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Education, job insecurity and the within country migration of couples

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Abstract

We consider the migration movements of power couples (couples where both members have at least a college degree), half-power and no-power couples within Australia. We explicitly allow for potential association of these movements with local labour market features including perceived job insecurity. The results support an urbanisation hypothesis; partnered college graduates like to live in major cities regardless of their gender or the qualifications of their partner.
JEL Classification: J3, J7

Keywords: Colocation, Tied-mover, Urbanisation, Migration, Power couples

1 Introduction

In an early study of family migration patterns, Costa and Kahn (2000) show that an increasing proportion of America's power couples (couples where both spouses are college educated to at least Bachelor level) were found in large metropolitan areas between 1940 (when 32 % were) and 1990 (when 50 % were). Costa and Kahn (2000) argue that this geographical shift for power couples is predominantly due to the greater probability of a successful labour market match for both spouses that larger metropolitan labour markets offer. In their model, power couples are viewed as dual career households in the sense that both household members aspire to their own careers (Mincer 1978). If power couples are joint decision makers, they face the difficulty of finding jobs that match the skills of each spouse within a reasonable distance from their mutual home. This may lead power couples to concentrate in large metropolitan areas where there are more potential job matches. Increases in the rates of college education and labour market participation amongst women (Goldin and Katz 2008) exacerbate this matching requirement, increasing the polarity across family education patterns found for metropolitan and rural areas. Costa and Kahn (2000) refer to this as a "colocation" phenomenon.

The issue of whether power couples actually migrate into large metropolitan areas (LMAs) is not easily addressed by the cross-sectional census data used by Costa and Kahn (2000). Using longitudinal panel data, Compton and Pollak (2007) further explore the within country migration patterns of couples and conclude that colocation is not necessarily the dominant explanation of movement into LMAs in America. If the family is looking to maximise its earnings from salaries, location preference may be given to the couple member with the highest paying occupation which may not necessarily accord with the highest education level. In other words, if there is a substantial difference in the earning capacity across couple members, then when couples do migrate, it is the education level of the highest salary earner (typically the husband) which best predicts this propensity to migrate. Whilst this may maximise the welfare of the couple, it also implies that the lower salary earner can become a "tied-mover" in the migration decision.

If women recognise that they will be typically be tied-movers, they would respond by seeking qualifications which are general rather than specific in nature (Becker 1962, 1964) allowing them greater geographical mobility and firms will be less likely to offer them training incorporating job specific skills. If women further believe that they will face a wage cut when migrating with their partner (Blackburn 2010), they may engage in less education resulting in gender-based productivity and earning differentials (Compton and Pollak 2007; page 479).

A simpler explanation which may be consistent with colocation and/or tied-moving is that the college educated tend to migrate into LMAs as they are attracted by the extra facilities available there and/or are typically more able to pay for them than those with lower education levels (Krugman 2015). This "urbanisation" results in a larger pool of the college educated in metropolitan areas over time.

Australia is particularly suitable for a within country migration study: it has one of the highest internal migration rates amongst stable economies (Hugo and Harris 2011, page 15) and a considerable proportion of its population live in urban areas.[1] Our contribution is to enrich this area of research by investigating internal migration movements of couples within Australia, explicitly allowing for the education of each couple member, and with a particular focus on the potential association between migration and local labour market features.

We believe that this is the first study of this nature carried out in the Australian context. Data and variable selection are discussed in the next section, estimation methods and results are presented and discussed in Section 3, with conclusions provided in Section 4.

2 The migration patterns of couples in Australia

The data are taken from the Household, Income and Labour Dynamics (HILDA)[2] survey which is a nationally representative, annual sample of private Australian households. The HILDA Survey was launched in 2001. Each year, individual adult members (those aged 15 years and over) of households are interviewed over a broad range of socioeconomic topics, with particular emphasis on income, labour market characteristics and family formation. (For greater detail on the HILDA Survey design see Summerfield et al. 2013).

We make use of eight waves of the HILDA data (waves 2 to 9). The first wave is excluded due to a lack of data on pertinent variables.[3] Whilst Australia was slow to respond to the recent international financial crises (IMF 2009, pages 11–14), 2010 saw an impact from the global recession and a substantial growth in unemployment (Junankar 2014), the time period of interest has been accordingly limited to 2009. The sample is also restricted to couples whose average age is 50 or less as it is plausible to assume that these couples are more inclined to move for career reasons than are older households closer to retirement age.[4] These sampling restrictions and those associated with the explanatory variables leads to the identification of 14,097 couple observations.

The couples are divided into four categories based on the education levels of the members: "power" couples (both couple members have at least a college, defined as Bachelor or higher level, degree); "male" or "female half-power" couples (only the male or female partner, respectively, has at least a college degree); and "no-power" couples (neither of the partners has a college degree). Table 1 reports the distribution of the 14,097 sample units across the four couple categories. We can see that of the 14,097 couples in the sample, 2385 (or 16.9 % of the total) are power couples, of these 94 couples migrated (or 3.9 % of the 2385 power couples).

The term "migration" is used in this work to identify a change in Major Statistical Region (MSR) residency, with a relocation of 50 km. Data available in HILDA provide the geographical identification of households at a MSR level. Information on MSRs was combined with information on the Section of State (SOS) which enables grouping into three broad types: major city, urban or rural. The joint use of MSRs and SOS leads to the identification of migration movements and type of place of destination and origin. The distance moved from the last wave is calculated by the data providers using geocoded addresses (Summerfield et al. 2013, pages 32–35). Migration is relatively common in the sample, columns 3 and 4 of Table 1 reveal that 550 (or some 4 %) of the couples migrated between 2002 and 2009.

Figure 1 reports the overall geographical distribution of couples by power-type and by type of location. Living in a major city is clearly the most common outcome for all of the couple types, more so for the power couples. There is also prima facie evidence that male-power couple outcomes have a more similar geographical distribution to power couples than do female-power couples or no-power couples.

Table 2 presents selected summary statistics for the variables and samples of interest. The table contains five columns for the full sample, power couples, male-power, female-power and no-power couples, respectively. Beginning with the full sample of all couples in column 1 of Table 2, males (panel 1) and females (panel 2) can be seen to have similar education (both genders having on average close to 13 years of education). We assume individuals judge whether they are over or under-educated by comparing their own education (measured in years) with the local area (MSR) average education for their occupation. Furthermore, if the individual is not employed, she/he is assumed to compare their education level to the average education of those not in employment in their MSR. These relative education measures are constructed for the two genders

Table 1 Couple power-types

	All		Migrated	
	Freq.	Perc.	Freq.	Perc.
	(1)	(2)	(3)	(4)
Power couples	2385	16.9	94	3.9
Male-power couples	1472	10.4	56	3.8
Female-power couples	2040	14.5	95	4.7
No-power couples	8200	58.2	305	3.7
Total	14,097	100	550	3.9

Source: HILDA Survey – Waves 2 to 9 (Pooled)

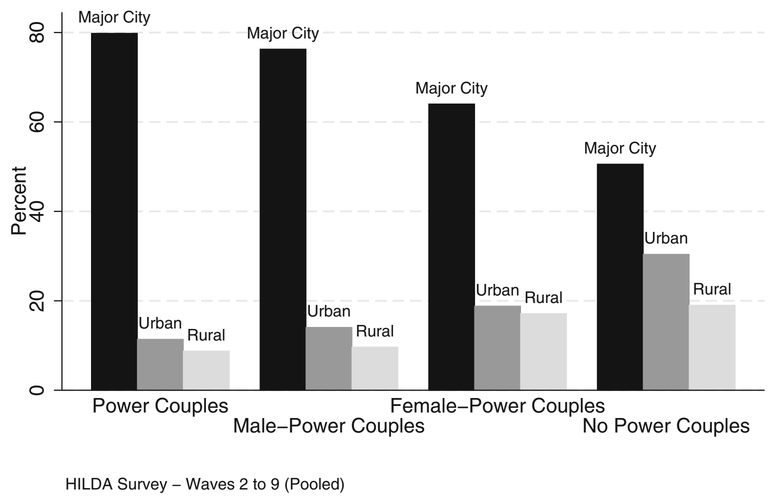

Fig. 1 Geographical distribution by household types

separately; the female member of the couple compares herself with the local female labour force and similarly the male member of the couple compares himself with the local male labour force. Overall (see Table 2), females tend to be over-educated relative to males although there is substantial variance in the measure. When the analysis is restricted to power-type couples (columns 3 and 4), the power members of the couples are typically over-educated and the no-power member under-educated, analogously both couple members are on average under-educated in no-power couples (column 5).

The MSR unemployment rate is included as an indicator of local labour market tightness. This measure is also constructed for the two genders separately. Perhaps unsurprisingly, this measure of unemployment is similar for the two genders, being slightly less for power couples than for no-power couples. A further indicator of labour market tightness is provided by constructing a measure of local labour market job insecurity. A particularly attractive characteristic of the HILDA Survey is the presence of subjective job insecurity information. The respondent is asked: "What do you think is the per cent chance that you will lose your job during the next 12 months? (That is, get retrenched or fired or not have your contract renewed)". A value of 0 indicates the individual is certain of retaining their job, whereas a value of 100 suggests the individual is certain of losing his/her job in the next 12 months. Local market job insecurity was constructed by taking the average of this subjective job insecurity measure at MSR level for the two genders separately. As shown in Table 2, on average males report a slightly more insecure local labour market than females and this is true for all couple types (considering columns 1 to 6, inclusively).

Table 2 also reports labour force status for males and females across power-type couples. Employment rates are considerably higher for males at 94 % for all males and 75 % for all females. The biggest employment difference across couple members occurs amongst male-power couples (with 97 % of the men and 71 % of the women employed). In general, the gender employment rates are closer for power couples and female-power couples, whilst no-power couples also have considerably fewer women employed. A similar pattern is found for the percentage out-of-the-labour-force; men are consistently found to be more likely to be participating in the labour market, with

Table 2 Selected descriptive statistics

	(1) Full sample		(2) Power couple		(3) Male power		(4) Female power		(5) No-power couple	
	Mean	S.Dev.	Mean	S.Dev.	Mean	S.Dev.	Mean	Mean	Mean	S.Dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Male (panel 1)										
Education (years)	12.79	2.74	16.63	2.17	16.33	1.99	11.76	1.12	11.30	1.22
Over-education	0.2	2.24	2.39	2.43	2.35	2.30	−0.70	1.67	−0.60	1.47
Age	38.71	8.38	38.68	7.72	40.33	7.76	38.63	8.44	38.44	8.62
MSR unemployment rate	0.06	0.01	0.05	0.01	0.05	0.01	0.06	0.01	0.06	0.01
MSR job market insecurity	12.22	1.56	12.49	1.70	12.4	1.61	12.25	1.55	12.10	1.50
Employed	0.94		0.97		0.97		0.95		0.92	
Unemployed	0.02		0.01		0.01		0.02		0.02	
Not in labour force	0.05		0.02		0.03		0.04		0.06	
Female (panel 2)										
Education (years)	12.94	2.55	16.38	1.90	11.94	1.09	15.76	1.53	11.41	1.18
Over-education	0.43	2.14	2.46	2.39	−0.41	1.57	2.11	2.05	−0.43	1.41
Age	36.42	7.97	36.62	7.30	37.82	7.32	36.06	7.36	36.20	8.37
MSR unemployment rate	0.05	0.01	0.05	0.01	0.05	0.01	0.06	0.01	0.05	0.01
MSR job market insecurity	11.11	1.69	11.49	1.83	11.38	1.78	11.17	1.70	10.94	1.61
Employed	0.75		0.85		0.71		0.84		0.71	
Unemployed	0.02		0.01		0.02		0.01		0.03	
Not in labour force	0.23		0.14		0.27		0.15		0.26	
Household (panel 3)										
Size	3.57	1.25	3.36	1.15	3.70	1.25	3.36	1.20	3.66	1.27
Age (couple average)	37.56	7.85	37.65	7.19	39.08	7.21	37.34	7.50	37.32	8.19
Education (couple average)	12.87	2.26	16.51	1.60	14.14	1.14	13.76	0.99	11.35	0.95
Dependent child	0.63		0.60		0.66		0.60		0.64	
Disposable income ($10,000)	7.89	4.40	10.53	5.59	8.93	5.04	8.24	4.59	6.86	3.33
Female income share	0.32	0.25	0.36	0.21	0.25	0.21	0.41	0.25	0.30	0.25
Foreign	0.30	0.46	0.42	0.49	0.32	0.47	0.32	0.47	0.25	0.43
Home owners	0.74	0.44	0.80	0.40	0.79	0.41	0.78	0.42	0.71	0.45
Female earned more	0.21	0.41	0.24	0.43	0.12	0.33	0.37	0.48	0.18	0.38
Male earned more	0.71	0.45	0.72	0.45	0.85	0.36	0.59	0.49	0.72	0.45
Observations	14,097		2385		1472		2040		8200	

HILDA Survey – Waves 2 to 9 (Pooled). Standard deviations not provided for simple binary (dummy) variables

the gender gap in participation being highest in male-power couples (followed closely by no-power couples). In aggregate, and unsurprisingly, unemployment rates are lower amongst power couple members than no-power couples.

Considering household characteristics (panel 3 of Table 2), the average age distribution across couples is similar with male-power couples averaging the oldest at 39 years. On average, 63 % of the households in the full sample have dependent children present (with, on average, 1.3 children), this is 60 % when the female couple member is a graduate (1.1 children). Household financial year disposable income is calculated as the difference between household financial year gross incomes (including wages and other income) less all household financial year taxes. Power couples have 53.5 % more household disposable income than no-power couples in Australia. A substantial proportion of the couple members are foreign born, considerably more so amongst power couples (column 9). Home ownership is prevalent in Australia (Mariotti et al. 2015), and the distribution of home ownership across power-type couples is consistent with expectations: no-power couples are considerably less likely to be home owners. We would expect home ownership to increase the costs associated with migration and to lessen the probability of the couple moving.

Akerlof and Kranton (2000 and 2010) and Bertrand et al. (2015) argue that couples seek traditional roles with respect to the control of household resources, in particular, couples may reject labour market outcomes which result in women earning more than their male partners and/or that households display an aversion to women having higher incomes than their partners. Whilst on average, the male is more likely to earn more in the Australian labour market (comparing average hourly wages) regardless of power couple type, it is also clear that this is not always the case for every household; even in male-power couples, there are 12 % of households where the woman earns more, whilst males earn more in 59 % of female-power couples (see Appendix Table 7 for further summary statistics on primary earner status and power couple type). Junge et al. (2014) use split sample analysis with a very large Danish data set to consider the relationship between international migration and couple earner status, finding that primary earner status is important for men or women. We will return to consider the implications of similar split sample analysis for our model of within country migration below. In our base model, we include a measure of female household disposable income share which is the female partner's individual contribution to her total household's disposable income. The share of household income controlled by the female is on average 32 % (or some half of the share generally controlled by the male). This value varies between 25 % in male-power couples (column 5) to 41 % for female-power couples (column 7).

3 Estimation and results

We estimate two econometric models of migration. The first model estimates the probability of migrating allowing for sample selection:

$$q_{it}^{*} = z_{it}\delta + v_{it} \quad i = 1, \ldots, N_1 \quad \text{and} \quad t = 1, \ldots, T \tag{1}$$

$$y_{it}^{*} = x_{it}\beta + u_{it} \quad i = 1, \ldots, N_2, N_2 < N_1 \quad \text{and} \quad t = 1, \ldots, T \tag{2}$$

where Eq. (1) estimates the probability of remaining in the sample, q_i^*; and Eq. (2) estimates the probability of migrating y_i^*; z_{it} and x_{it} are vectors of exogenous explanatory variables; δ and β are the corresponding vectors of parameters to be estimated; and v_{it} and u_{it} are error terms; N_1 denotes the full sample; N_2 includes all the couples that survive (e.g. couples that remain together and decide to keep participating in the survey).[5] Sample attrition can be considered by rewriting Eq. (2):

$$y_{it}^{*} = x_{it}\beta + \lambda\left[\frac{\phi(z_{it}\delta)}{\Phi(z_{it}\delta)}\right] + \eta_{it}, \quad i = 1, \ldots, N_1, \quad \text{and} \quad t = 1, \ldots, T \tag{3}$$

replacing v_{it} with the estimated generalised residuals from the probit model, (shown by Vella (1993) to be equal to their respective inverse Mills ratio); the t test on λ is a test of attrition.

In the second model, the decision to migrate (or not) is modelled simultaneously with the type of place of destination (Compton and Pollak 2007, page 485). The probability that observation i chooses outcome j is given by:

$$\mathrm{P}(y=1|\mathbf{x}) = 1/\left[1+\sum_{h=1}^{J}\exp\left(x_{it}\beta_h\right)\right], \qquad j=1$$
$$\mathrm{P}(y=j|\mathbf{x}) = \exp\left(x_{it}\beta_h\right)/\left[1+\sum_{h=1}^{J}\exp\left(x_{it}\beta_h\right)\right], \quad j=2,3,4$$

where $j = 1, 2, 3, 4$ represents the four destination outcomes (not migrating $j = 1$, migrating to rural $j = 2$, urban $j = 3$, or major city $j = 4$ location, respectively). The baseline category, chosen for the multinomial logit model, is not migrating.

3.1 Model 1, the migration decision

We begin with a base model for the probability of the couple migrating, corresponding to Eq. (3). The explanatory variables included in the base model are the type of power coupling (omitted category is no-power); the type of location (major city, urban or rural where the omitted category is urban); the age (and age squared) of each couple member; each couple member's education relative to the MSR average for their occupation; the presence of dependent children in the household, at least one couple member being foreign born, and if the couple are home owners. Full results for the base model are provided in Table 3 with no correction for attrition in column 1; IMR correction in column 2 (Vella 1998)[6]; or inverse probability weighting IPW in column 3 (Robins et al. 1995).[7] We did not find substantially improved results adopting IPW and instead adopt the simpler IMR correction throughout the analyses below. Whilst we discuss more readily interpretable marginal probabilities for selected results from the base model in detail shortly, it is worth noting here that we consistently find that couples are significantly less likely to migrate if the couple own (purchased or currently paying a mortgage on) their house across the three specifications in Table 3.

Table 4 presents the selected marginal effects from the probit estimation of the probability of migrating (with IMR correction); corresponding to Eq. (3) and the base model presented in column 2 of Table 3. The results presented in column (A) of Table 4 reveal that power couples are 15.6 % more likely to migrate than no-power couples, male-power couples are 19.3 % more likely and female-power couples are 18.4 % more so, although these differences in rank are not significant (at standard confidence levels). The relationship between female-power couples and migration is, however, strongly significant in its own right. Moving across the columns in Table 4, alternative explanatory variables are added to the model and the marginal effects associated with these variables are reported. Column B considers job insecurity in the local labour market of origin which is not found to be significantly associated with couple migration. Column C considers the local unemployment rate which is also not found to be significantly related to couple migration. Column D considers labour market status, household disposable income and the female income share. The final rows of column D suggest that couples where the female is not employed or couples with higher household disposable income are significantly more likely to migrate; however, female income share is not significantly relevant. Importantly, changing the model specification as we move across the columns in

Table 3 Migration probability (probit), base model

	Probit without sample selection controls	Probit: test for sample selection (base model)	IPW-Probit
	(A)	(B)	(C)
Power couple	0.142	0.156*	0.143
	(0.074)	(0.074)	(0.075)
Male-power couple	0.184*	0.193*	0.187*
	(0.085)	(0.085)	(0.085)
Female-power couple	0.172**	0.184**	0.159*
	(0.066)	(0.066)	(0.067)
Origin—major city	−0.320**	−0.323**	−0.328**
	(0.050)	(0.050)	(0.050)
Origin—rural	−0.200**	−0.202**	−0.204**
	(0.067)	(0.067)	(0.068)
Age (male)	0.055	0.054	0.045
	(0.030)	(0.030)	(0.030)
Age^2 (male)	−0.001*	−0.001*	−0.001
	(0.0004)	(0.0004)	(0.0004)
Age (female)	−0.002	−0.005	0.002
	(0.033)	(0.033)	(0.033)
Age^2 (female)	−0.0001	−0.0001	−0.0002
	(0.0005)	(0.0005)	(0.0005)
Over-education (female)	0.072	0.068	0.078
	(0.049)	(0.049)	(0.050)
Over-education (male)	−0.025	−0.025	−0.031
	(0.049)	(0.049)	(0.049)
Dependent child	−0.033	−0.010	−0.039
	(0.050)	(0.052)	(0.050)
Foreign	0.006	0.006	0.017
	(0.052)	(0.052)	(0.052)
Home ownership	−0.649**	−0.651**	−0.650**
	(0.048)	(0.048)	(0.049)
λ		0.232*	
		(0.112)	

Standard errors are adjusted for clustering on household identifier. HILDA Survey – Waves 2 to 9 (Pooled) standard errors reported in parenthesis. Significance levels: $**p < 0.01$; $*p < 0.05$

Table 4 is not associated with substantial or significant changes in the marginal effect of power couple status on the probability of migrating (as seen in the upper rows of Table 4).

It is notable that, unlike Compton and Pollak (2007), we do not find male half-power couples are significantly more likely to migrate than are joint power couples. We also find that female half-power couples are significantly more likely to migrate than no-power couples. Couples are more likely to migrate when the woman is not working but this may reflect lower household opportunity costs associated with migration rather than the wife being a tied-mover. Focussing analysis on those households where both couple members are employed (see Appendix Table 8), a significant association between migration and power is found only for female-power couples,[8] furthering our belief that female graduates are not tied-movers in Australia. The results in Table 4 also reveal significant differences

Table 4 Migration probability (probit) selected marginal effects

	Base model			
	(A)	(B)	(C)	(D)
Power couple	0.156*	0.162*	0.150*	0.188*
	(0.074)	(0.074)	(0.075)	(0.079)
Male-power couple	0.193*	0.197*	0.188*	0.184*
	(0.085)	(0.085)	(0.086)	(0.087)
Female-power couple	0.184**	0.188**	0.184**	0.231**
	(0.066)	(0.066)	(0.066)	(0.068)
Origin—major city	−0.323**	−0.300**	−0.336**	−0.323**
	(0.050)	(0.053)	(0.055)	(0.050)
Origin—rural	−0.202**	−0.192**	−0.198**	−0.190**
	(0.067)	(0.067)	(0.068)	(0.068)
Labour market insecurity of MSR of origin (male)		0.023		
		(0.028)		
Labour market insecurity of MSR of origin (female)		−0.035		
		(0.026)		
Unemployment rate in MSR of origin (male)			−4.070	
			(2.915)	
Unemployment rate in MSR of origin (female)			−1.308	
			(3.882)	
Unemployed (male)				−0.017
				(0.134)
Out of labour force (male)				0.072
				(0.097)
Unemployed (female)				0.558**
				(0.107)
Out of labour force (female)				0.279**
				(0.060)
Disposable income (×10,000)				0.011*
				(0.004)
Female income share				0.062
				(0.104)
No. obs.	14.097	14.097	14.097	14.097

HILDA Survey – Waves 2 to 9 (Pooled) All estimates (in models A to D) include controls for the age (and age squared) of each couple member; each couple member's education relative to the MSR average for their occupation; dependent children in the household, least one couple member being foreign born, and if the couple are home owners. For ease of analysis, marginal effects are reported. $p >$ abs(Z) in parenthesis. Significance levels: $^{**}p < 0.01$; $^{*}p < 0.05$. Standard errors are adjusted for clustering on household identifier

in the probability to migrate related to the type of origin location (Costa and Kahn 2000); compared to the omitted urban category, Australian couples are less likely to migrate if they are residing in a major city or a rural location. We explore this finding further next.

3.2 Model 2, migration and destination determined together

Table 5 presents selected results for the multinomial logit estimation of the probability of migrating to major city (column 1), urban (column 2) or rural (column 3) destinations

Table 5 Migration probability by destination type (multinomial logit), selected results

	Major city	Urban	Rural
Panel A	(1)	(2)	(3)
Power couple	***2.783***	*0.667*	*0.904*
	1.023**	−0.404	−0.101
	(0.223)	(0.282)	(0.389)
Male-power couple	***2.887***	*0.770*	*0.826*
	1.060**	−0.261	−0.192
	(0.243)	(0.308)	(0.453)
Female-power couple	***1.607***	*1.421*	*1.036*
	0.475*	0.352	0.035
	(0.222)	(0.201)	(0.326)
Origin—major city	***0.589***	***0.412***	***0.457***
	−0.529**	**−0.887****	**−0.782****
	(0.162)	(0.177)	(0.278)
Origin—rural	***0.506***	***0.548***	*1.236*
	−0.681**	**−0.602****	0.212
	(0.260)	(0.221)	(0.301)
Panel B			
Power couple	***2.870***	*0.683*	*0.883*
	1.054**	−0.382	−0.124
	(0.224)	(0.282)	(0.396)
Male-power couple	***2.951***	*0.780*	*0.820*
	1.082**	−0.249	−0.198
	(0.244)	(0.307)	(0.455)
Female-power couple	***1.625***	*1.432*	*1.025*
	0.485*	0.359	0.025
	(0.222)	(0.200)	(0.327)
Origin—major city	***0.656***	***0.446***	***0.404***
	−0.422*	**−0.808****	**−0.905****
	(0.167)	(0.185)	(0.305)
Origin—rural	***0.520***	***0.566***	*1.210*
	−0.654*	**−0.568***	0.190
	(0.260)	(0.223)	(0.300)
Labour market insecurity of MSR of origin (male)	*1.043*	*1.071*	*1.005*
	0.042	0.069	0.005
	(0.089)	(0.091)	(0.134)
Labour market insecurity of MSR of origin (female)	*0.893*	*0.895*	*1.086*
	−0.113	−0.111	0.082
	(0.080)	(0.085)	(0.130)
Panel C			
Power couple	***2.764***	*0.658*	*0.890*
	1.017**	−0.418	−0.117
	(0.226)	(0.283)	(0.392)

Table 5 Migration probability by destination type (multinomial logit), selected results *(Continued)*

Male-power couple	***2.873***	*0.755*	*0.807*
	1.055**	−0.281	−0.215
	(0.245)	(0.308)	(0.454)
Female-power couple	***1.606***	*1.416*	*1.036*
	0.474*	0.348	0.035
	(0.222)	(0.202)	(0.325)
Origin—major city	***0.597***	***0.372***	***0.415***
	−0.515**	−0.988**	−0.879**
	(0.180)	(0.197)	(0.308)
Origin—rural	***0.510***	***0.545***	*1.235*
	−0.673**	−0.608**	0.211
	(0.259)	(0.225)	(0.303)
Unemployment rate in MSR of origin (male)	*0.007*	*0.006*	$9.41e^{-6}$
	−4.934	−5.107	−11.574
	(9.507)	(9.993)	(16.020)
Unemployment rate in MSR of origin (female)	*48.328*	$2.54e^{-7}$	$1.14e^{-6}$
	3.878	−15.187	−13.684
	(12.779)	(13.345)	(21.705)
Panel D			
Power couple	***2.733***	*0.806*	*1.213*
	1.005**	−0.215	0.193
	(0.239)	(0.300)	(0.425)
Male-power couple	***2.776***	*0.798*	*0.884*
	1.021**	−0.225	−0.123
	(0.247)	(0.311)	(0.458)
Female-power couple	***1.665***	***1.683***	*1.338*
	0.510*	0.520*	0.291
	(0.230)	(0.208)	(0.336)
Origin—major city	***0.569***	***0.409***	***0.457***
	−0.563**	−0.893**	−0.783**
	(0.164)	(0.179)	(0.276)
Origin—rural	***0.512***	***0.553***	*1.266*
	−0.669*	−0.592**	0.236
	(0.260)	(0.222)	(0.302)
Unemployed (male)	*0.863*	*0.985*	*1.138*
	−0.147	−0.015	0.130
	(0.422)	(0.376)	(0.596)
Out of labour force (male)	*0.816*	*1.102*	***2.394***
	−0.203	0.097	0.873*
	(0.349)	(0.285)	(0.412)
Unemployed (female)	***2.860***	***3.905***	***3.403***
	1.051**	1.362**	1.225**
	(0.313)	(0.310)	(0.441)

Table 5 Migration probability by destination type (multinomial logit), selected results *(Continued)*

Out of labour force (female)	***1.903***	***2.152***	*1.336*
	0.644**	**0.766****	0.290
	(0.196)	(0.190)	(0.309)
HH disposable income (×10,000)	***1.044***	*0.999*	*0.990*
	0.043**	−0.001	−0.010
	(0.009)	(0.019)	(0.032)
Female income share	*1.426*	*1.514*	*0.461*
	0.355	0.414	−0.774
	(0.317)	(0.319)	(0.497)

HILDA Survey – Waves 2 to 9 (Pooled). Relative risk ratios in italics, coefficient estimates are in standard text, standard errors reported in parenthesis. Significance levels: ***p* < 0.01; **p* < 0.05, signifance is also denoted here by bold font. Standard errors are adjusted for clustering on household identifier. All estimates (in panels A to D) include controls for the age (and age squared) of each couple member; each couple member's education relative to the MSR average for their occupation; dependent children in the household, least one couple member being foreign born, and if the couple are home owners

relative to not migrating for the base model.[9] Relative risk ratios are recorded in italics, followed by the respective coefficient estimate and standard error. The panels in Table 5 correspond to the columns in Table 4, so panel A of Table 5 provides results for the equivalent model in column A of Table 4; panel B of Table 5 for column B of Table 5 and so on.

The selected results presented in column 1 of panel A of Table 5 reveal that power couples are 2.8 times more likely to migrate to a major city relative to the omitted no-power couples; male-power couples are 2.9 times more likely; and female-power couples are 1.6 times more likely. Reading across the columns in panel A reveals that the significant relationship (and the qualitative ranking) between migration probability and power-type is found for migration into a major city; there are no significant associations found for couple power-type and the probability to migrate to urban or rural locations. Considering the type of the origin location in column 1, after controlling for power couple type and compared to the omitted urban, couples are less likely to migrate if they come from a major city already. Couples are also less likely, compared to those living in an urban area, to move from a rural area to a major city or to an urban location.

Similar results are found in panel B when the gender-specific labour market insecurity measure of the origin MSR is included in the analysis; in panel C when the gender-specific unemployment rate in the origin MSR is included; and in panel D when individual labour market status, household disposable income and female couple member's share of household disposable income are reported.

Taken together, our results suggest that couples with at least one graduate member are more likely to migrate to a major city regardless of the gender of the graduate. The results in Table 5 also indicate little significant relationship between the probability of migration and other gender-specific variables with the exception of female employment. We could interpret this finding as suggesting that the couple is more likely to migrate when the female's labour market position is tenuous. It is only in column 3 of panel D that we find a significant relationship between migration and a male labour market characteristic where couples are more likely to migrate to rural locations when the male is out of the labour force.

The results presented in Tables 4 and 5 (column 3 of panel D) also suggest that couples with higher household disposable income are more likely to migrate; however, there is not a significant relationship between couple migration and the female share of household income. This finding might be an artefact of not controlling for which couple member is the primary earner[10]; if the primary earner is female, an increase in her salary will increase her share of household disposable income and vice versa for males (if he is the primary earner, an increase in his wage will decrease the female income share), potentially confounding the relationship in our analysis. Following Junge et al. (2014), we accordingly divide our sample to separately consider the subsample where the female is the primary earner and the subsample where the male is the primary earner (see Appendix Table 7 for relevant summary statistics). Results are presented for our base model (model A in columns 1 and 2) and full model (model D in columns 3 and 4) for each of these subsamples in Table 6.

The results for the male primary earners (columns 2 and 4 of Table 6) are very similar to those found in Table 4 (models A and D). Power couples of all types are again found to be significantly more likely to migrate than no-power couples, and whilst the marginal effect is now stronger for female-power couples, the differences in the probabilities are not significant between power-type couples. Amongst the female primary earner couples, there are no significant differences in migration probability between no-power and power couples (of any type).

Home owners are consistently less likely to migrate, as are couples where the female is employed (regardless of the gender of the primary earner). We also find that, whilst higher household income is associated with increased migration for female primary earning couples, female income share is again not related to migration for either subsample (see columns 3 and 4) supporting our earlier interpretation.

4 Conclusions

We analyse the within country migration movements of on-going couples in Australia between 2002 and 2009. The couples are divided into four categories based on the education levels of the members: power couples (both couple members have at least a college, defined as Bachelor or higher level, degree); male or female half-power couples (only the male or female partner, respectively, has at least a college degree); and no-power couples (neither of the partners has a college degree). We also address potential association of these migration movements with a range of local labour market features.

Power couples appear to be the most likely to migrate; however, we find this relationship to be significant and similar for both male half-power couples and female half-power couples. Furthermore, when the probability of migration is found to be significantly associated with gender-specific variables, these tend to be the female measures and not the male. Rather than being a tied-mover, we could interpret these findings as suggesting that females who are not well matched in the local labour market are successfully migrating the couple. Alternatively, the couple are more likely to migrate when the female's labour market position is tenuous.

Taken together, our results suggest that couples with at least one graduate member are more likely to migrate to a major city regardless of the gender of the graduate. The results are consistent with an urbanisation hypothesis for couples: partnered college graduates in Australia like to live in cities regardless of their gender or the qualifications of their partner.

Table 6 Migration probability (probit) by primary earner status

	Female primary earner	Male primary earner	Female primary earner	Male primary earner
	(A)	(B)	(C)	(D)
Power couple	−0.062	0.227**	−0.100	0.275**
	(0.153)	(0.085)	(0.158)	(0.090)
Male-power couple	0.098	0.188*	0.050	0.198*
	(0.220)	(0.095)	(0.220)	(0.097)
Female-power couple	−0.061	0.270**	−0.053	0.308**
	(0.122)	(0.082)	(0.125)	(0.084)
Origin—major city	−0.382**	−0.334**	−0.382**	−0.331**
	(0.109)	(0.058)	(0.110)	(0.058)
Origin—rural	−0.703**	−0.116	−0.689**	−0.114
	(0.178)	(0.079)	(0.179)	(0.080)
Age (male)	0.055	0.055	0.049	0.053
	(0.071)	(0.037)	(0.072)	(0.036)
Age^2 (male)	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.000)	(0.001)	(0.000)
Age (female)	0.013	0.001	0.032	0.005
	(0.082)	(0.040)	(0.083)	(0.040)
Age^2 (female)	−0.000	−0.000	−0.001	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Over-education (female)	0.194	0.026	0.173	−0.030
	(0.105)	(0.058)	(0.109)	(0.059)
Over-education (male)	−0.058	−0.004	−0.037	−0.007
	(0.104)	(0.057)	(0.105)	(0.058)
Dependent children	−0.085	0.029	−0.146	−0.025
	(0.117)	(0.062)	(0.116)	(0.064)
Foreign	0.199	−0.037	0.181	−0.051
	(0.114)	(0.061)	(0.113)	(0.062)
Home ownership	−0.521**	−0.721**	−0.522**	−0.694**
	(0.113)	(0.057)	(0.113)	(0.059)
Unemployed (male)			−0.056	0.011
			(0.293)	(0.162)
Out of labour force (male)			0.049	0.283
			(0.187)	(0.175)
Unemployed (female)			0.699*	0.611**
			(0.296)	(0.125)
Out of labour force (female)			0.342*	0.318**
			(0.174)	(0.070)
Disposable income (×10,000)			0.017*	0.005
			(0.007)	(0.006)
Female income share			−0.099	0.351
			(0.274)	(0.180)
No. obs.	2975	10,061	2975	10,061

HILDA Survey – Waves 2 to 9 (Pooled). For ease of analysis, marginal effects are reported. $p >$ abs(Z) in parenthesis. Significance levels: ** $p < 0.01$; * $p < 0.05$. Standard errors are adjusted for clustering on household identifier

Endnotes

[1]In 2014, 89 % of Australia's population were urban compared to 81 % in the USA, 86 % in New Zealand, 88 % in Denmark and 92 % in Israel (Central Intelligence Agency 2014).

[2]This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

[3]For example, information on home ownership was only collected from the second wave, this variable is used as a control variable in the estimation.

[4]The same analysis was repeated for couples with an average age of 40 or less and confirms the results obtained with the older couples. Results are available on request.

[5]In Compton and Pollak (2007), the migration decision is defined in terms of a three equation latent dependent variable model (rather than the two equation model presented here), the third equation estimates the probability of the coupling continuing (not divorcing). The divorce equation cannot be estimated with the HILDA dataset that we use as it is not possible to identify why sample units disappear from the survey.

[6]Inverse Mills Ratio

	Mean	St. dev	Min	Max
$\varphi(z_{it}\delta)/\Phi(z_{it}\delta)$	0.237	0. 177	0	1.213

HILDA Survey – Waves 2 to 9 (Pooled)

The vector z_{it} in Eq. (1) includes the base model variables and each couple member's own health status (a binary measure coded as 1 if the individual records their health as fair or poor, as opposed to being good, very good or excellent). Sample attrition is found to be relevant and should be addressed when considering coupled migration within Australia (as indicated by the significant Inverse Mills Ratio in the penultimate row of Table 4).

[7]We considered sample attrition correction based on Inverse Probability Weighting (IPW) which can be applied to general M estimators (Robins et al. 1995; Wooldridge 2002a, b). This approach can be applied in the context of inherently non-linear models (such as probit). From the first-stage probit estimation represented by Eq. (1), the fitted probabilities of estimated response p_{it} are obtained. The inverse of the fitted probabilities are used to weight the observations in the IPW models. The observations appearing for the first time in the sample are attached a $p = 1$ (a trivial interpretation is that sample units appearing for the first time in the sample are certain to be in their respective waves). Results are presented in column 3 of Table 3 for the base model.

[8]Junge et al. (2014; Table 4, columns 1 and 2) find an insignificantly different pattern across the genders in their Danish data set with over 4 million dual earner observations; they find power couples are the most likely to migrate, followed by male power and then female power couples regardless of the gender of the primary earner.

[9]Table 9 of the Appendix provides full results for the base model multinomial logits corresponding to panel A of Table 5: couples are again found to be less likely to migrate if the male is over-educated (although not significantly for migration into a major city) or if the couple own (purchased or currently paying a mortgage on) their house.

[10]We thank the referee for pointing out this possibility and how to address its implications.

Appendix

Table 7 Couple power-types by primary earner status

	All		Male earned more		Female earned more		Female and male earned the same	
	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Power couples	2385	16.9	1710	71.7	577	24.2	98	4.1
Male-power couples	1472	10.4	1248	84.8	181	12.3	43	2.9
Female-power couples	2040	14.5	1208	59.2	746	36.6	86	4.2
No-power couples	8200	58.2	5895	71.9	1471	17.9	834	10.2
Total	14,097	100	10,061	71.4	2975	21.1	1061	7.5

Table 8 Migration probability (probit) selected marginal effects; dual earner

	Base model			
	(A)	(B)	(C)	(D)
Power couple	0.108	0.112	0.105	0.079
	(0.088)	(0.088)	(0.089)	(0.093)
Male-power couple	0.136	0.139	0.133	0.115
	(0.107)	(0.107)	(0.107)	(0.107)
Female-power couple	0.239**	0.239**	0.239**	0.234**
	(0.078)	(0.077)	(0.078)	(0.079)
Origin—major city	−0.197**	−0.171*	−0.228**	−0.201**
	(0.066)	(0.069)	(0.071)	(0.066)
Origin—rural	−0.092	−0.088	−0.093	−0.084
	(0.087)	(0.086)	(0.087)	(0.087)
Labour market insecurity of MSR of origin (male)		−0.002		
		(0.036)		
Labour market insecurity of MSR of origin (female)		−0.018		
		(0.034)		
Unemployment rate in MSR of origin (male)			−1.660	
			(3.683)	
Unemployment rate in MSR of origin (female)			−4.847	
			(4.635)	
Disposable income (×10,000)				0.011
				(0.006)
Female income share				−0.122
				(0.144)
No. obs.	10,136	10,136	10,136	10,136

HILDA Survey – Waves 2 to 9 (Pooled) All estimates (in models A to D) include controls for the age (and age squared) of each couple member; each couple member's education relative to the MSR average for their occupation; dependent children in the household, least one couple member being foreign born, and if the couple are home owners. For ease of analysis, marginal effects are reported. p > abs(Z) in parenthesis. Significance levels: ** $p < 0.01$ * $p < 0.05$. Standard errors are adjusted for clustering on household identifier

Table 9 Migration probability by destination type (multinomial logit), base model. Full results

	Major City	Urban	Rural
	(1)	(2)	(3)
Power couple	1.023**	−0.404	−0.101
	(0.223)	(0.282)	(0.389)
Male-power couple	1.060**	−0.261	−0.192
	(0.243)	(0.308)	(0.453)
Female-power couple	0.475*	0.352	0.035
	(0.222)	(0.201)	(0.326)
Origin—major city	−0.529**	−0.887**	−0.782**
	(0.162)	(0.177)	(0.278)
Origin—rural	−0.681**	−0.602**	0.212
	(0.260)	(0.221)	(0.301)
Age (male)	0.051	0.183*	0.085
	(0.089)	(0.090)	(0.152)
Age^2 (male)	−0.001	−0.003*	−0.001
	(0.001)	(0.001)	(0.002)
Age (female)	−0.045	−0.012	0.235
	(0.095)	(0.092)	(0.181)
Age^2 (female)	0.000	−0.000	−0.004
	(0.001)	(0.001)	(0.002)
Over-education (female)	0.007	0.389*	0.177
	(0.156)	(0.165)	(0.243)
Over-education (male)	−0.368*	0.205	0.032
	(0.154)	(0.157)	(0.236)
Dependent children	−0.113	0.017	−0.048
	(0.162)	(0.171)	(0.254)
Foreign	0.341*	−0.297	−0.340
	(0.155)	(0.192)	(0.275)
Home ownership	−1.438**	−1.540**	−1.034**
	(0.159)	(0.167)	(0.230)
No. obs.	14,097	14,097	14,097

Standard errors are adjusted for clustering on household identifier. HILDA Survey – Waves 2 to 9 (Pooled) standard errors reported in parenthesis, Significance levels: ** $p < 0.01$; * $p < 0.05$

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Competing interests
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