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Order and Timing of Home Ownership and Fertility Decisions in Australia

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Abstract: *The birth of a child and transition into home ownership are markers of progression along a life course. Research shows that pathways to home ownership have become more diverse and deviate from the traditional pathway which was characterised by marriage followed by the birth of a child before entering home ownership. This study investigates the timing and order of the two interrelated events of birth of a child and the transition to home ownership in Australia. Using the Household, Income and Labour Dynamics in Australia panel survey, we apply a multi-process event history analysis for describing the timing of each event following the formation of a cohabiting relationship. The results suggest that the likelihood of birth increases with prior home ownership attainment but as time passes following the purchase of a home, the likelihood of birth decreases, similarly, the likelihood of home ownership attainment decreased with time following birth.*

Keywords: event history analysis; multi-process; life course; home ownership; fertility.

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Introduction

Family events and housing outcomes are interconnected processes as every family that plans for children is required to seek appropriate housing to meet their needs. This relationship has been consistently identified in the international literature, where the transition to home ownership has been found to be linked with events that take place early in the life course, in particular, family formation and birth of the first and consecutive child (Feijten & Mulder, 2002; Kulu & Milewski, 2007; Mulder, 2006). However, close occurrence of these life events may have a significant negative impact on housing affordability, stress and other family outcomes (Beer and Faulkner 2009; Berry et al. 2009). Researchers have speculated that there is a time and order for life events, which, if not followed, can lead to negative outcomes later on in life (George 1993; Harley & Mortimer 2000; Hogan & Astone 1986).

In recent decades Australia has experienced significant changes in the transition to home ownership and family formation. The generations of Australians who entered adulthood in the second half of the twentieth century experienced a standard housing tenure pathway that was more clearly defined than it is today. Young adults would typically leave the family home to marry and await the birth of their first child while residing in a rental home before entering home ownership. However, for later generations who entered adulthood closer to the turn of the twenty-first century, the standard life course pathway was challenged by the concept of 'choice', which led to the loosening of traditions and a more diverse range of lifestyles. Many of these changes were associated with changing life course patterns with individuals spending more time in further education, delaying entry into the labour force, entering unions that may or may not result in marriage and choosing to postpone the birth of a first child (De Vaus 2004). In 1975 only 16% of marriages in Australia were preceded by cohabitation, but this had increased to 81% by 2016 (Australian Institute of Family Studies 2019), which led to the de-standardisation of housing tenure pathways.

In Germany it has been shown that childbearing is the most important factor for home ownership attainment (Mulder & Wagner 2001), which is similar to findings from the Netherlands where researchers discuss the synchronisation of fertility events and home ownership transitions (Feijten & Mulder 2002; Mulder & Wagner 2001). Findings from a cross-sectional survey in Australia were mixed: the primary reason for moving into home ownership was not the arrival of children, but 67% of those who entered home ownership with children did so on average one year following the arrival of their first child (Beer & Faulkner, 2009). These findings suggest that birth plays an instrumental factor in home ownership decisions in Australia.

This study aims to further contributes to this literature by investigating the order and timing of birth and the transition to home ownership following a relationship formation, using longitudinal data from ten years of the Household Income and Labour Dynamics in Australia panel survey (HILDA) (Wooden and Watson 2001), and uses the life course theory as an overarching framework with the understanding that transitions are influenced and shaped by earlier experiences, allowing for the flexibility in the unpredictable nature and diversity of life events that has emerged in contemporary society (Elder 1995).

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Research Questions

(1) Is t here a delay in home ownership following birth?
(2) Does home ownership trigger birth of a child?
(3) Is home ownership attainment and birth of a child similarly influenced and driven by correlated unmeasurable factors?

Method

Analytic Sample

The analytic sample was extracted from the HILDA survey, a nationally representative household panel study commencing in 2001, with 13,696 individuals aged 15 years and older participating in the first wave of the survey. Data collected for the period from 2001 to 2010 was considered for this analysis, as well as retrospectively collected data prior to wave one. This analysis investigated both transition to birth of a child and home ownership following the commencement of a cohabiting relationship. As HILDA collects information from all adults in the household we analysed data recorded for women only, considering women to be 'at risk' of experiencing birth or home ownership attainment (Steele, Kallis, Goldstein, & Joshi 2005). For the purposes of this study the analytic sample was defined at wave one and included women in childbearing age with and without children. The following restrictions were applied: women with children aged 18 years and under, and women without children but of a childbearing age defined as 41 years or younger were included. After the 41-year mark we observed a significant decrease in child birth occurrences, which is why the 41-year mark was chosen as the upper age limit for women without children but in childbearing age. By including women with children, we can utilise retrospective data on child birth and home ownership transitions. To further define the risk set, these women were required to be in a couple relationship residing together with known start date. The analytic sample included 2,546 coupled women (both legally married and de facto), with either children aged 18 years and under, or without children but of childbearing age.

Analytic Plan

The decision to bring a child into the family will often be jointly determined with the decision to move into home ownership. Hence, there may be observed as well as unobserved factors that drive both decision processes, such as the increased propensity for enhanced job security and higher pay. If these decision processes are jointly determined, then the unobserved factors will be correlated and the two processes need to be estimated simultaneously to avoid biased estimates. Therefore, we address the three research questions by applying a multi-process discrete-time event history model, where the beginning of the time 'at risk' of experiencing birth or home ownership transition starts with the formation of a cohabiting relationship. The multi-process framework allows joint examination of the occurrence of home ownership transition and birth. With this approach we can detect and control for unmeasured factors that influence both processes. Records could be right censored for one or both events in the case of non-occurrence during the observation period. While birth and home ownership transitions can be repeated events, we focus on the first recorded transition.

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The multi-process event history model is defined by equations (1) and (2) below.

Transition to birth:

$$probit\ h_i^B(t) = \beta_{10} D_i^B(t) + \beta_{11} HO_{it} + \beta_{12} time_{it_{sinceHO}} + \beta_3 X_i^B + e_i^B \qquad (1)$$

Transition to home ownership:

$$probit\ h_i^{HO}(t) = \beta_{20} D_i^{HO}(t) + \beta_{21} B_{it} + \beta_{22} time_{it_{sinceB}} + \beta_3 X_i^{HO} + e_i^{HO}. \qquad (2)$$

In these equations 'i' denotes an individual. The connection between the two equations is made by allowing the individual residual errors to be correlated, which is also referred to as a nonzero correlation between the individual elements (e_i^B, e_i^{HO}). The component of the functions referred to as $D(t)$, represents the shape of the probit baseline hazard function which captures the varying probability of the events with duration since commencement of the relationship.

In equation (1) for the birth event, a dummy variable is included to indicate whether the individual has already entered home ownership (HO) by the time birth occurred, and a time variable or counter $(time)$ is included to indicate length of time (in months) since home ownership has occurred. Both variables are time varying which is indicated by the subscript t. In equation (2) for the transition to home ownership, a dummy variable is included to indicate whether the individual has already given birth (B) prior to home ownership attainment, and the time variable to indicate length of time (in months) since the birth occurred $(time)$. The inclusion of explanatory fixed time-invariant variables in both equations are represented by the term X_i with corresponding coefficients β.

The data preparation was conducted using Stata (StataCorp., 2013), model estimation was performed using Markov Chain Monte Carlo (MCMC) estimation in the MLwiN software, with a burn-in of 5,000 and a chain length of 20,000 (Browne 2009).

Prior to the model estimation, summary statistics for the explanatory variables are produced as well as summary statistics applicable for the event history data of birth and home ownership transitions: the survival and hazard functions.

Measures

The two dependent variables in the analysis are the events of birth of a child and the transition into home ownership, both defined as binary variables. For the event of home ownership attainment, information on tenure status and date of when the individual moved into the current home was used to derive the date of when individuals entered home ownership. The children's date of birth was used to compute the timing of birth, accurate to the month. Other time-invariant explanatory variables included in both models are women's age at the beginning of the relationship (in years), country of birth to identify respondent's ethnicity, highest level of education achieved in 2001 and both mother and father's occupation when the participant was 14 years of age as proxies for socio-economic status (Tzeng & Mare 1995). Country of birth

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was coded as Australian-born, born in a European country, born in an Asian country, and other. Highest level of education achieved in 2001 was categorised into Bachelor or higher degree, Diploma, Trade or Certificate, and Year 12 and below. Mother's and father's occupation was each grouped into four broad occupational categories: Manager and Professionals, White Collar, Blue Collar and did not have a paid job. It was not possible to include employment status or any other time-varying covariate in these models, as their status prior to 2001 could not be identified.

Results

Summary Statistics

This section provides summary statistics for all variables used in the main analysis. From the 2,546 relationship spells, 1,079 (42.4%) included both a birth and a transition to home ownership, 662 (26.0%) relationship spells included a birth but not a home ownership transition, and 339 relationship spells (13.3%) included a home ownership transition, but not a birth, and the remaining 466 (18.3%) relationships experienced neither event. Table 1 provides frequencies and percentages or means for the explanatory variables.

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Table 1: Summary statistics of the explanatory variables

Variables	N	%
Country of Birth		
Australian-born	1,975	77.6
European country	220	8.6
Asian country	126	5.0
Other	225	8.8
Education		
Bachelor or higher degree	452	17.8
Diploma	378	14.8
Trade or Certificate	292	11.5
Year 12 and below	1,423	55.9
Not specified	1	>0.1
Mother's occupation		
Manager and Professionals	539	21.2
White Collar	942	37.0
Blue Collar	418	16.4
Did not have a job	385	15.1
Not specified	262	10.3
Father's occupation		
Manager and Professionals	892	35.0
White Collar	835	32.8
Blue Collar	498	19.6
Did not have a job	5	0.2
Not specified	316	12.4
Age at start of the relationship	mean 24.7 years (SD 5.5)	

The overall trends for the occurrence of the birth and home ownership events are demonstrated by plotting the survivor and hazard functions for the events of birth and transition to home ownership (Allison 1984) (Figure 1). The survivor functions (Figure 1:a,b) show that women were at a higher risk of experiencing a birth earlier on in a relationship compared to the risk of transitioning into home ownership.

The hazard function of the birth event (Figure 1c) shows that the incidence of birth was increasing up to around 72 months from the beginning of a relationship, but then decreased slowly until 96 months, after which the fluctuations in the hazard of birth increased. In comparison, the incidence rate of the transitions to home ownership decreased steeply in the very beginning of the relationship and stays almost constant for the remainder of the observation time. The high hazard of home ownership attainment in the first months of the relationship represents women who move into a home that is already owned by one person in the partnership. Similar findings have been reported previously (Lersch & Vidal 2014).

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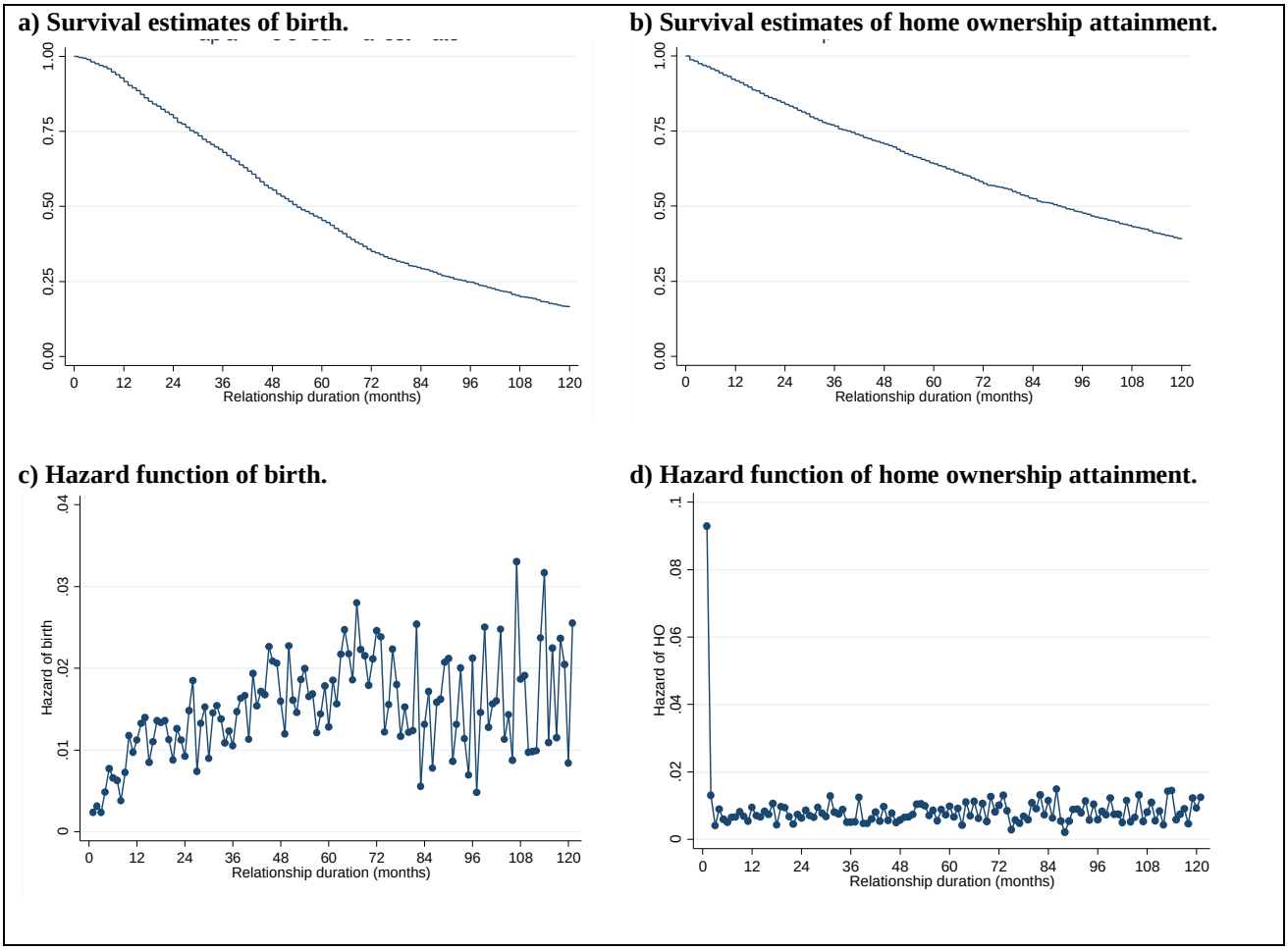
Figure 1: Survival and hazard function of time since relationship formation until birth and home ownership attainment



The probit transformation of the baseline hazard function is included in the model using a polynomial function (function of time $D(t)$). To identify the functions that best describe the baseline hazards for both processes, a range of polynomial forms including the logarithmic function were tested, and the corresponding AIC and BIC used to determine best fit. The preferred function to represent the main effects of the time following relationship commencement for birth events is a cubic polynomial function, compared to the cubic power of the inverse function for home ownership attainment, which appropriately captures the sharp drop off in hazard following the first month of entering a relationship (Figure 2).

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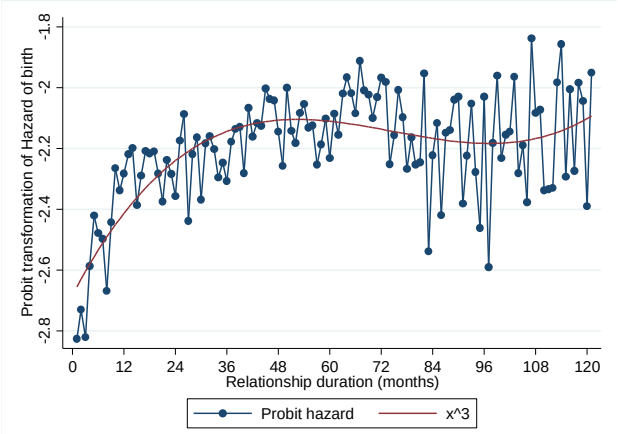
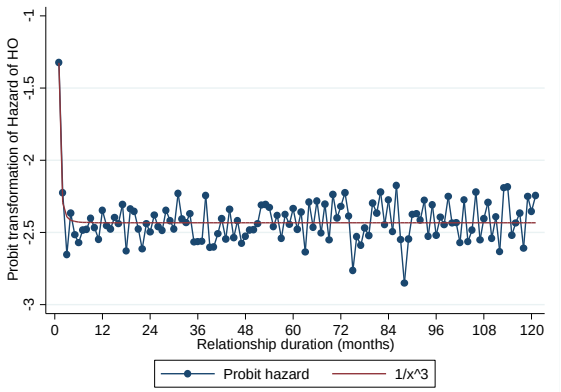
Figure 2: Probit hazard functions of birth and home ownership attainment, including baseline hazard functions (red) to represent the main effect of time on the event

e) Probit hazard function of birth.



f) Probit hazard function of home ownership attainment.



Results from the multi-process discrete-time Event History Analysis

The results from the multi-process discrete time event history analyses are shown in Table 2 below. For the birth model, prior home ownership attainment is significantly associated with an increased likelihood of birth, whereas the time passed since home ownership attainment is associated with a decrease in the likelihood of a birth outcome. A woman's age at the start of the relationship is negatively associated with the birth event.

For the home ownership model, the event of prior birth was not significantly associated with home ownership attainment; however, the time since birth was negatively associated with the home ownership event. The age of the woman at the start of the relationship was positively associated with home ownership attainment. Country of birth had some influence on the transition to home ownership, with being born in Europe or a country other than Australia or Asia being negatively associated with the transition. Less influential (at 10% significance level) were the women's level of education and their mother's and father's occupation. The correlation coefficient for the residual errors between the two models was negative (-0.072) with a 95% credible interval of [-0.167; 0.012], being borderline significant. This suggests that there were unobserved factors that positively influenced one transition event, but negatively influenced the other transition event.

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Table 2: Regression coefficients from the multi-process discrete-time event history model for the processes birth and home ownership attainment following the beginning of a relationship

	Birth	Home ownership (HO)
Time	0.017***	-
$Time^2$	-0.0003***	-
$Time^3$	<0.001***	-
$1/Time^3$	-	1.213***
Home ownership attainment	0.109***	-
Time since HO attainment	-0.002***	-
Birth	-	0.012
Time since birth	-	-0.001**
Age at start of the relationship	-0.004**	0.012***
Country of birth		
Australia	-	-
Europe	-0.014	-0.054*
Asia	0.010	-0.003
Other	-0.017	-0.155***
Education		
Bachelor or higher degree	-	-
Diploma	0.003	-0.027
Trade or Certificate	-0.005	-0.011
Year 12 and below	0.009	-0.040*
Mother's occupation		
Manager/Professional	-	-
White Collar	0.008	-0.001
Blue Collar	0.013	-0.008
Not working	0.015	-0.045*
Father's occupation		
Manager/Professional	-	-
White Collar	-0.017	-0.008
Blue Collar	-0.015	-0.038*
Not working	0.057	-0.08
Constant	-2.468***	-2.811***

*** p-value<0.001

** p-value<0.05

* p-value<0.1

$\text{cov}\left(e_i^B, e_i^{HO}\right)$ = -0.072 [-0.167; 0.012]

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Discussion

In this paper, we investigated the interrelationship of the events of birth and the transition to home ownership. These events were firstly examined separately through survival and hazard functions, before they were analysed in a multi-process framework.

We addressed the following research questions:

(1) *Is there a delay in home ownership following birth?* Based on the findings from the multi-process model, the transition to home ownership was not associated with prior birth, however if there was a birth, the likelihood of home ownership attainment decreased with time following birth.
(2) *Does home ownership trigger birth?* When the order is reversed and home ownership occurs prior to birth, home ownership is positively associated with the birth event and could therefore be interpreted as a trigger for birth.
(3) *Are home ownership attainment and birth of a child similarly influenced and driven by correlated unmeasurable factors?* The covariance coefficient for the residual errors between the two model components was negative, this means that our analysis revealed unmeasured characteristics of women that influenced both their fertility and home ownership decisions. Since these characteristics are unmeasured, they cannot be defined or explained until they can get measured. However, a possible factor that may drive this result is household income which could not be included in the analysis due to the unavailability of this measure.

Recent literature reports that housing pathways are now more diverse than in previous decades (Spallek, Haynes, & Jones, 2014). The analysis implemented in this paper identified that for the pathways where the transition to home ownership occurs prior to a birth, home ownership attainment is positively associated with the birth event, which revises earlier research where birth was interpreted as being a trigger for the transition into home ownership (Winter & Stone, 1999).

One important aspect of the proximity of home ownership attainment and the birth of a child is competing costs (Courgeau, 1985), in particular if these events occur close together. This can be further explained by findings from Evans and Kelley (2008), who reported that women with preschool children have been found to be less likely in the workforce which has an impact on the household's financial situation and hence on the ability to pay for housing, which is usually the largest component of a household's expenditure (Yates & Berry, 2011). Little research has investigated the dynamics of housing affordability with changes in both family composition and home ownership attainment in Australia, and further research might focus on understanding how the order and the timing of the two family life events, birth of a child and entering home ownership, are associated with a family's ability to pay for their homes.

Our analysis has focused on individuals and has not examined how couple or household characteristics influence transitions. Cohabiting relationship involve two people, and decisions related to home ownership transitions and having a child are often made jointly. Taking advantage of household-level data may have increased the explanatory capacity of this research.

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Starting a cohabiting relationship plays a significant role in the pathway of home ownership attainment, however, the housing pathways of individuals that stay single are still unclear. There is still a need for further research to explore a greater range of housing tenure pathways beyond those explored in this paper.

The changes in pathways to home ownership and impacts of family life events investigated in this research have several implications. The traditional pathway with the order where people married, experienced the birth of a child and entered home ownership soon after is becoming less dominant. Individuals are now forming partnerships later in life and the age associated with a birth has increased so that individuals are now more likely to aim for stability and security in their home before the birth of a child. This finding is similar to the situation in the Netherlands, were an increasing proportion of couples make the transition to home ownership before becoming parents (Feijten & Mulder, 2002; Mulder & Wagner, 2001).

One important aspect of home ownership attainment and the subsequent birth of a child is competing costs, in particular if these events occur close together. Women with preschool children are much less likely to be in the workforce which has an impact on the household's financial situation and contributes to the accumulation of financial stress and reduced well-being (Evans & Kelley, 2008). Hence, women with young children would benefit from additional support to both transition into or maintaining home ownership. This support could be provided through access to mortgages and alternative payment options, while caring for young children, or through the provision of adequate childcare support while maintaining the level of employment required to meet home mortgage payments.

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