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How Long People Are Homeless?

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# **A Journey Home: What Drives How Long People Are Homeless?\***

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## **Abstract**

This paper uses survival analysis to model exits over time from two alternative notions of homelessness. We are unique in being able to account for time-invariant, unobserved heterogeneity. We find that duration dependence has an inverted U-shape with exit rates initially increasing (indicating positive duration dependence) and then falling. Like previous researchers, we find results consistent with negative duration dependence in models which ignore unobserved heterogeneity. Exit rates out of homelessness fall with age and with the education level of mothers. Women are more likely than men to exit homelessness when it is broadly conceived, but appear to be less likely to exit when it is narrowly defined. Finally, higher paternal education and exemptions from welfare-related activity requirements due to either mental or physical health conditions are all associated with higher exit rates.

**JEL classification:** I3, R2, C4

**Keywords:** Homelessness, housing insecurity, survival analysis, duration dependence

## 1. Introduction

International law has recognized adequate housing as a basic human right for nearly three generations.<sup>1</sup> Despite this, homelessness remains a pressing issue in even the most wealthy of nations. In the United States, for example, over 600,000 people are homeless on any given day (Henry et al. 2013), while over 100,000 Australians are estimated to have been homeless on census night 2011 (ABS 2012). These estimates of the point-in-time incidence of homelessness dramatically understate the number of people who will ever be affected by homelessness at some point in their lives (Toro et al. 2007; Lee et al. 2010). For some, the homeless experience may be brief. For others, a night on the streets may mark the beginning of a lengthy period of housing insecurity which undermines both economic and social well-being. Unfortunately, efforts to understand how long people are likely to remain without adequate housing have been limited by a lack of large-scale, panel data that follow people as they enter and exit homelessness over time (Rossi 1991; Philippot et al. 2007; Frankish et al. 2009). This has left researchers studying what is a dynamic process from a very static perspective.

Homelessness stems from an unfortunate combination of personal disadvantage (e.g. poor health, family breakdown, unemployment, drug addiction, etc.), structural factors (e.g. weak social safety nets, high rents, limited public housing, etc.), and bad luck (see for example O’Flaherty 2004, 2009a and 2009b; Curtis et al. 2011; Gould & Williams 2013; Shelton et al. 2009). The length of time that people spend homeless will therefore depend on their own personal circumstances. In addition, homelessness itself may alter people’s preferences, endowments, or behavior in ways that make them either more or less likely to find adequate housing the longer they are homeless. Negative duration dependence – often

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<sup>1</sup> Specifically, adequate housing was recognized as a component of the right to an adequate standard of living in both the 1948 Universal Declaration of Human Rights and the 1966 International Covenant on Economic, Social and Cultural Rights (UN 2009).

referred to as scarring – occurs if people become less likely to leave homelessness the longer they remain homeless. Scarring may arise if homelessness directly reduces people’s human capital (e.g. physical or mental health, non-cognitive skills, physical appearance, access to credit, etc.) making it more difficult to access adequate housing or if the homeless acclimate to street life and form social networks which reduce the incentives to accept other housing options (Snow & Anderson 1987; Simons et al. 1989). On the other hand, positive duration dependence can occur if people devote more effort to or receive more public assistance in finding housing the longer they are homeless. Either way, duration dependence can have an important impact on the time people spend without adequate housing.

Previous studies of homelessness tend to be small scale, focus on particular locations and/or demographic groups (Hall & Freeman 1989), and take a narrow view of homelessness by relying on samples of shelter users (Allgood et al. 1997; Culhane & Kuhn 1998; Shinn et al. 1998). As a result, the literature tells us much more about the characteristics associated with being homeless than about the amount of time people will remain without adequate housing.<sup>2</sup> Unfortunately, data constraints – and the inherent econometric difficulties in achieving identification – imply that those studies that do examine the dynamics of homelessness have been unable to shed light on the effect of any duration dependence (Allgood & Warren 2003; Culhane & Kuhn 1998; Piliavin et al. 1993; 1996).<sup>3</sup>

Our goal is to fill a void in the literature by analyzing factors driving the length of time people spend homeless. Our estimation relies on data from the Journey’s Home Project which follows nearly 1700 Australians experiencing housing insecurity as they enter into and

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<sup>2</sup> See also O’Flaherty (2012) who models the effect of housing policy on entry and exit into homelessness.

<sup>3</sup> For example, Allgood and Warren (2003) analyze data from the National Survey of Homelessness Assistance Providers and Clients (NSHAPC) and conclude that homeless spell length varies with individuals’ characteristics and previous behavior. Their findings, however, must be tempered by the fact that the NSHAPC data are cross-sectional, almost always right-censored (i.e. durations cannot be determined), and collected from clients of homeless-assistance programs who may be not fully representative of the U.S. homeless population. Most importantly, the authors’ inability to control for unobserved heterogeneity implies that it is not possible for them to estimate the effect of duration dependence on homeless durations.

exit homelessness. These data are ideally suited to studying the dynamics of homelessness because they are nationally-representative, longitudinal, and extremely detailed. Importantly, we use survival analysis to model the hazard of exiting homelessness over time, accounting for a range of time-invariant characteristics, both observed and unobserved.

We make two valuable contributions. First, identifying the effects of duration dependence is empirically very demanding. While there is U.S. evidence that those with longer durations are less likely to exit homelessness (e.g. Allgood & Warren 2003; Culhane & Kuhn 1998), it is unclear whether this stems from duration dependence per se or from selection (i.e. heterogeneity) in those unobserved characteristics that predispose some people to longer durations. Our detailed data and estimation strategy allow us to analyze the factors that drive the length of time people spend homeless while accounting for both unobserved heterogeneity and duration dependence. This is critical in shedding light on the development of policies to reduce the amount of time people spend without adequate housing. If there is negative duration dependence (i.e. scarring), then rapid-rehousing initiatives which move the homeless into housing as quickly as possible are needed. If it is individuals' personal characteristics and housing backgrounds that largely determine how long people remain homeless, then policy makers should strive to identify those susceptible to long periods of homelessness and target them for intensive intervention.

Second, it seems clear that the factors driving homeless durations will fundamentally depend on the notion of "homelessness" we have in mind. In particular, the costs and benefits of exiting homelessness are closely tied to whether we mean "leaving the streets" or "leaving a friend's couch for a home of one's own". Homelessness may be more scarring if one is sleeping on the streets than if one is sleeping in a boarding house, in a caravan, or with friends. At the same time, housing assistance is not universal, but rather is targeted towards individuals and families with the most immediate housing needs, i.e. those on the streets. For

both these reasons, the direction and extent of duration dependence is likely to depend on how we define homelessness. Unlike previous researchers, we are able to exploit the richness of our data to consider both broad (i.e. without a home of one's own) and narrow (i.e. living on the streets) notions of what it means to be homeless. Thus, we are the first to provide empirical evidence on the role of alternative notions of inadequate housing in shaping homelessness durations.

We find that duration dependence has an inverted U-shape with exit rates initially increasing (indicating positive duration dependence) and then falling. Like previous researchers, however, we find results consistent with negative duration dependence in models which ignore unobserved heterogeneity. Moreover, the length of time people spend homeless depends in part on their personal circumstances. Exit rates out of homelessness fall with age and with the education level of mothers. Women are more likely than men to exit homelessness when it is broadly conceived, but appear to be less likely to exit when it is narrowly defined. Finally, higher paternal education and exemptions from welfare-related activity requirements due to either mental or physical health conditions are all associated with higher exit rates.

This paper proceeds as follows. In Section 2 we describe the institutional context shaping homelessness in Australia. The details of the Journey's Home data, our estimation sample, and the parameterizations of homelessness are described in Section 3. Our estimation strategy is outlined in Section 4. Results are presented in Section 5, while our conclusions and suggestions for future research can be found in Section 6.

## **2. The Institutional Context**

There is no single, universally-accepted definition of what it means to be homeless. Instead working definitions of homelessness are often crafted from political considerations, rules

adopted by statistical agencies, statutory regulations designed to allocate public resources, or the data constraints faced by researchers. All are highly contested and subject to considerable debate (see Watson 1984; Chamberlain & Mackenzie 1992; Argeriou et al. 1995; Culhane & Hornburg 1997; Jacobs et al. 1999; Toro 2007). The lack of a shared understanding of homelessness has rendered comparative research across countries virtually impossible (Fitzpatrick & Christian 2006). In the United States, researchers tend to adopt a narrow definition that considers only those who are ‘literally homeless’ (Toro 2007). Correspondingly, U.S. national statistics count as homeless only those on the streets (sleeping rough), using emergency shelters, or in transitional housing programs (Henry et al. 2013). In Europe, on the other hand, a much broader notion of homelessness has emerged with the recent development of the European Typology on Homelessness and Housing Exclusion (ETHOS). The ETHOS definition also counts as homeless people in precarious or inadequate housing. Many European countries are now in the process of adjusting or refining their national definitions of homelessness to fit more closely with the ETHOS definition (Busch-Geertsema 2010). Importantly, the conceptualization of homelessness has shifted over time with the recognition that the issue of inadequate housing is no longer confined solely to derelict single men, but is a broader social problem facing women, young people, and families (Lee et al. 2010).

Australian policymakers and researchers have largely coalesced around a cultural definition of homelessness in which shared community standards set the bar for the minimum accommodation that people should expect to achieve (Chamberlain 1999; Chamberlain & Mackenzie 1992; 2003; 2008). This results in the following people being defined as homeless: (i) people without conventional accommodation (e.g. living on the streets, in squats, etc.); (ii) people staying temporarily with other households (because they have no usual address); (iii) people in emergency accommodation (e.g. refugees, shelters etc.); and



(iv) people in boarding houses. It is this definition that was used in enumerating the homeless population in Australia in 1999, 2001 and 2006.

Australia's welfare system is characterized by the universal provision of cash benefits to those most in need, with low, and essentially flat-rate, entitlement levels (Whiteford 2010). The Commonwealth government provides cash assistance to low-income renters in the private rental market, while state and territory governments provide non-cash assistance in the form of public housing and targeted homelessness services.<sup>4</sup> Public housing is in relatively limited supply and although those currently experiencing homelessness are prioritized, there are frequently long waiting lists (AIHW 2013). Targeted homelessness services provide a range of support including general assistance, accommodation (usually short-term), assistance in maintaining a tenancy or preventing mortgage foreclosure, and other specialized services (AIHW 2013). Service providers are typically non-government organizations funded by the government. Finally, unlike in the United States, veteran homelessness is not a pressing issue.<sup>5</sup>

These institutional arrangements make Australia a particularly interesting case study for shedding light on the dynamics of homelessness. First, the universality of the Australian welfare system and the government's emphasis on reaching out to those in need appear to have resulted in the vast majority of homeless Australians receiving welfare payments from the Commonwealth government. For example, 82 percent of clients requesting some form of targeted homelessness service in the December quarter of 2011 had a Commonwealth pension or allowance as a source of income (AIHW 2012). This implies that – unlike the case in the United States where welfare is a state responsibility – Australia offers the opportunity to study homelessness using a nationally-representative sample of both homeless and at-risk

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<sup>4</sup> Although responsibility for the provision of these services falls to the states and territories, they are jointly funded by the Commonwealth government through a range of Commonwealth-state funding agreements.

<sup>5</sup> The Department of Veterans Affairs estimates that 200-300 veterans are at-risk of homelessness at any point in time (personal correspondence with the Department).

individuals. Second, Australia's preference for a broad, cultural notion of homelessness is an important counterbalance to the narrow perspective adopted in the United States and allows us to understand how the drivers of homeless durations vary with its intensity. Finally, our understanding of homelessness to-date has been based almost exclusively on U.S. evidence. Australian data provide an important opportunity to amass new evidence on the dynamics of housing insecurity in a developed country with a generous social safety net.<sup>6</sup>

### **3. The data**

Our analysis relies on unique data from a new study of homelessness known as *Journeys Home: A Longitudinal Study of the Factors Affecting Housing Stability*. Previous panel studies have focused on specific locations or on relatively narrow groups of homeless individuals, i.e. those accessing shelters or those living on the streets (see Wong & Piliavin 1997; Allgood et al. 1997; Culhane & Kuhn 1998). In contrast, Journey's Home is not restricted to those who are currently homeless, but instead follows a representative sample of individuals experiencing housing insecurity more broadly. Importantly, respondents' survey information can be linked to their administrative social assistance records providing accurate information about their welfare histories. The survey data also provide information about respondents' demographic, human capital, and family background characteristics; housing circumstances; mental and physical health; employment outcomes; family relationships; and prior experiences of homelessness. Together, these data provide a unique opportunity to study the dynamics of housing insecurity.

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<sup>6</sup> In addition to a well-targeted welfare system, Australia also provides universal access to basic health care, a relatively regulated labor market with high minimum wages, generous cash payments to families with dependent children and (despite the above) a relatively small government sector relative to other OECD countries.

### ***3.1 Journey's Home Sample Design***

In Australia, all social benefits are administered at the national level through one central agency known as Centrelink (see Section 2).<sup>7</sup> It is the administrative data held by Centrelink which provide the sampling frame for Journey's Home Project.<sup>8</sup> In Australia, virtually all at-risk individuals across the range of precarious housing situations, e.g. couch surfing, public housing, shelters, boarding houses, living on the streets, etc. receive some form of social assistance. Thus, the Journey's Home sampling frame results in a much broader representation of the homeless population than do previous studies.

Because the vast majority of individuals captured in the administrative data are not at any real risk of homelessness, it is necessary to identify a more targeted population to be sampled (see Wooden et al. 2012). Fortunately, since 2010 Centrelink staff have been using a set of protocols to identify – and flag – customers that they determine to be either ‘homeless’ or ‘at risk of homelessness’.<sup>9</sup> Random samples of both groups were selected for interview. In addition, because these protocols were designed to target service delivery – not identify the homeless population – a third group of individuals was identified for interview based on their probability of being flagged as homeless. Although not flagged as currently homeless, this group nevertheless has characteristics similar to homeless individuals thus constituting a group that is, at least in a statistical sense, vulnerable to homelessness.

These protocols resulted in a total population of 139,801 individuals being identified as being (i) homeless, (ii) at-risk of homelessness, or (iii) vulnerable to homelessness. From this population, a stratified random sample of 2,992 individuals across 36 distinct locations

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<sup>7</sup> Veterans' benefits are the exception, which are administered by the Department of Veterans' Affairs. However as noted earlier the number of at-risk veterans is quite low in Australia.

<sup>8</sup> In particular, the Centrelink data include the administrative records for the universe of Australians receiving any form of social assistance since July 1, 2002. See Wooden et al. (2012) for more details.

<sup>9</sup> The combination of these two categories give a population of homeless people that roughly accords with the cultural definition of homelessness described earlier. Note that in the 2011 Census, in addition to those considered culturally homeless, the Australian Bureau of Statistics also considers persons in severely overcrowded dwellings as homeless. Thus the Journeys Home population vulnerable to homelessness is not comparable to that of the 2011 Census.

was selected for interview. Of this group, 273 were subsequently determined to be out of scope – mostly because they had moved out of the designated survey interview area prior to fieldwork commencing – leaving an effective sample of 2,719. Almost 62 percent of this group (n=1,682) agreed to participate in a wave 1 interview which was conducted between September and November 2011. This response rate not only compares favorably with other studies that sample from seriously disadvantaged populations (O’Callaghan 1996; Randall & Brown 1996; Weitzman et al. 1990), but it is also in line with panel surveys of the general population, including the Household Income and Labour Dynamics in Australia survey, the German Socio-economic Panel study, and the British Understanding Society Survey, which have wave 1 response rates of 61, 66 and 57 per cent (Watson & Wooden 2014).

Our data come from the first five waves of Journey’s Home data. Respondents are interviewed in person whenever possible, with telephone interviews conducted in situations in which face-to-face interviews were not feasible.<sup>10</sup> Fully, 91 (wave 2), 88 (wave 3), 86 (wave 4) and 85 percent (wave 5) of wave 1 respondents were successfully re-interviewed. These re-interview rates are extremely high, especially when we take account of the relatively high rates of mobility, mortality and imprisonment in this population.

A particular advantage of the Journey Home data is the ability to link to respondents’ administrative welfare histories. Over 98 percent of respondents consented to this data linkage. This enables us to gather accurate information not only on welfare histories but also on each individual’s personal circumstances (e.g. medical conditions, accommodation type and incarceration, etc.) while on welfare.

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<sup>10</sup> This mainly occurs when a respondent moves well outside of our 36 study locations.

### ***3.2 Parameterizing Homelessness***

We first consider a broad, cultural definition of homelessness in which community standards set the bar for adequate housing. Specifically, individuals are considered to be housed only when they live in their own home (or that of relatives) either as renters or as owners. The following groups are therefore all considered to be homeless under this broad, cultural definition: persons staying with friends; persons living in caravans, cabins, mobile homes, boarding or rooming houses, hostels, hotels or motels; or persons squatting in abandoned buildings, living in emergency or crisis accommodation, or sleeping rough (on the streets).<sup>11</sup> We then examine a narrow, more literal definition of homelessness that counts as homeless only those who are sleeping rough (on the streets), squatting or staying in emergency or crisis accommodation. The ability to consider alternative notions of homelessness is fundamental to gaining a deeper understanding of the dynamics of homelessness.

Journey's Home respondents provide detailed information about their housing situation at each interview. In addition, the questionnaire includes an accommodation calendar that is designed to capture all changes in housing status since their previous interview. Specifically, respondents are asked about the timing of all of their moves into and out of particular types of accommodation in 10-day blocks. These data therefore allow us to create indicators of individuals' detailed housing status in 10-day increments and then construct homeless spells according to our alternative definition of homelessness.

### ***3.3 Sample Selection***

In total, 1,275 episodes of cultural (broad) homelessness and 481 spells of literal (narrow) homelessness are observed during the study period (waves 1 to 5). Unfortunately, it is not possible to construct spell lengths for the spells that were already underway at wave 1, i.e. for

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<sup>11</sup> Those who were in a health institution or a jail were considered as homeless (housed) if they were homeless (housed) prior entering those institutions.

437 cultural and 87 literal spells. This left-censoring problem potentially results in a sample selection problem in that shorter spells are more likely to be included in the sample. This is a common problem in many duration studies and it has no straightforward solution. The potential selection bias decreases the larger is the observation window and the shorter is the duration of the processes being studied. In our case, we have an observation window of two years while the median duration of homelessness is four months using the cultural definition and two months using the narrow definition (see below). For this reason, left-censoring should not result in a substantial bias in our analysis.

We must also exclude 113 (cultural) and 64 (literal) spells of homelessness due to missing data for one or more of our variables of interest. Our estimation sample therefore consists of 530 (cultural) and 235 (literal) homeless individuals experiencing 725 episodes of cultural homelessness and 330 episodes of literal homelessness. Of these, 222 spells (31 percent) cultural and 59 literal (18 percent) homeless spells are right censored.<sup>12</sup>

### ***3.4 The Duration of Homeless Spells***

Figures 1 and 2 illustrate the dynamic nature of homeless spells by depicting the empirical hazard rates (i.e. the proportion of people exiting homelessness after a given length of time for those who have not yet exited) and survival rates (i.e. the proportion of individuals who remain homeless after a given length of time has passed) for our two types of homelessness.<sup>13</sup>

Figure 1 demonstrates that hazard rates for both cultural and literal homeless spells are generally declining with duration, although there is more variation around the trend line in the case of literal homelessness. We note that the hazard of exiting homelessness is on

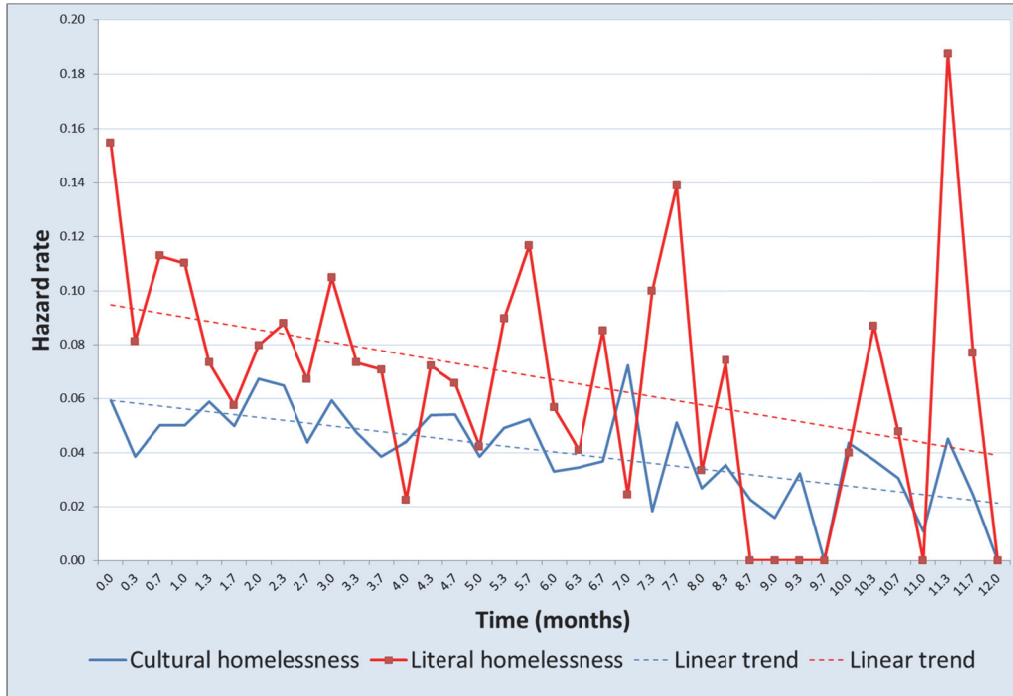
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<sup>12</sup> We censor spells at 12 and 22 months when using the literal and cultural definitions respectively. Beyond these durations, the sample size is too small to make any valid inference.

<sup>13</sup> Empirical (non-smoothed) hazard rates are presented in Figure 1. Kaplan-Meier survival rates are presented in Figure 2.

average substantially higher for the literal homeless than for those experiencing cultural homelessness.

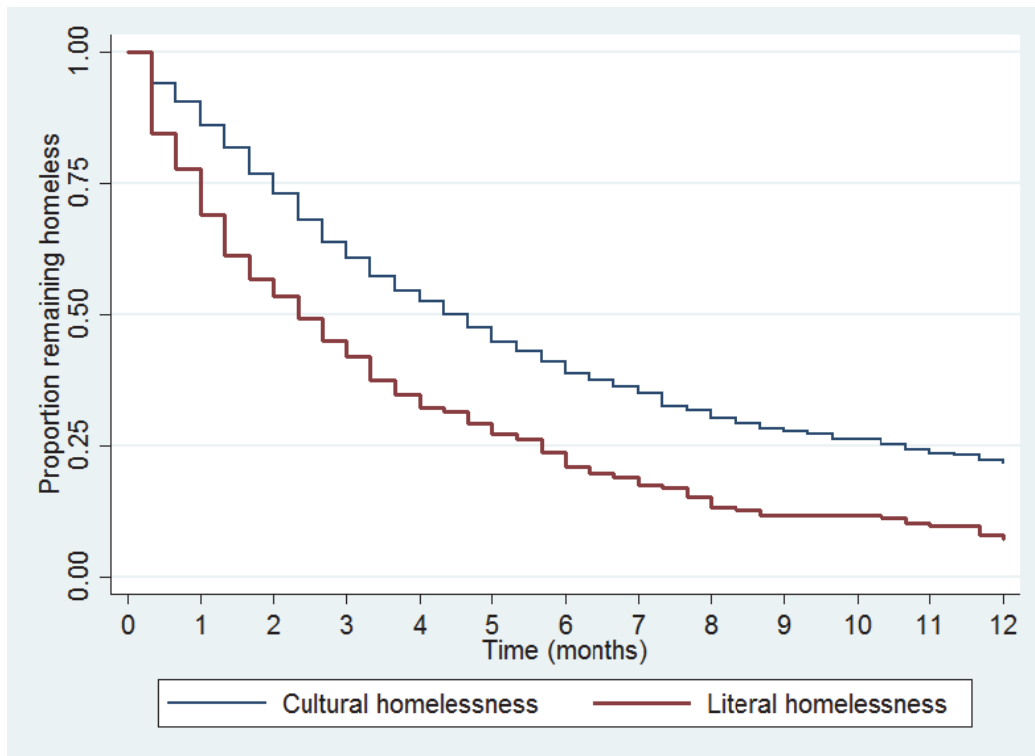
**Figure 1 Empirical Hazard Rates: Cultural and Literal Homelessness**



Source: Journeys Home data.

Note: The time unit is 1/3<sup>rd</sup> of a month, or approximately 10 days.

**Figure 2 Empirical Survival Functions: Cultural and Literal Homelessness**



Source: Journeys Home data.

Note: The time unit is 1/3<sup>rd</sup> of a month, or approximately 10 days.

This pattern translates to a disparity in survival rates at three months of over 20 percentage points (see Figure 2). Although the gap in survival rates becomes slightly smaller as durations increase, it remains substantial at 12 months. Thus, the median duration of cultural homelessness is approximately four months, while the median spell of literal homelessness is around two months. In comparison, the median shelter homeless spell in New York City and Philadelphia is under a month (Culhane & Kuhn 1998; O’Flaherty 2012). Less than ten percent of literal homeless spells last more than 12 month while about 20 percent of cultural homeless spells are longer than 12 months.

#### **4. Estimation Strategy**

We begin with a conceptual framework in which both entry into and exit out of homelessness are driven by individuals’ personal circumstances, the institutional arrangements governing local housing markets, access to social assistance, etc., and luck (Honig & Filer 1993; O’Flaherty 2004; Curtis et al. 2011; Gould & Williams 2013 and others). This implies that the length of time individuals spend homeless will depend in part on the human capital and family background characteristics that drive their costs and benefits of exiting homelessness. Disparity in support services across time or geographic locations imply that – conditional on ones circumstances – it may be easier to exit homelessness in some areas or in certain periods than in others. Moreover, homelessness itself may over time alter people’s preferences, endowments, or behavior. This implies that the likelihood of finding adequate housing given someone’s personal circumstances may depend on the length of time that he or she has been homeless. Finally, finding adequate housing may also involve a degree of luck which we will model as estimation error.



## 4.2 Estimation Model

Our approach is to estimate a hazard model of the transition from homeless to housed accounting for the effects of individual circumstances and duration dependence on the length of homeless spells.<sup>14</sup> As our data identify individuals' housing status in 10-day periods (see Section 4.2), we estimate the discrete-time hazard rate,  $h(t)_{ij}$ , that individual  $i$  exits homeless spell  $j$  between times  $t$  and  $t + 1$ :

$$h(t)_{ij} = \text{prob}(T_{ij} = t \mid T_{ij} \geq t) \quad (1)$$

where  $T_{ij}$  is the duration of spell  $j$ . Given our conceptual framework, we assume that  $h(t)_{ij}$  depends on both the length of the homeless spell  $j$  at time  $t$  and a vector of (pre-determined) observable individual characteristics  $X_{ij}$ . Adopting the commonly-used logistic specification of the hazard function, we obtain:

$$h(t)_{ij} = \frac{\exp(\gamma f(t) + \beta X_{ij} + v_i)}{1 + \exp(\gamma f(t) + \beta X_{ij} + v_i)} \quad (2)$$

where  $f(t)$  is a function of time  $t$  to be specified. Our preferred specification adopts a piecewise-constant functional form for  $f(t)$  which is particularly flexible and approaches a non-parametric representation of the baseline hazard (as in a continuous-time Cox model) as the number of constants increases (Jenkins 1995). However, we also estimate and test alternative functional forms for  $f(t)$  including polynomial, spline and log formulations. Finally,  $v_i$  is a time-invariant individual random effect capturing the unobserved characteristics of individual  $i$ , while  $\gamma$  and  $\beta$  are parameters to be estimated.

It is not possible to make accurate statements about duration dependence without accounting for the effects of unobserved heterogeneity. In particular, disparity in individuals' unobserved propensities to leave homelessness may lead to a systematic bias (either upward

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<sup>14</sup> See Lancaster (1990) for a discussion of duration models.

or downward) in the estimated effect of duration and thus can give the illusion of duration dependence even when it is not present (see Lancaster 1990; Van den Berg 2001).<sup>15</sup> We therefore follow others in the literature and use a random effects specification to avoid confounding estimated duration dependence with unobserved heterogeneity. These random effects are assumed to be independent of the control variables and normally distributed with zero mean and variance  $\sigma_v^2$ .

Note that the assumptions underpinning our model – while standard – are not completely innocuous. Fortunately, assuming that the unobserved heterogeneity distribution is normal when it is not is unlikely to result in biased estimates of either the covariates or duration dependence (Nicoletti & Rondinelli 2010). Still, the identification of unobserved heterogeneity and duration dependence in single-spell duration models can be challenging (Wooldridge 2002, pg. 705). In our case, the inclusion of only time-invariant, pre-determined covariates allows us to avoid the additional hurdles associated with the identification of time-varying covariates (Wooldridge 2002, pg. 713). Moreover, more than a third of our data consists of multiple spells of homelessness. Although this is insufficient to account for unobserved heterogeneity using a fixed effects approach, van den Berg (2001) argues that identification is less reliant on the random-effects independence assumption when the data are multi-spelled.<sup>16</sup>

### ***4.3 Control Variables***

In selecting covariates, we were largely guided by the previous literature examining homelessness risk factors. An additional concern is that the structure of the Journey's Home

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<sup>15</sup> See Cameron and Trevedi (2005 pg. 611) for a nice discussion of the implications of unobserved heterogeneity for duration modelling.

<sup>16</sup> Multi-spell duration models are also robust with respect to the functional-form specification of the distribution of unobserved heterogeneity (Nielsen et al. 1992; Guo & Rodriguez 1992; Gönül & Srinivasan 1993; Bonnal et al. Sérandon 1997).

data precludes the inclusion of time-varying controls with the exception of variables (e.g. age) that evolve deterministically. Consequently, we consider a set of controls that are pre-determined before the start of the current homeless spell.

Previous evidence suggests that the amount of time individuals spend homeless is related to their demographic characteristics. Consequently all of our estimation models include the respondents' age at the beginning of their homeless spell as well as indicators for gender and ethnicity, i.e. Aboriginal or Torres Strait Islanders (ATSI); non-English speaking background (NESB) immigrants; and English-speaking background (ESB) immigrants. We also account for individuals' highest educational qualification and employment history, i.e. the proportion of time spent in paid work since first leaving full-time education, at the beginning of their homeless spell.

As the cost and benefits of exiting homelessness are likely to be different for first and subsequent spells of homelessness, we include an indicator of whether or not the current spell is the respondent's first homeless spell. We also include an indicator of whether or not the respondent has ever slept rough before when estimating the determinants of cultural homelessness. We account for mental illness by including an indicator of whether or not respondents were diagnosed with schizophrenia prior to the current spell.<sup>17</sup> Drug use is controlled for by including an indicator of whether or not respondents had used illicit drugs prior to the current spell. We include an indicator of whether or not respondents had been incarcerated prior to the current spell as well as an indicator for sexual abuse during childhood. Finally, we include indicators for whether or not the respondent lived in major urban area, a non-major urban area or a non-urban area.

While there is a large literature on the intergenerational transmission of poverty and disadvantage (see d'Addio 2007 for a review), there is no direct evidence of an

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<sup>17</sup> Other milder mental health conditions such as depression or post-traumatic stress disorder were found to have no significant relationship with homelessness duration.

intergenerational link in homelessness specifically. Still, it seems reasonable to expect that homelessness is more entrenched for those growing up in particularly vulnerable families with parents who themselves may have histories of mental illness, substance abuse and/or having been incarcerated. To account for this, we therefore also control for respondents' family background including (i) whether they had any principal caregivers at age 14 and (ii) parental socio-economic status (i.e. parents/caregivers employment status at age 14; parents/caregivers highest education level).<sup>18</sup>

Data obtained from individuals' administrative welfare records was used to construct three additional indicators of: (i) whether or not the respondent was in receipt of welfare in the month preceding the current spell of homelessness; (ii) the type of accommodation the respondent was living in prior to the current homeless spell; <sup>19</sup> and (iii) whether or not the respondent had an exemption from work or job search for either mental or physical health conditions in the 12 months preceding the homeless spell. Descriptive statistics on all of these variables are presented in Appendix Table A1.

## 5. Results

### 5.1 Duration Dependence

Our interest is in understanding the dynamics of homelessness. Consequently, we begin by estimating the hazard model given in equation (2) accounting for a highly flexible specification of duration dependence through what is essentially a non-parametric baseline hazard function. Specifically, we begin by modeling cultural homeless duration,  $f(t)$ , with dummies for each 10-day block for durations less than 9 months and then a dummy for durations between 10 and 12 months. For literal homelessness, we use dummies for each 10-

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<sup>18</sup> In preliminary analysis, parents' mental health and incarceration histories were not significantly related to homelessness duration. These variables have not been included in our preferred specifications.

<sup>19</sup> Accommodation type is based on the type of rent being paid according to respondents' Centrelink records.

day block for durations less than 8 months. Beyond these respective durations, we fit a constant baseline hazard to the small number of remaining observations. These (mean) baseline hazard rates are depicted in Figure 3.

Figure 3 suggests that the probability of exiting cultural homelessness is lower – but more stable – than is the case for literal homelessness. Moreover, there is no clear evidence of either positive or negative duration dependence in baseline hazard rates over the first 12 months. Hazard rates appear to increase initially and although they do fall subsequently, the number of observations at these very long durations is small and – in the case of literal homelessness – the probability of exiting homelessness remains at least as high as at much shorter durations. These patterns – which take into account both observed and unobserved heterogeneity – are consistent with empirical hazard rates which do not exhibit any specific duration dependence pattern (see Figure 1).

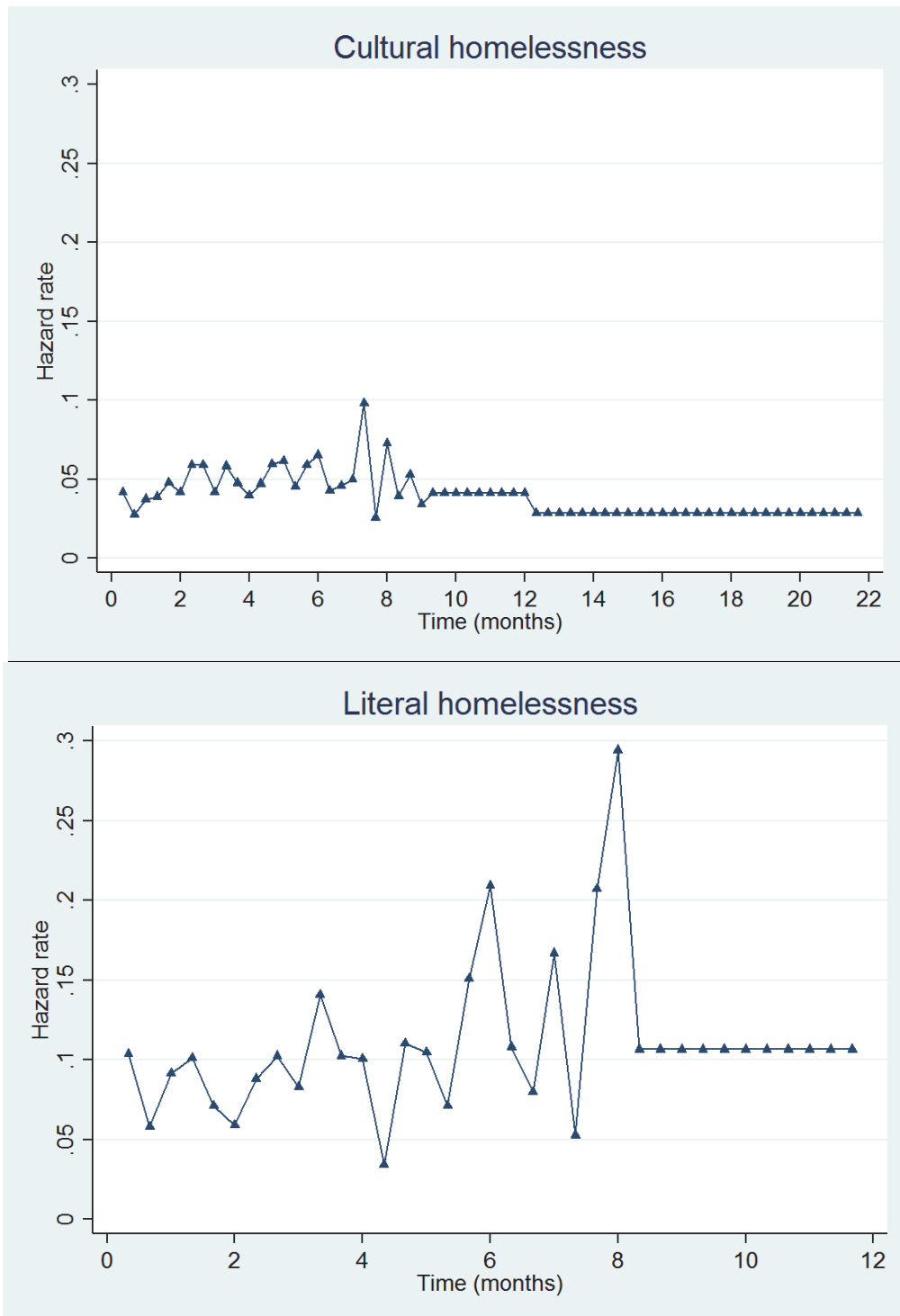
We next conduct a series of likelihood-ratio tests in order to identify the most appropriate specification of the baseline hazard. These tests resulted in the adoption of a piecewise-constant baseline hazard with five segments for literal homelessness and six segments for cultural homelessness.<sup>20</sup> The marginal effect of each of these durations on exit rates is presented in Table 1.<sup>21</sup> Importantly, we present results from models with and without random effects to illustrate the impact of accounting for individual heterogeneity.

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<sup>20</sup> In the case of literal homelessness, none of the duration dummies are statistically significant when we control for unobserved heterogeneity irrespective of the specification of the baseline hazard indicating that a simple constant is always the preferred specification for the baseline hazard. However, to facilitate comparison between alternative notions of homelessness, we fit the same piecewise-constant baseline hazard for literal homelessness as for cultural homelessness.

<sup>21</sup> Marginal effects are computed as the average change, over the entire sample, in the predicted exit rate associated with a one unit increase in the corresponding variable. These calculations are based on estimates which account for random effects. In practice, we use 500 draws from the estimated coefficients and the variance-covariance matrix, together with 25 draws of the random error term.

**Figure 3 Estimated Baseline Hazard Functions: Cultural and Literal Homelessness<sup>a</sup>**



Note: a.  $f(t)$  captured for cultural homelessness with dummies for each 10-day block for durations less than 9 months, a dummy for durations between 10 and 12 months and then another dummy for durations longer than a year. For literal homelessness, the model includes dummies for each 10-day block for durations less than 8 months and then a dummy for durations between 9 and 12 months. In the estimation of these baseline hazard functions, we control for individual risk factors and unobserved heterogeneity.

**Table 1 Duration Dependence in Cultural and Literal Homelessness - (Average Marginal Effects on Exit Rates in Percentage Points)<sup>a</sup>**

Homelessness definition	Random effect	Elapsed spell duration					Duration dummies' joint-significance
		2 to 3 months	4 to 6 months	7 to 9 months	10 to 12 months	More than 1 year	
<b>Cultural Homelessness</b>	<b>NO</b>	0.79	0.48	-0.40	-1.60 *	-2.94 ***	***
	<b>YES</b>	1.36 *	1.86 *	1.50	0.21	-1.21	**
<b>Literal Homelessness</b>	<b>NO</b>	-2.58 *	-2.12	-2.16	-4.48		
	<b>YES</b>	-0.21	3.12	5.71	3.58		

Notes: a) Marginal effects are computed as the average change, over the entire sample, in the predicted exit rate associated with a one unit increase in the corresponding variable, holding all other variables fixed. These estimates are based on logistic discrete-time hazard model controlling for individual risk factors. The coefficient estimates of the model with random effects are presented in Appendix Table A2 and the coefficients of the model without random effects are available upon request from the authors. The reference category reflects durations of less than 2 months. Estimates presented also control for individual risk factors.

\* denotes significance at the 10% level, \*\* significance at the 5% level, and \*\*\* significance at the 1% level.

Our results highlight the importance of accounting for unobserved heterogeneity when drawing inferences about the potential scarring effects of homelessness. When unobserved individual heterogeneity is ignored, there appears to be negative duration dependence in homelessness. Specifically, exit rates out of cultural homelessness are significantly lower for spells that last 10-12 months (1.6 percentage points) or more than one year (2.9 percentage points) than for spells lasting less than two months.

The results are also consistent with negative duration dependence in literal homelessness when unobserved heterogeneity is ignored. Specifically, exit rates out of literal homelessness decline by 2.6 percentage points at durations exceeding two months and fall roughly by a further two percentage points once the duration reaches 10 months or more.

This decline in hazard rates over time however is almost completely explained by unobserved individual heterogeneity. Once we account for individual unobserved heterogeneity, there is evidence of positive duration dependence for short to medium term spells of cultural homelessness.

Overall, duration dependence in homelessness appears to have an inverted U-shape. Exit rates out of cultural homelessness initially increase, reaching a peak at four to six months, then fall again at longer durations. The overall magnitude of the differences are

small, however, and only statistically significant in relation to the upward sloping section of the baseline hazard. In contrast, while exits out of literal homelessness have a steeper inverted U-shape, the peak occurs later – at seven to nine months. These effects are imprecisely estimated, however, possibly due to small sample sizes.<sup>22</sup> In neither case is there evidence of negative duration dependence, i.e. scarring, in the first nine months of homelessness once we account for unobserved heterogeneity. Once durations exceed nine months, exit rates out of homelessness start to decline, though this reversal is not statistically significant perhaps as a result of the small number of spells, particularly literal spells, lasting beyond nine months.

These patterns are consistent with a world in which homeless individuals initially require a bit of time to search for and find suitable accommodation. In particular, although there are no clear duration-based eligibility requirements for homeless services in Australia, assistance is unlikely to be immediate. It takes time to contact and receive assistance from government, service agencies, churches, etc. Over time, as homeless individuals become successful in getting assistance, finding low-cost accommodation, and getting back on their feet their chances of leaving homelessness increase. However, those who are unlucky enough to not find accommodation within those first few months of becoming homeless may eventually find it harder and harder to find adequate housing.

Taken together, our findings underscore the importance of accounting for unobserved heterogeneity in driving the length of time people will remain homeless. Unfortunately, previous estimates of the scarring effects of homelessness have confounded duration dependence with unobserved heterogeneity (Allgood & Warren 2003; Cullhane & Kuhn 1998). Like these studies, we also find evidence consistent with negative duration dependence in homelessness when we do not account for unobserved heterogeneity. However, when unobserved heterogeneity is taken into account, we find no evidence of

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<sup>22</sup> Goodman et al. (2014) find evidence of rising exit rates over much longer durations, i.e. up to 500 days.



negative duration dependence for literal homelessness and some evidence of positive duration dependence within the initial stages of cultural homelessness.

## ***5.2 Individual Risk Factors***

We turn now to consider how individual risk factors influence the length of time individuals are likely to spend without adequate housing. These risk factors are important in highlighting the groups to target for intervention and in shedding light on the heterogeneity within the homeless population in the costs and benefits of exiting homelessness. In particular, the marginal effects of changes in individuals' personal and background characteristics on both the hazard rate and the expected duration of homelessness are presented in Table 2.<sup>23</sup> The corresponding coefficient estimates can be found in Appendix Table A2.

Several important observations can be made about the results reported in Table 2. In particular, the individual risk factors we examine are better at explaining literal homelessness than they are at explaining cultural homelessness. In fact, few of the variables included in our preferred model of cultural homelessness are statistically significant. In contrast, these factors are more likely to be statistically significant and qualitatively important when we focus instead on the more severe problem of literal homelessness. We now discuss the individual drivers in more detail.

There is disparity in the amount of time men and women can expect to spend homeless which depends on the nature of homelessness we are considering. While women have shorter durations of cultural homelessness than do men, they have longer spells of literal homelessness.

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<sup>23</sup> Following Katz and Meyer (1990), marginal effects on expected duration are computed as a cumulative sum with the convergence speed depending on the size of the predicted hazard rates. Given the relatively high predicted hazard rates, an extrapolation out to two years was found appropriate to compute the marginal effects on expected duration.

**Table 2 Average Marginal Effects & Risk Factors on Exit from Homelessness and Median Duration: Cultural and Literal Homelessness<sup>a</sup>**

	Cultural homelessness		Literal homelessness	
	Exit rate (in ppt)	Exp. median duration (in months)	Exit rate (in ppt)	Exp. median duration (in months)
<i>Demographic Characteristics<sup>b</sup></i>				
Age at start of spell (divided by 10)	-1.11 ***	1.87	-3.42 ***	1.02
Female	2.31 ***	-3.13	-3.60	0.91
Aboriginal or Torres Strait Islander	-0.48	0.74	-1.30	0.34
Migrant from ESB	0.27	-0.37	4.26	-0.81
Migrant from NESB	3.18	-2.95	5.72	-1.01
<i>Personal Background<sup>b</sup></i>				
Education (ref. is Less than Year 12)				
Year 12	0.78	-1.10	5.55	-1.09
Tertiary vocational education	0.25	-0.38	-1.85	0.57
Tertiary university education	3.15 *	-3.24	3.92	-0.84
Unknown	3.34	-3.36	8.23	-1.44
Proportion of time in paid work since completing education (0-100)	0.01	-0.02	0.10 **	-0.02
Missing employment history	-0.73	1.15	2.47	-0.50
First time homeless	-0.14	0.20	0.01	0.00
Never slept rough before current spell	-0.45	0.65		
Schizophrenia before current spell	-0.19	0.27	-4.81	1.51
Had used illicit drugs before current spell	1.22	-1.94	0.30	-0.07
Refused questions on health or drugs	-1.26	2.12	-4.20	1.27
Incarcerated before current spell (self-reported)	0.36	-0.50	0.05	-0.01
Victim of child sexual abuse (ref. is NO)				
Yes	-1.28 **	1.91	0.42	-0.11
Opted out or refused question	-0.93	1.31	7.63 *	-1.34
Region (ref. is major urban)				
Other urban area	0.39	-0.52	5.94	-1.15
Non-urban area	-0.73	1.17	5.51	-1.09
<i>Family Background<sup>b</sup></i>				
Had no principal caregivers at 14	-1.02	1.65	4.04	-0.80
Both principal caregivers in paid employment at 14	-0.85	1.27	-0.89	0.21
Education level of primary male carer (ref. is secondary school but less than Year 10)				
Unknown or not applicable	-1.32	1.77	0.47	-0.16
Primary or no schooling	0.25	-0.26	0.68	-0.23
Year 11 or 12	-1.47	2.01	11.35 **	-2.15
Tertiary education	-0.60	0.71	9.21 **	-1.91
Education level of primary female carer (ref. is secondary school but less than Year 10)				
Unknown or not applicable	-0.99	1.24	-1.44	0.23
Primary or no schooling	-2.08 *	3.16	-9.97 **	3.03
Year 11 or 12	-0.98	1.24	-9.58 ***	2.80
Tertiary education	-2.35 ***	3.74	-10.57 ***	3.42
<i>Welfare and medical history<sup>c</sup></i>				
Not on welfare in the month prior to the current spell	0.52	-0.69	3.94	-0.75
Rent type before current spell (ref. is Private or Government)				
Boarding or other	0.20	-0.26	-7.69 ***	2.00
No rent	-0.35	0.50	-5.15 *	1.10
Not in rent table	-1.41	2.43	6.39	-0.76

	Cultural homelessness		Literal homelessness	
	Exit rate (in ppt)	Exp. median duration (in months)	Exit rate (in ppt)	Exp. median duration (in months)
Medical exemption in the 12 months before current spell (ref. is no exemption)				
Physical condition	1.14 *	-1.68	3.87	-1.09
Mental condition	0.99	-1.50	5.34 *	-1.39
Mean hazard rate and median expected duration	4.91	6.95	15.26	2.99

Notes: a) Marginal effects are computed as the average change, over the entire sample, in the predicted exit rate and expected duration associated with a one unit increase in the corresponding variable, holding all other variables fixed. These estimates are based on a logistic discrete-time hazard model with duration dummies and random effects. The full set of underlying coefficients is presented in Appendix Table A2 and the marginal effects associated with the duration dummies are presented in Table 1; b) Self-reported characteristics from the survey; c) Characteristics generated from administrative data. \* denotes significance at the 10% level, \*\* significance at the 5% level, and \*\*\* significance at the 1% level.

In particular, the exit rate for women out of cultural homelessness is 2.3 percentage points higher than for men, which translates into 3.1 fewer months without adequate housing. In contrast, women spend 0.9 months longer than men in homelessness when we use the literal definition, although this latter effect is imprecisely estimated and not statistically significant. This gender gap is due to the fact that women are more likely to enter crisis accommodation – which is characterized by longer stays – rather than sleeping rough (i.e. on the streets). Men, on the other hand, are more likely to be sleeping rough.

Interestingly U.S. studies of homelessness, many of which are based on shelter populations, often find that the duration of homelessness is significantly longer for men than for women (Piliavin et al. 1993; Culhane and Kuhn 1998; Allgood and Warren 2003), but that women are more likely to return to homelessness (Piliavin et al. 1996).

As expected, exit rates from homelessness, particularly literal homelessness, decline with age. The marginal age effects presented in Table 2 are the average effect of a one-year increase in age on the hazard rate evaluated at each individual’s own age (holding all other characteristics constant).<sup>24</sup> Exit rates decline, on average, by 0.11 and 0.34 percentage point

<sup>24</sup> A linear coefficient on age was found to provide a better fit than a quadratic function.

with additional year of age for the cultural and literal homeless respectively. Hence, the older homeless have the longest expected durations of both cultural and literal homelessness.

Consistent with U.S. studies that do not find race (Allgood & Warren 2003) or citizenship effects (Culhane & Kuhn 1998), we find no evidence that homelessness lasts longer for immigrants or for Aboriginal or Torres Strait Islanders than for other Australians. In fact, immigrants appear to have shorter spells of homelessness, although the effects are not statistically significant. Interestingly, previous experience with homelessness is also not associated with either lower exit rates (e.g. due to deeper disadvantage or more extensive acclimation to street life) or higher exit rates (e.g. as a result of better information about housing services).

Higher education levels, and more specifically a university degree, is associated with higher exit rates out of cultural homeless. As found by Allgood & Warren (2003) however, there is no evidence of a statistically significant association between education and the duration of literal homelessness, although we note that the corresponding marginal effects are sizeable. Previous work experience, captured here as the proportion of time in paid employment since first completing full-time education, is associated with shorter spells of literal homelessness. Each additional percentage point in the proportion of time in paid work increases the exit rate by 0.1 percentage point.

Previous research indicates that the chronic homeless are more likely than others to have severe mental illnesses, be heavy drinkers, and to use illicit substances (e.g. Phelan & Link 1999; Johnson et al. 2008; Johnson & Chamberlain 2011; see Allgood & Warren 2003 for a review). However, we find very little evidence that pre-existing (i.e. before onset of current homeless spell) mental illness, alcohol consumption, and illicit substance use is associated with the length of the current spell of homelessness. For those diagnosed with schizophrenia before entering homelessness the effect on literal homelessness is quite large,

being associated with a 4.8 percentage point lower probability of exiting, however this is not statistically significant. In addition, those refusing to answer the relevant health and substance use questions – whom one might expect to have the most acute health or drug problems – may be more at risk of experiencing longer periods of homelessness. Again, however this effect is not statistically significant for either cultural or literal homelessness, even though it is quite large in magnitude for the latter.

We find no significant association between self-reports of previous incarceration and homelessness duration.<sup>25</sup> Those who reported having been a victim of child sexual abuse experience longer spells of cultural homelessness, whereas there is no significant association with literal homelessness. Additionally, we can only speculate why the approximately one in ten individuals who refuse to answer questions about childhood sexual abuse appear to exit literal homelessness faster. These individuals may have had particularly traumatic experiences in childhood and, if true, it is puzzling that this leads to shorter spells of homelessness, a pattern also found in the raw data.

Location appears to be linked to the duration of literal homeless. Individuals located in major urban areas prior to the current spell experience longer spells of homelessness than those located in non-major urban areas or in non-urban areas. Although these marginal effects are large in magnitude, with an increase in the median expected duration by more than one month, they are not statistically significant.

Family background, in particular parental education, is also linked to the length of time that individuals spend without adequate housing, but in ways that are complicated and difficult to interpret. First, paternal education is related only to a narrow definition of literal homelessness and not to the broader notion of homelessness that our cultural definition

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<sup>25</sup> We also find no significant effects when we instead use an indicator of incarceration in the previous 12 months using administrative social security data.

implies. This is interesting because it implies that individuals' ability to exit cultural homelessness is not strongly related to their family's socio-economic status. Second, having a well-educated father is associated with leaving the streets or crisis accommodation quicker, while having a well-educated mother is associated with remaining in literal homelessness, and to a lesser extent in cultural homelessness, longer. These findings are robust to the inclusions of interactions between the father's and mother's education. Finally, there is no evidence that how long one remains homeless is related to whether or not an individual had principle caregivers at age 14 or had two working caregivers at age 14. Taken together, these results provide no evidence that homeless spells are shorter for individuals from more advantaged backgrounds.

Finally, one of the strengths of the Journey's Home data is the ability to use administrative welfare records to account for heterogeneity in personal circumstances (i.e. welfare receipt, housing situation, and medical conditions) prior to the start of the current homeless spell. Those experiencing more intensive disadvantage may find it more difficult to return to adequate housing after becoming homeless. We find that individuals living in boarding houses rather than in private rental or public housing before becoming homeless have much lower (7.7 percentage points) exit rates out of literal homelessness.<sup>26</sup> The receipt of welfare shortly before the start of a homeless spell does not appear to be related to the duration of that spell. On the other hand, those with medical exemptions from the work or job search requirements linked to welfare receipt have exit rates that are significantly higher. Specifically, a physical condition is associated with a reduction in the expected duration of cultural homelessness of 1.7 months. Exemptions due to mental health conditions are associated with a reduction in the duration of literal homelessness by 1.4 months. These individuals may have more pressing health conditions that potentially make exiting

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<sup>26</sup> The number of people who were in public housing prior to their current homeless spell is very small.

homelessness more challenging. On the other hand, they may also routinely come into contact with – and be given priority in – the service system as a result of their existing contact with Australia’s public health system.

## **6. Conclusions**

Homelessness is a visible reminder of the extreme social and economic disparity that often exists within even the most affluent of modern societies. For many, homelessness is not a permanent state, but rather is characterized by a series of episodes. Unfortunately, the static nature of much of what we know about this dynamic – perhaps largely stochastic – process has been a barrier to addressing the issue of inadequate housing. Knowing even the most fundamental facts about the homeless population requires that we understand not only who becomes homeless, but also how long they are likely to remain there. Point-in-time snap shots provide a biased view of the size, stability and composition of the homeless population (Phelan & Link 1999) and the factors which lead people to become homeless may have little to do with the length of their homeless spell (Goodman, Messeri & O’Flaherty 2014). In short, appropriate policy responses depend on a deeper understanding of the ways that people move into and out of homelessness.

This paper uses unique data from the Journey’s Home Project to estimate the probability (hazard) of exiting homelessness. Unlike previous researchers, we distinguish between different types of homelessness and we control for unobserved selectivity in exit rates, taking both a broad (i.e. without a home of one’s own) and a narrow (i.e. living on the streets) perspective on what it means to be homeless. Like others, we too find that exit rates are consistent with homelessness having scarring effects – i.e. exhibiting negative duration dependence – when we ignore unobserved individual-specific heterogeneity. Controlling for unobserved heterogeneity, however, we find that the duration dependence patterns crucially

depend on the type of homelessness. Although we find that the pattern of duration dependence has an inverted U-shape, with exit rates initially increasing and then falling, for both types of homelessness, this is only statistically significant for cultural homelessness. Thus for cultural homelessness we find evidence of significant positive duration dependence in the initial stages of cultural homelessness, with exit rates then falling for longer durations. Moreover, the length of time people spend homeless depends in part on their personal circumstances. Increased age and higher maternal education are associated with slower exits and increased durations. Women are more likely than men to leave homelessness when broadly defined by acquiring homes of their own, however, they also appear to remain in crisis accommodation or on the streets longer than do men. Finally, exit rates are higher for those with highly-educated fathers and for those with exemptions from welfare-related activity requirements due to either mental or physical health conditions.

These results lead to a number of important conclusions. First, it is clear to us that understanding the true nature of duration dependence in homelessness requires that we carefully account for both observed – and unobserved – heterogeneity. Any apparent scarring effects of longer periods of homelessness disappear once we control for selectivity in the speed with which individuals find adequate housing. At its most basic level, this argues for the development of interventions that target those whose characteristics, personal circumstances, and family backgrounds make them susceptible to long periods of homelessness (see Early 2005). O’Flaherty (2009a) contends, however, that luck (i.e. stochastic error) plays such a large role in housing dynamics that identifying those predisposed to long-term homelessness is like “picking stocks”. Indeed, our results indicate that there is a great deal of randomness associated with leaving homelessness, particularly when it is broadly defined. Very little predicts the duration of cultural homelessness and, while our model is better at predicting literal homeless spell length, many of the individual



risk factors commonly associated with an increased probability of becoming homeless (e.g. schizophrenia, illicit drug use, being Indigenous, incarceration, etc.) (Nooe & Patterson 2010) are completely unrelated to the length of time people are likely to remain on the streets.

Second, the inverted U-shaped nature of duration dependence is striking. Exit rates out of homelessness initially rise and then fall again. This pattern is consistent with O’Flaherty’s (2012) theoretical model in which the relative value that homeless households place on being housed evolves over time and there is a fixed cost associated with leaving homelessness. Given these circumstances, O’Flaherty’s model predicts that the baseline hazard function will be concave with a single maximum. Importantly, this inverted U-shape is not the result of selectivity into homelessness (all homeless individuals are assumed to be the same) nor is it the result of any specific assumption on the direction of duration dependence (indeed it can be either positive or negative). Thus, the common wisdom that exit rates fall continuously with increased spell length due to a combination of selectivity and scarring effects appears to be overly simplistic. We need to begin to consider the dynamics of homelessness in more complex ways.

Finally, our results demonstrate the importance of analyzing housing dynamics in settings other than the United States. The median spell of sleeping rough or living in crisis accommodation (two months) in our data is similar to the estimated median spell length in U.S. homeless shelters (O’Flaherty 2012) suggesting that, amongst the most disadvantaged, experiences of homelessness may not be all that dissimilar in Australia and the United States. At the same time, the Australian context also sheds light on a broader, culturally-based notion of homelessness giving us the opportunity to develop a richer understanding of housing dynamics. The role of specific risk factors (e.g. gender) or luck in driving the length of time people spend homeless both depend on whether we take a broad or a narrow perspective on what it means to lack adequate housing. Moreover, the fact that those who have received

medical exemptions from welfare-related work or job search requirements – and who are likely to be more disadvantaged – have significantly higher exit rates suggests to us that Australia’s public health and welfare systems play a supporting role in moving individuals out of homelessness. Thus, the institutional context matters making it important to investigate housing dynamics across a number of different settings.

Despite these conclusions, there remains a great deal that we do not fully understand about the way that people fall into and climb out of homelessness. In particular, we need to know more about the consequences homelessness has, for example on physical and mental health, social networks, etc., and how these consequences evolve the longer individuals are homeless. We also need to know more about repeated spells of homelessness and whether the speed with which they exit – and the type of home they exit to – affect the probability of subsequently falling back into homelessness.

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**Appendix Table A1 Descriptive Statistics: Means and Median Durations of Individual Risk Factors**

	<b>Cultural homelessness</b>		<b>Literal homelessness</b>	
	Sample mean	Median duration	Sample mean	Median duration
<i>Demographic Characteristics<sup>a</sup></i>				
Age at start of spell				
20 or under	0.301	3.7	0.182	2.0
21 to 30	0.308	4.3	0.197	2.4
31 to 40	0.204	2.7	0.309	1.3
41 to 50	0.137	5.9	0.206	3.0
51 or above	0.051	10.7	0.106	3.0
Male	0.554	4.7	0.642	2.0
Female	0.446	3.4	0.358	2.6
Aboriginal or Torres Strait Islander	0.166	5.3	0.209	3.0
Migrant from ESB	0.047	3.7	0.061	1.0
Migrant from NESB	0.036	2.6	0.039	2.6
<i>Personal Background<sup>a</sup></i>				
Education				
Less than Year 12	0.619	4.4	0.548	2.4
Year 12	0.098	3.0	0.121	1.9
Tertiary vocational education	0.190	4.0	0.194	1.6
Tertiary university education	0.072	2.6	0.094	2.3
Unknown	0.021	2.3	0.042	1.0
Proportion of time in paid work since completing education				
Less than a third of the time	0.455	4.3	0.448	2.4
Between a third and two thirds	0.324	4.3	0.330	2.3
More than two thirds	0.203	3.7	0.200	1.3
Missing employment history	0.018	5.3	0.021	2.2
First time homeless	0.052	4.0	0.097	2.3
Never slept rough before current spell	0.299	4.0	0.170	2.7
Schizophrenia before current spell	0.073	4.3	0.097	3.0
Had used illicit drugs before current spell	0.790	3.7	0.782	1.7
Incarcerated before current spell	0.287	4.9	0.406	2.0
Refused questions on health or drugs	0.091	8.4	0.091	4.3
Victim of child sexual abuse				
No	0.615	4.0	0.573	2.3
Yes	0.280	4.3	0.318	2.0
Opted out or refused question	0.105	4.9	0.109	1.3
Region				
Major Urban	0.712	4.0	0.788	2.3
Other Urban	0.214	4.3	0.152	1.1
Other	0.074	7.0	0.061	2.0
<i>Family Background<sup>a</sup></i>				
Had no principal caregivers at 14	0.081	5.7	0.139	1.3
Both principal caregivers in paid employment at 14	0.295	4.7	0.291	3.0
Education level of primary male carer				
Unknown or not applicable	0.434	4.4	0.448	2.6
Primary or no schooling	0.051	3.4	0.061	3.0
Secondary school but less than Year 10	0.226	3.4	0.200	2.3
Year 11 or 12	0.142	4.3	0.136	1.4
Tertiary education	0.146	4.9	0.155	2.3

	Cultural homelessness		Literal homelessness	
	Sample mean	Median duration	Sample mean	Median duration
<b>Education level of primary female carer</b>				
Unknown or not applicable	0.337	4.6	0.345	1.7
Primary or no schooling	0.057	5.7	0.085	5.7
Secondary school but less than Year 10	0.324	3.4	0.321	1.3
Year 11 or 12	0.190	4.7	0.152	3.0
Tertiary education	0.092	5.4	0.097	3.6
<i>Welfare and medical history<sup>b</sup></i>				
Not on welfare in the month prior to the current spell	0.076	4.0	0.048	1.3
<b>Rent type before current spell</b>				
Private or Government	0.393	4.0	0.382	2.0
Boarding or other	0.269	4.3	0.300	3.0
No rent	0.302	4.4	0.276	1.7
Not in rent tables	0.036	4.9	0.042	1.3
<b>Medical exemption in the 12 months before current spell</b>				
Physical condition	0.388	3.9	0.370	2.3
Mental condition	0.281	4.3	0.358	1.9
No exemption	0.331	4.3	0.273	2.3
<i>Number of spells</i>	725	4.3	330	2.3
<i>Number of right-censored spells</i>		222		59
<i>Number of individuals</i>		530		235

Source: Journeys Home data

Notes: a) Self-reported characteristics from the survey; b) Characteristics generated from administrative data.

### Appendix Table A2 Coefficient Estimates from a Hazard Model of Homelessness Duration

	Cultural homelessness		Literal homelessness	
	Coef.	S.E.	Coef.	S.E.
<b>Elapsed spell duration (reference = &lt;2 months)</b>				
2 to 3 months	0.268*	(0.141)	-0.022	(0.195)
4 to 6 months	0.353**	(0.179)	0.299	(0.278)
7 to 9 months	0.293	(0.239)	0.515	(0.390)
10 to 12 months	0.046	(0.302)	0.339	(0.522)
More than 1 year	-0.348	(0.347)		
<i>Demographic Characteristics<sup>b</sup></i>				
Age at start of spell (divided by 10)	-0.277***	(0.070)	-0.334***	(0.108)
Female	0.505***	(0.139)	-0.329	(0.233)
Aboriginal or Torres Strait Islander	-0.113	(0.166)	-0.120	(0.247)
Migrant from ESB	0.059	(0.285)	0.347	(0.433)
Migrant from NESB	0.562*	(0.320)	0.454	(0.527)
<i>Personal Background<sup>b</sup></i>				
<b>Education (ref. is Less than Year 12)</b>				
Year 12	0.173	(0.198)	0.456	(0.304)
Tertiary vocational education	0.058	(0.160)	-0.181	(0.270)
Tertiary university education	0.588**	(0.231)	0.333	(0.354)
Unknown	0.617	(0.413)	0.645	(0.555)
Proportion of time in paid work since completing education (0-100)	0.003	(0.002)	0.009**	(0.004)
Missing employment history	-0.174	(0.439)	0.208	(0.690)
First time homeless	-0.031	(0.272)	0.001	(0.314)
Never slept rough before current spell	-0.101	(0.137)		
Schizophrenia before current spell	-0.043	(0.229)	-0.477	(0.336)
Had used illicit drugs before current spell	0.293	(0.189)	0.027	(0.330)



	Cultural homelessness		Literal homelessness	
	Coef.	S.E.	Coef.	S.E.
Refused questions on health or drugs	-0.314	(0.271)	-0.411	(0.431)
Incarcerated before current spell (self-reported)	0.079	(0.144)	0.005	(0.206)
Victim of child sexual abuse (ref. is NO)				
Yes	-0.295**	(0.144)	0.039	(0.228)
Opted out or refused question	-0.206	(0.198)	0.606**	(0.308)
Region (ref. is major urban)				
Other urban area	0.083	(0.141)	0.489*	(0.280)
Non-urban area	-0.176	(0.235)	0.457	(0.404)
<i>Family Background<sup>b</sup></i>				
Had no principal caregivers at 14	-0.247	(0.218)	0.336	(0.291)
Both principal caregivers in paid employment at 14	-0.196	(0.134)	-0.080	(0.220)
Education level of primary male carer (ref. is secondary school but less than Year 10)				
Unknown or not applicable	-0.286*	(0.163)	0.048	(0.272)
Primary or no schooling	0.047	(0.313)	0.069	(0.456)
Year 11 or 12	-0.322	(0.196)	0.915***	(0.352)
Tertiary education	-0.120	(0.204)	0.770**	(0.347)
Education level of primary female carer (ref. is secondary school but less than Year 10)				
Unknown or not applicable	-0.206	(0.157)	-0.110	(0.261)
Primary or no schooling	-0.488	(0.311)	-0.956**	(0.408)
Year 11 or 12	-0.205	(0.165)	-0.906***	(0.314)
Tertiary education	-0.567**	(0.228)	-1.037***	(0.388)
<i>Welfare and medical history<sup>c</sup></i>				
Not on welfare in the month prior to the current spell	0.111	(0.227)	0.324	(0.426)
Rent type before current spell (ref. is Private or Government)				
Boarding or other	0.042	(0.137)	-0.699***	(0.218)
No rent	-0.078	(0.141)	-0.437*	(0.236)
Not in rent table	-0.358	(0.314)	0.439	(0.473)
Medical exemption in the 12 months before current spell (ref. is no exemption)				
Physical condition	0.260*	(0.140)	0.369	(0.253)
Mental condition	0.230	(0.161)	0.491*	(0.257)
Constant	-2.666***	(0.342)	-1.595***	(0.569)
Sample size	11,444		3,193	
Log-likelihood	-1,988.84		-872.41	
Sigma ( $\sigma_v$ )	0.600	(0.147)	0.749	(0.188)
Rho	0.099	(0.044)	0.146	(0.062)
Likelihood-ratio test of rho=0 and p-value	6.43	0.006	8.29	0.002
<i>Number of spells</i>	725		330	
<i>Number of right-censored spells</i>	222		59	
<i>Number of individuals</i>	530		235	

Notes: a) Self-reported characteristics from the survey; b) Characteristics generated from administrative data.  
\* denotes significance at the 10% level, \*\* significance at the 5% level, and \*\*\* significance at the 1% level.