characteristics of tenants (the treatment group) and applicants (the control group). Fixed characteristics, described in table 3, are characteristics that are time invariant. There are several significant differences between the fixed characteristics of the treatment and control groups. The treatment group is more likely to be older, a priority applicant and Aboriginal. There are also some regional differences across groups. However, these differences are controlled for in our analysis by including these fixed characteristics into our panel model as control variables. Importantly, the differences between public housing tenants and applicants are much smaller than differences between tenants and persons living in other tenures (see Wood et al, 2006).

Table 3: Means of fixed characteristics and test of significant differences between treatment and control groups[a]

Fixed characteristic	Control	Treatment
Year of birth	1967	1965*
Female	0.588	0.582
Aboriginal	0.131	0.337*
Priority case	0.011	0.209*
Metropolitan regions		
North Metro	0.351	0.232*
South Metro	0.187	0.130*
South East Metro	0.187	0.182
Country regions		
Great Southern	0.031	0.032
South West	0.063	0.054*
Goldfields	0.037	0.068*
Midwest-Gascoyne	0.044	0.077*
Pilbara	0.035	0.090*
Kimberley	0.054	0.075*
Wheatbelt	0.010	0.061*
Sample	36,567	18,497

Source: Authors' calculations from DHW public housing data 1999-2005
Notes:
* Significantly different from applicants at 1% level
a.   Excludes transfer cases.

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[10] Applicants from outside the public housing sector receive what DHW call 'normal assistance'. Applicants who have applied for transfers from within the public housing sector receive what DHW call 'transfer assistance'.

5. Findings

The straightforward comparisons of pre- and post transition employment rates suggest that there are net positive impacts on employment outcomes. Table 4 presents estimates derived from tracking the employment profile of working age individuals in the data as they move from the wait list into public housing to the current point in time. The table shows that the aggregate employment rate of persons is 14% at entry onto the wait list, increases to 16% at entry into public housing, but then rises to 20% at the most current point time. We find inter-regional differentials in employment rates, with higher employment rates observed for tenants in country regions. Persons who are on the priority list also have lower employment rates than those on the normal wait-turn list. As expected, males are more likely to be employed than females, and non-disabled persons than disabled persons. We find higher employment rates among Aboriginal tenants than non-Aboriginal tenants. However, the employment trend as tenants make transitions from wait lists into public housing tenancies remains similar across all regions and socio-demographic groups.

Table 4: Employment rate at entry onto the wait list, entry into public housing and most recent observation, by socio-demographic characteristics, working age tenants, per cent [a]

	Entry onto wait list	Entry into public housing	Most recent observation	Sample
All	13.9	15.8	20.2	26,880
Priority level during wait list period				
Wait-turn	15.5	18.3	22.6	16,569
Priority	11.5	11.8	16.5	10,311
Gender				
Male	16.6	19.8	25.1	10,288
Female	12.3	13.4	17.2	16,591
Aboriginality				
Non-Aboriginal	13.1	14.8	19.9	17,716
Aboriginal	15.5	17.8	20.9	9,164
Disability status				
Not disabled	14.7	16.7	21.4	24,097
Disabled	7.2	7.9	9.8	2,783
Region				
Metropolitan	9.7	11.2	16.3	15,324
Country	19.5	21.9	25.4	11,556

Source: Authors' calculations from DHW public housing data 1999-2005
Note:
a. The sample consists of individuals who entered public housing during the data timeframe and who were of working age from entry onto the wait list till their most recent observation. For tenants still in public housing at the end of the data timeframe, the most current observation is 30 November 2005. For tenants who left public housing before the end of the timeframe, the most current observation is the date of exit from public housing. Persons who did not spend any time on the wait list are excluded. For persons who have entered public housing more than once within the analysis period, their employment status in their most recent tenure is analysed.

A difficulty with the above table is that labour market conditions could be relatively more favourable in the post-entry phase and so we falsely attribute differences in employment rates to the effects of making a transition into public housing, when it in fact reflects change in labour market conditions. Table 5 addresses these concerns by comparing the employment outcomes of working age tenants during year *t* with the *contemporaneous* employment outcomes of working age wait list applicants in the same year. The year *t* employment outcome of applicants and tenants are both measured on 1 July. Table 5 reports contemporaneous outcomes of all working age tenants and applicants. Table 6 cross tabulates by priority status.

Table 5 demonstrates that the employment rate among wait list applicants is below that of those that have already entered. The average employment rate of tenants is 18% as compared to a contemporaneous employment rate of 13% for applicants. Hence, overall, tenants are 5 percentage points more likely to be employed than applicants and this difference is statistically significant at the 1% level. The same pattern persists across the years, with tenants' employment being more favourable than applicants' contemporaneous outcomes. We find the same pattern by gender, disability status, Aboriginality and region, with tenants' outcomes being significantly better than the contemporaneous outcomes of applicants in all subgroups examined[11].

Table 5: Employment rates, weekly wage and number of applicants and tenants, by year

	1999	2000	2001	2002	2003	2004	2005	All
Employment rate (%)								
Applicants	15.3	14.9	13.9	12.6	12.0	12.0	12.2	12.9
Tenants	15.9*	18.9*	17.4*	16.1*	17.9*	18.4*	20.0*	18.2*
Sample								
Applicants	4,255	10,472	15,298	16,073	15,643	15,422	15,284	92,447
Tenants	578	2,368	4,420	6,464	8,230	9,720	10,686	42,466

Source: Authors' calculations from DHW public housing data 1999-2005
* Significantly different from applicants at 1% level
a.   Excludes transfer cases.

Table 6 separates wait-turn from priority cases. We emphasise this distinction because the latter are in greater need of housing because their housing (e.g. homeless) and other circumstances (e.g. victims of drug abuse) are more desperate. Getting onto the wait-turn list is simply a matter of meeting the income eligibility and residence rules. Wait-turn applicants are more likely to have stable housing while on the wait list than priority applicants, who comprise individuals who are victims of domestic violence, homeless and living in emergency housing while on the wait list. Hence, any post-entry improvements in employment outcomes observed among priority applicants are more likely attributable to the housing stability created by transition into public housing. Wait-turn applicants typically spend slightly over one year on the wait list while the average wait list period for priority applicants is nearly half that duration at, 7 months[12]. The former are then more prone to welfare traps than the latter, given the longer wait list times they have to serve[13]. Any post-entry improvements in employment outcomes observed among wait-turn applicants are more likely attributable to welfare traps.

Table 6 shows that regardless of priority level, tenants' employment outcomes are favourable than applicants' contemporaneous outcomes. The typical gain in employment outcomes following public housing entry appear to be similar across priority level. Overall wait-turn (priority) tenants' employment rate is 7 (6) percentage points higher than wait-turn (priority) applicants' employment rate. Overall differences between applicants and tenants are all statistically significant at the 1% level regardless of priority level.

Table 6: Employment rates of applicants and tenants, by priority level and year, per cent

	1999	2000	2001	2002	2003	2004	2005	All
Wait-turn								

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[11] Details available from authors on request.

[12] These are average wait times calculated from a sample of normal applicants who entered public housing within the data timeframe.

[13] have no discretion over when wait-turn applicants are offered accommodation – it is simply on a 'first-come, first-served' basis. Selection effects will not contaminate the housing and employment profile of wait-turn applicants.

	1999	2000	2001	2002	2003	2004	2005	All
Employment rate (%)								
Applicants	15.6	15.3	14.3	12.9	12.4	12.3	12.6	13.3
Tenants	18.4*	20.1*	18.8*	17.1*	19.9*	20.7*	22.5*	20.1*
Average weekly wage ($)								
Applicants	50.6	45.0	42.8	39.4	36.9	74.6	39.6	46.6
Tenants	59.9	70.1*	59.7*	53.5*	62.0*	66.5	79.9*	66.3*
Priority								
Employment rate (%)								
Applicants	11.3	8.9	7.3	7.2	6.5	6.8	6.4	7.3
Tenants	4.0*	14.4*	12.7*	12.7*	12.2*	12.0*	13.2*	12.6*
Average weekly wage ($)								
Applicants	32.1	25.1	19.6	18.1	16.7	20.4	19.6	20.2
Tenants	10.1[+]	42.7[+]	44.7*	42.1*	38.3*	34.8*	44.7*	40.3*

Source: Authors' calculations from DHW public housing data 1999-2005
* Significantly different from applicants of same priority level at 1% level
[+] Significantly different from applicants of same priority level at 5% level
a.   Excludes transfer cases.

Table 7 presents panel model estimates based on equation (2). The estimates indicate that entry into public housing has a positive and significant impact on employment outcomes for both males and females. For males, being in public housing increases employment probability by 11 percentage points relative to being on the wait list. For females, the increase in employment probability is smaller than for males, at 5 percentage points. The overall model is highly significant. Table 8 shows that the model's predictive accuracy is 83% for males and 87% for females. However, while the model is extremely accurate at predicting the percentage of individuals who are not employed, it is a poor predictor of the percentage of individuals who are employed.

Most socio-demographic variables have the expected signs. Some noteworthy observations are that males and females with a psychiatric disability are less likely to be employed than those with other disabilities. Interestingly, persons with an intellectual disability are more likely to be employed than persons with no disability, and this is significant. There are very small numbers in the cognitive and neurological disability categories. Hence, individuals suffering from a cognitive or neurological disability have been grouped together with those with unspecified disabilities (the 'other disability' group). The reference year variable category is the year 2005. The coefficients on the year variables indicate that for males, labour market conditions in 1999 and 2000 were better than in 2005. However, labour market conditions for males were poorer between 2001 and 2004. For females, labour market conditions between 2000 and 2001 were better than in 2005, and then flattened out. The treatment group variable is negative and significant, indicating that there are some unobservable differences between tenants and applicants that negatively impact the employment outcomes of tenants relative to applicants.

Next we attempt to unbundle the positive net impact of public housing into a welfare trap effect and a housing stability effect. As described previously, priority applicants are less likely to be subject to a welfare trap because they spend very short periods on the wait list. Hence any post-public housing entry employment gains can be attributed to housing stability effects. On the other hand wait-turn applicants spend comparatively longer periods on the wait list and are likely to have a stable address while waiting for a public housing property to become available Hence, the employment gains of wait-turn individuals are more likely

attributable to a welfare trap effect. Tables 9 and 10 present panel model estimates for wait-turn males and females only. Tables 11 and 12 present panel model estimates for working age priority males and females only.

Referring to table 9 on wait-turn individuals, we observe that for wait-turn males, being in public housing increases employment probability by 12 percentage points relative to being on the wait list. For wait-turn females, the increase in employment probability is smaller, at 5 percentage points. Referring to table 11 on priority individuals, we find that for priority males, being in public housing increases employment probability by 4 percentage points relative to being on the wait list. For priority females, the increase in employment probability is smaller at 2 percentage points. It appears from our findings that the welfare trap effect is greater than the housing stability effect; in the case of both wait-turn and priority cases, the effects are twice as strong for males than for females.

Table 7: Employment logit, all working age males and females[a]

Explanatory variables[b]	Males				Females			
	Coef.	Robust std. error	Sig.	Marg. effect	Coef.	Robust std. error	Sig.	Marg. effect
Treatment group	-0.237	0.043	0.000	-0.029	-0.167	0.035	0.000	-0.017
Difference-in-difference estimator	0.810	0.044	0.000	0.111	0.493	0.037	0.000	0.053
Year 1999	0.158	0.069	0.022	0.020	0.069	0.062	0.265	0.007
Year 2000	0.088	0.048	0.070	0.011	0.122	0.042	0.004	0.013
Year 2001	-0.039	0.043	0.360	-0.005	0.068	0.037	0.066	0.007
Year 2002	-0.188	0.042	0.000	-0.022	-0.045	0.036	0.216	-0.004
Year 2003	-0.163	0.041	0.000	-0.019	-0.002	0.035	0.963	0.000
Year 2004	-0.102	0.040	0.010	-0.012	-0.024	0.034	0.486	-0.002
Age	-0.024	0.006	0.000	-0.003	0.071	0.006	0.000	0.007
Age squared	0.000	0.000	0.612	0.000	-0.001	0.000	0.000	0.000
Partnered	0.724	0.031	0.000	0.101	-0.059	0.030	0.049	-0.006
Number of children aged 0-2	0.023	0.032	0.474	0.003	-0.876	0.033	0.000	-0.088
Number of children aged 3-4	0.015	0.039	0.696	0.002	-0.572	0.032	0.000	-0.058
Number of children aged 5-9	0.021	0.022	0.344	0.003	-0.218	0.018	0.000	-0.022
Number of children aged 10-14	0.118	0.023	0.000	0.014	-0.067	0.018	0.000	-0.007
Aboriginal	-0.142	0.032	0.000	-0.017	-0.318	0.030	0.000	-0.030
Physical disability	-0.585	0.068	0.000	-0.060	-0.570	0.066	0.000	-0.047
Intellectual disability	0.628	0.116	0.000	0.095	0.335	0.120	0.005	0.038
Psychiatric disability	-1.119	0.125	0.000	-0.094	-0.654	0.100	0.000	-0.052
Sensory disability	-0.010	0.169	0.952	-0.001	0.018	0.162	0.910	0.002
Other disabilities	-0.647	0.090	0.000	-0.064	-0.513	0.089	0.000	-0.043
Priority case	-0.515	0.050	0.000	-0.054	-0.481	0.043	0.000	-0.042
South Metro	-0.089	0.044	0.040	-0.011	0.100	0.035	0.004	0.010
South East Metro	0.103	0.039	0.009	0.013	0.083	0.034	0.015	0.009
Great Southern	0.741	0.068	0.000	0.115	0.433	0.061	0.000	0.051
South West	0.434	0.055	0.000	0.061	0.284	0.046	0.000	0.031
Goldfields	0.516	0.061	0.000	0.075	0.406	0.054	0.000	0.047
Midwest-Gascoyne	0.421	0.055	0.000	0.059	0.527	0.049	0.000	0.063
Pilbara	1.137	0.051	0.000	0.193	0.959	0.045	0.000	0.132
Kimberley	1.592	0.047	0.000	0.294	1.466	0.042	0.000	0.231
Wheatbelt	0.414	0.073	0.000	0.058	0.452	0.065	0.000	0.054
Constant	-1.331	0.122	0.000		-2.909	0.109	0.000	
Sample	51,567				81,829			
Wald Chi-sq(31)	3,962.12		0.000		3,341.70		0.000	
Log pseudo-likelihood	-21,226.342				-29,915.52			

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Explanatory variables[b]	Males				Females			
	Coef.	Robust std. error	Sig.	Marg. effect	Coef.	Robust std. error	Sig.	Marg. effect
Pesudo R-sq	0.099				0.060			

Source: Authors' calculations from DHW public housing data 1999-2005
Notes:
a.   Excludes transfer cases.
b.   Omitted year = 2005; Omitted region = North metro

Table 8: Employment logit classification table, all working age males and females

Observed	Predicted			%	Predicted			%
	Not employed	Employed	Total	correct	Not employed	Employed	Total	correct
Not employed	42,253	531	42,784	98.8	71,063	20	71,083	100.0
Employed	8,039	744	8,783	8.5	10,728	18	10,746	0.2
Total	50,292	1,275	51,567	83.4	81,791	38	81,829	86.9

Source: Authors' calculations from DHW public housing data 1999-2005

Table 9: Employment logit, all working age wait-turn males and females[a]

Explanatory variables[b]	Males				Females			
	Coef.	Robust std. error	Sig.	Marg. effect	Coef.	Robust std. error	Sig.	Marg. effect
Treatment group	-0.255	0.045	0.000	-0.031	-0.143	0.036	0.000	-0.015
Difference-in-difference estimator	0.811	0.047	0.000	0.115	0.457	0.039	0.000	0.053
Year 1999	0.174	0.071	0.014	0.023	0.072	0.064	0.267	0.008
Year 2000	0.099	0.050	0.050	0.013	0.118	0.044	0.008	0.013
Year 2001	-0.035	0.045	0.442	-0.004	0.076	0.039	0.051	0.008
Year 2002	-0.196	0.044	0.000	-0.023	-0.051	0.038	0.182	-0.005
Year 2003	-0.170	0.043	0.000	-0.020	-0.006	0.037	0.873	-0.001
Year 2004	-0.104	0.042	0.014	-0.013	-0.020	0.037	0.585	-0.002
Age	-0.024	0.007	0.000	-0.003	0.075	0.006	0.000	0.008
Age squared	0.000	0.000	0.584	0.000	-0.001	0.000	0.000	0.000
Partnered	0.741	0.032	0.000	0.106	-0.091	0.032	0.004	-0.009
Number of children aged 0-2	0.000	0.035	0.991	0.000	-0.895	0.036	0.000	-0.095
Number of children aged 3-4	0.015	0.041	0.710	0.002	-0.570	0.034	0.000	-0.061
Number of children aged 5-9	0.021	0.024	0.388	0.003	-0.236	0.019	0.000	-0.025
Number of children aged 10-14	0.117	0.024	0.000	0.015	-0.068	0.019	0.000	-0.007
Aboriginal	-0.122	0.035	0.000	-0.015	-0.297	0.033	0.000	-0.030
Physical disability	-0.620	0.073	0.000	-0.064	-0.596	0.072	0.000	-0.051
Intellectual disability	0.540	0.127	0.000	0.081	0.387	0.129	0.003	0.047
Psychiatric disability	-1.034	0.129	0.000	-0.091	-0.610	0.105	0.000	-0.052
Sensory disability	0.051	0.189	0.787	0.007	0.038	0.176	0.828	0.004
Other disabilities	-0.779	0.102	0.000	-0.075	-0.535	0.096	0.000	-0.047
South Metro	-0.074	0.046	0.104	-0.009	0.138	0.036	0.000	0.015
South East Metro	0.114	0.041	0.005	0.015	0.137	0.036	0.000	0.015
Great Southern	0.751	0.070	0.000	0.119	0.451	0.064	0.000	0.056
South West	0.404	0.057	0.000	0.057	0.301	0.048	0.000	0.035
Goldfields	0.537	0.064	0.000	0.079	0.396	0.057	0.000	0.048
Midwest-Gascoyne	0.405	0.057	0.000	0.057	0.533	0.052	0.000	0.068
Pilbara	1.121	0.055	0.000	0.193	0.962	0.049	0.000	0.139
Kimberley	1.593	0.050	0.000	0.297	1.453	0.045	0.000	0.237
Wheatbelt	0.455	0.076	0.000	0.066	0.508	0.067	0.000	0.064
Constant	-1.328	0.128	0.000		-2.980	0.114	0.000	
Sample	46,491				71,058			
Wald Chi-sq(30)	3,577.65		0.000		2,925.00		0.000	
Log pseudo-likelihood	-19,821.478				-26,852.21			
Pesudo R-sq	0.097				0.057			

Source: Authors' calculations from DHW public housing data 1999-2005
Notes:
a. Excludes transfer cases.
b. Omitted year = 2005; Omitted region = North metro

Table 10: Employment logit classification table, all working age wait-turn males and females

Observed	Predicted			%	Predicted			%
	Not employed	Employed	Total	correct	Not employed	Employed	Total	correct
Not employed	37,972	486	38,458	98.7	61,260	18	61,278	100.0
Employed	7,343	690	8,033	8.6	9,763	17	9,780	0.2
Total	45,315	1,176	46,491	83.2	71,023	35	71,058	86.2

Source: Authors' calculations from DHW public housing data 1999-2005

Table 11: Employment logit, all working age priority males and females[a]

Explanatory variables[b]	Males				Females			
	Coef.	Robust std. error	Sig.	Marg. effect	Coef.	Robust std. error	Sig.	Marg. effect
Treatment group	0.369	0.183	0.044	0.033	0.279	0.158	0.078	0.017
Difference-in-difference estimator	0.377	0.126	0.003	0.036	0.294	0.097	0.002	0.019
Year 1999	-0.273	0.313	0.383	-0.025	-0.089	0.250	0.722	-0.006
Year 2000	-0.173	0.186	0.353	-0.016	0.021	0.157	0.894	0.001
Year 2001	-0.204	0.153	0.183	-0.019	-0.181	0.136	0.182	-0.011
Year 2002	-0.188	0.140	0.180	-0.018	-0.094	0.117	0.419	-0.006
Year 2003	-0.188	0.133	0.158	-0.018	-0.047	0.108	0.663	-0.003
Year 2004	-0.148	0.125	0.238	-0.014	-0.114	0.103	0.270	-0.007
Age	-0.022	0.021	0.293	-0.002	0.039	0.019	0.038	0.003
Age squared	0.000	0.000	0.940	0.000	-0.001	0.000	0.009	0.000
Partnered	0.579	0.099	0.000	0.063	0.200	0.090	0.026	0.014
Number of children aged 0-2	0.241	0.090	0.007	0.024	-0.716	0.093	0.000	-0.048
Number of children aged 3-4	0.018	0.112	0.876	0.002	-0.603	0.101	0.000	-0.040
Number of children aged 5-9	0.043	0.062	0.494	0.004	-0.099	0.051	0.050	-0.007
Number of children aged 10-14	0.145	0.064	0.023	0.014	-0.062	0.048	0.199	-0.004
Aboriginal	-0.204	0.091	0.025	-0.020	-0.303	0.076	0.000	-0.020
Physical disability	-0.342	0.186	0.067	-0.031	-0.338	0.167	0.042	-0.020
Intellectual disability	1.259	0.312	0.000	0.193	0.173	0.339	0.610	0.012
Psychiatric disability	-2.010	0.499	0.000	-0.105	-0.980	0.324	0.002	-0.045
Sensory disability	-0.180	0.379	0.634	-0.017	-0.139	0.426	0.744	-0.009
Other disabilities	-0.020	0.197	0.919	-0.002	-0.337	0.229	0.141	-0.020
South Metro	-0.214	0.151	0.154	-0.020	-0.285	0.119	0.016	-0.018
South East Metro	0.040	0.138	0.772	0.004	-0.412	0.118	0.000	-0.025
Great Southern	0.696	0.262	0.008	0.089	0.225	0.213	0.289	0.016
South West	0.870	0.204	0.000	0.117	0.099	0.183	0.590	0.007
Goldfields	0.328	0.198	0.098	0.037	0.394	0.153	0.010	0.031
Midwest-Gascoyne	0.634	0.199	0.001	0.079	0.411	0.162	0.011	0.032
Pilbara	1.249	0.143	0.000	0.181	0.807	0.114	0.000	0.072
Kimberley	1.534	0.156	0.000	0.244	1.400	0.124	0.000	0.158
Wheatbelt	-0.518	0.383	0.176	-0.043	-0.496	0.333	0.137	-0.027
Constant	-1.947	0.413	0.000		-2.905	0.389	0.000	
Sample	5,076				10,771			
Wald Chi-sq(30)	445.13		0.000		411.35		0.000	
Log pseudo-likelihood	-1,868.560				-3,007.952			
Pesudo R-sq	0.121				0.075			

Source: Authors' calculations from DHW public housing data 1999-2005
Notes:
a. Excludes transfer cases.
b. Omitted year = 2005; Omitted region = North metro

Table 12: Employment logit classification table, all working age priority males and females

Observed	Predicted			%	Predicted			%
	Not employed	Employed	Total	correct	Not employed	Employed	Total	correct
Not employed	4,276	50	4,326	98.8	9,805	0	9,805	100.0
Employed	694	56	750	7.5	966	0	966	0.0
Total	4,970	106	5,076	85.3	10,771	0	10,771	91.0

Source: Authors' calculations from DHW public housing data 1999-2005

6. Conclusion and Future Research Directions

In this paper we have examined the impact of public housing assistance on employment outcomes using the 1999-2005 public housing administrative data from the Western Australia Department of Housing and Works. It is often difficult to accurately measure the impact of public housing on employment because public housing is correlated with unobservable factors that may discourage employment. This study circumvents the issue of endogeneity by using a quasi-experimental approach in which individuals who entered public housing within the data timeframe form a treatment group that can be compared to a control group consisting of public housing applicants who did not enter public housing within the timeframe. An important condition for our analysis is that the selection variable assigning people between the treatment and control groups should be unrelated to the outcome variable. In our case the selection variable is the eligibility tests for public housing that are based on income and asset levels. An assumption here is that the rationing feature in public housing programmes ensures that both public housing tenants and applicants are likely to share the same characteristics because both must satisfy income and asset eligibility rules as well as reside in rental or rent-free housing when applying for entry onto wait lists. We find that transition into public housing has a positive net impact on employment outcomes. The difference-in-difference estimator shows that transition into public housing increases employment probability by 5 percentage points for females. For males, the increase is twice as high at 11 percentage points.

The positive impact of public housing assistance can be attributable to a welfare trap effect and/or a housing stability effect. The welfare trap argument states that because of the rationing of public housing stock, individuals depress their labour supply while on the public housing wait list in order to maintain eligibility for public housing. The housing stability hypothesis states that the employment outcomes of individuals improve once they have been allocated a public housing property because they have a secure address from which they can conduct their job search. These questions are important from a policy perspective. The welfare trap argument suggests that eligibility criteria should be relaxed once an applicant has been accepted onto wait lists, or public housing opportunities should be expanded so that wait times are reduced and welfare traps eroded. If it is due to positive virtues of public housing then we have to be cautious about the application of fixed term tenures that might threaten stability of tenants' housing circumstances. Overall, we find the welfare trap effect to be stronger than the housing stability effect.

We have identified two drawbacks to our approach. First, individuals who have not yet entered public housing are only reviewed at the date of entry onto the wait list and the date of entry into public housing. We are unable to observe their profile in the same way as tenants who are subject to annual reviews. The gap in the income review dates poses a problem for our analysis in that we have to assume that there is no change in employment status between the two review dates. If applicants were to undertake employment while on the wait list and then quit employment when a property becomes available, this would be a stronger indication that a welfare trap problem exists. We intend to circumvent this issue in the future by exploiting the sample of transfer applicants in the data. Transfer applicants are individuals already living in public housing, who have applied to transfer to another public housing property. The use of transfer applicants has two distinct advantages. First, because transfer applicants are already living in public housing, they are subject to annual income reviews and we are able to observe their income annually while they are on the transfer wait list, as opposed to normal applicants who are only reviewed at entry onto the wait list and entry into

public housing. Second, because transfer applicants are already living in public housing, they have a secure address from which they can conduct job search. Housing instability is minimised because of their public housing status. We will therefore able to control for the housing stability effect and measure the extent of the welfare trap problem by examining the employment behaviour of transfer applicants.

A second weakness in the present analysis is that it does not take into account attrition bias. Once an individual drops off the wait list or exits public housing, s/he also drops out of the data. This is a potential source of attrition bias and will be addressed in future analyses.

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