Female labour supply in Australia and Japan: An analysis based on longitudinal data

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The objective of this study

The following are the main objectives of this study:

- To compare the dynamics of female labour supply in Australia with those in Japan using longitudinal data.
- In particular, we focus on the relationships between education, vocational qualifications, and employment status of women in both countries.
- As the two countries differ in vocational training and employment systems, the comparison enables us to identify problems concerning job creation and family formation in the Japanese labour market.

Previous research in Japan

- Nawata, K. and Ii, M. (2004) 'Estimation of the labour participation and wage equation model of Japanese married women by the simultaneous maximum likelihood method', *Journal of the Japanese and International Economies*, 18(3)

- Edwards, L. and Pasquale, M. (2003) 'Women's higher education in Japan, family background, economic factors, and the Equal Employment Opportunity Law', *Journal of the Japanese and International Economies*, 17(1).

- Okamura, K. and Islam, N. (2011) 'Inter-temporal labour force participation among married women in Japan', *The Japanese Economic Review*, 62(4).

- Waldfogel, J., Higuchi, Y., and Abe, M. (1999) 'Family leave policies and women's retention after childbirth: Evidence from the United States, Britain, and Japan', *Journal of Population Economics*, 12(4)

Previous research in Australia

- Buddelmeyer, H., Wooden, M., and Ghantous, S. (2006) 'Transitions from casual employment in Australia', Report prepared for the Australian Department of Employment and Workplace Relations under the Social Policy Research Services Agreement, Melbourne Institute of Applied Economic and Social Research.

- Cai, L. (2010) 'Work choices of married women: Drivers of change', Visiting Researcher Paper, Productivity Commission, Canberra.

- Mitchell, W. and Welters, R. (2008) 'Does casual employment provide a "stepping stone" to better work prospects?', Centre of Full Employment and Equity Working Paper No. 08-11, University of Newcastle.

The data (1)

- We used two longitudinal data sets for the comparative analysis:
- the Household Income and Labour Dynamics in Australia (HILDA) Survey for Australia and the Japanese Panel Survey on Consumers (JPSC) for Japan.
- The two longitudinal data sets have the following features.

	HILDA	JPSC
Starting year	2001	1993
Gender of respondents	Both men and women	Only women
Age group for the first year	14–92 years	24–34 years
N of participants in the beginning	13,969	1,500
Interviews	Conducted annually	no interviews are conducted; questionnaire are sent to the respondents and returned to the institute by post.
Continuity	Panel members are followed over time	Panel members are followed over time
Topping of the data	5,477 new members were added in wave 11	500 new members were added in wave 5. 836 new members were added in wave 11
Information	Economic and subjective well-being, labour market dynamics, and family dynamics	Family dynamics, labour market dynamics, household incomes, savings, and expenditure

The data (2)

- We confine our analysis to respondents who fulfil the following conditions:
- (1) Female respondents aged 25–40 years
- (2) Respondents who responded for each year from 2005 to 2009
- (3) Respondents whose employment statuses are clear

- Because of the third condition, the sample data are strongly balanced, that is, they have the same number of time periods for all respondents. The number of observations for the data is
- 904 ×5 (waves) = 4,520 for the HILDA Survey
- 746 ×5 (waves) = 3,820 for the JPSC

The model (1)

- We assume that work experience increases the probability that a woman will work in the future, even if initial entry into the workforce is determined by a random process. That is, the employment outcome of the ith individual in the tth period depends on that in the $(t-1)^{th}$ period. α_i is an individual-specific error term.

$$y_{it}^* = \gamma\, y_{it-1} + x'_{it}\, \beta + \alpha_i + u_{it}$$

- $$u_{it} \sim N(0,\ \sigma_u^2)$$

- The initial employment status is specified as a reduced–form linear model in the following manner. Z_{i1} is a vector of exogenous instruments.

- $$y_{i1}^* = z_{i1}'\,\pi + \theta\alpha_i + u_{i1}$$

- The error term is assumed to follow the autoregressive process, as shown below:

$$u_{it} = \rho u_{it-1} + \varepsilon_{it}$$

The model (2)

- ## Model 1

$$y_{it} = \begin{cases} 1 \ (\text{employed}) & \text{if } y_{it}^* \geqq 0 \\ \\ 0 \ (\text{not employed}) & \text{if } y_{it}^* < 0 \end{cases}$$

- ## Model 2

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$$y_{it} = \begin{cases} 1 \ (\text{permanent or regular employment}) & \text{if } y_{it}^* \geqq 0 \\ \\ 0 \ (\text{casual or non-regular employment or NLF}) & \text{else} \end{cases}$$

- We adopt Stewart's (2006) method for the estimation using STATA.
- Stewart, M. (2006) 'Maximum simulated likelihood estimation of random–effects dynamic probit models with auto-correlated errors', *The Stata Journal*, 6(2)

Variables

- Because the systems of education and qualification differ between the two countries, we used different explanatory variables for the two countries for the highest education achieved.

- For the HILDA Survey   For the JPSC
- Postgraduate degrees   Bachelor's degree or higher
  (including Graduate certificates)   Technical or junior college
- Bachelor's or honours degrees   Vocational schools
- Advanced diplomas, diplomas   Vocational licences $\times$ Vocational schools
- Certificates III or IV

- For the HILDA Survey: reference group: twelve years of education , Certificate I/II or less
- For the JPSC Survey : reference group: senior high school or less

- The common explanatory variables used are number of children aged 0-4 years, number of children aged 5-14 years, and spousal incomes.

Australian Qualification Framework

TAFE (Technical and Further Education) qualifications
- Level 1 – Certificate I
- Level 2 – Certificate II
- Level 3 – Certificate III
- Level 4 – Certificate IV
- Level 5 – Diploma
- Level 6 – Advanced Diploma, Associate Degree

Degrees
- Level 7 – Bachelor Degree
- Level 8 – Bachelor Honours Degree, Graduate Certificate, Graduate Diploma
- Level 9 – Masters Degree
- Level 10 – Doctoral Degree

Estimated results (1) for the HILDA Survey   Dependent variable: employed/not employed

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (Employed)	0.685	5.54***	1.268	6.64***
Children0_4	-0.671	-8.51***	-0.525	-6.61***
Children5_14	-0.064	-1.01	-0.018	-0.36
Spousal income (AUD1,000)	-0.001	-0.60	-0.001	-0.83
Postgraduate degree	0.763	3.45***	0.569	3.17***
Bachelor's degree	0.767	4.53***	0.529	3.71***
Advanced diploma	0.413	1.79*	0.208	1.23
Certificate III/IV	0.040	0.21	0.023	0.15
Intercept (Wave4)	0.743	3.67***	0.192	0.87
Postgraduate degree	0.887	3.66***	0.869	3.79***
Bachelor's degree	0.965	5.19***	0.890	5.11***
Advanced diploma	0.990	3.71***	0.934	3.80***
Certificate III/IV	0.017	0.08	0.024	0.12

*** : significant at the 1% significance level, **: significant at the 5% significance level, *:   significant at the 10% significance level

Estimated results (2) for the HILDA Survey
Dependent variable : permanent employment/ casual employment or nlf

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (permanent)	0.750	6.26***	1.206	4.18***
Children0_4	-0.555	-6.80***	-0.458	-4.91***
Children5_14	-0.027	-0.44	0.007	0.12
Spousal income (AUD1,000)	0.000	0.09	0.000	0.30
Postgraduate degree	1.012	4.24***	0.840	3.36***
Bachelor's degree	1.395	6.86***	1.062	4.64***
Advanced diploma	0.904	3.26***	0.569	2.53**
Certificate III/IV	0.139	0.68	0.140	0.77
Intercept	-0.595	-3.78***	-0.831	-4.80***
(Wave 4)				
Postgraduate degree	1.008	3.86***	0.988	3.81***
Bachelor's degree	1.238	5.50***	1.145	5.43***
Advanced diploma	0.958	3.26***	0.818	3.04***
Certificate III/IV	0.118	0.44	0.141	0.54

*** : significant at the 1% significance level, **: significant at the 5% significance level,*: significant at the 10% significance level

Estimated results (3) for the JPSC Survey　Dependent variable: employed/not employed

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (Employed)	1.456	8.97***	1.893	6.78***
Children0_4	-0.346	-3.05***	-0.249	-2.32**
Children5_14	0.131	1.51	0.150	2.29**
Spousal income (JPY 10,000)	-0.005	-2.05**	-0.004	-1.83*
Bachelor's or postgraduate degree	0.495	1.32	0.280	0.87
Technical or junior college	0.504	1.45	0.208	0.70
Vocational school	0.462	1.30	0.147	0.50
Intercept	-0.922	-2.63***	-0.957	-3.01***
(Wave13)				
Bachelor's or postgraduate degree	0.360	0.82	0.508	1.16
Technical or junior college	0.572	1.40	0.457	1.06
Vocational school	0.629	1.52	0.266	0.58
Intercept	-0.581	-1.51	-0.455	-1.11

*** : significant at the 1% significance level, **: significant at the 5% significance level, *: significant at the 10% significance level

Estimated results (4) for the JPSC Survey
Dependent variable: regular employment/employed part-time or not working

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (Regular)	1.770	5.94***	2.115	4.16***
Children0_4	-0.355	-2.28**	-0.291	-1.77*
Children5_14	0.043	0.39	0.064	0.64
Spousal income (JPY10,000)	-0.009	-1.77*	-0.009	-1.82*
Bachelor or postgraduate degree	1.508	1.91*	1.216	1.57
Technical or junior college	0.878	1.28	0.726	1.17
Vocational school	0.233	0.35	0.180	0.32
Intercept (wave13)	-2.561	-3.26***	-2.346	-3.29***
Bachelor or postgraduate degree	4.703	0.11	2.575	2.16**
Technical or junior college	4.085	0.09	1.927	1.73*
Vocational school	3.627	0.08	1.375	1.26

*** : significant at the 1% significance level, **: significant at the 5% significance level, *: significant at the 10% significance level

Estimated results (5) for the JPSC Survey　　Dependent variable: employed/not employed

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (Employed)	1.498	9.25***	1.898	6.80***
Children0_4	-0.330	-3.03***	-0.247	-2.31**
Children5_14	0.134	1.62	0.150	2.30**
Spousal income (JPY 10,000)	-0.005	-2.05**	-0.004	-1.84*
Bachelor's or postgraduate degree	0.111	0.44	0.166	0.86
Technical or junior college	0.105	0.53	0.094	0.62
Vocational school* vocational licence	0.034	0.12	0.043	0.22
Intercept (Wave 13)	-0.556	-2.19**	-0.848	-3.33***
Bachelor's or postgraduate degree	-0.176	-0.63	-0.158	-0.58
Technical or junior college	0.030	0.14	0.034	0.16
Vocational school* vocational licence	0.040	0.14	0.067	0.23

*** : significant at the 1% significance level, **: significant at the 5% significance level, *: significant at the 10% significance level

Estimated results (6) for the JPSC Survey
Dependent variable: regular employment/employed part-time or not working

	RE dynamic probit model		RE dynamic model with AR (1)	
	Marginal effect	z-value	Marginal effect	z-value
Lag1 (Regular)	1.776	9.45***	2.146	4.25***
Children0_4	-0.356	-2.53**	-0.284	-1.73*
Children5_14	0.093	1.00	0.070	0.70
Spousal income (JPY 10,000)	-0.008	-1.62	-0.009	-1.85*
Bachelor's or postgraduate degree	1.139	3.54***	1.115	2.03**
Technical or junior college	0.670	2.79***	0.630	1.79*
Vocational school × vocational licence	0.315	1.05	0.178	0.50
Intercept	-4.223	-0.15	-2.245	-4.69***
(wave13)				
Bachelor's or postgraduate degree	1.246	2.59**	1.349	2.56**
Technical or junior college	0.637	1.93*	0.712	1.74*
Vocational school × vocational licence	0.271	0.64	0.159	0.31

*** : significant at the 1% significance level, **: significant at the 5% significance level, *: significant at the 10% significance level

Major findings

- 1) The effects of postgraduate or bachelor's degrees on employment are significant and positive in the estimations using HILDA data but not for those using JPSC data.

- 2) In the HILDA estimation, higher vocational qualifications, that is, advanced diplomas or diplomas, have significant positive effects on both the probability of general employment and that of permanent employment. In contrast, the effects of technical or junior college on both the probability of general employment and that of permanent employment were weak in the JPSC estimation.

- 3) The marginal effects of Lag1(Employed) are higher in the JPSC results than in the HILDA results. Likewise, the marginal effects of Lag1(Regular) in the JPSC are higher than those of Lag1(Permanent) in the HILDA Survey.

Concluding remarks

- The finding that, in Japan, state dependence is strong while the effects of vocational licences are weak suggests that it remains difficult for women to re-enter the job market after a career interruption.
- It may be necessary to establish a vocational education system similar to the Australian Qualification Framework so that certain vocational licences and graduation from higher-level vocational schools indicate consistent levels of skill or knowledge.
- It is also necessary for Japanese firms to change their employment policies to evaluate not only years of experience within firms but also skills acquired outside the firm.

Births and total fertility rate, Australia

Year	TFR	Crude births
2007~8	1.959	295,168
2008~9	1.963	300,077
2009~10	1.888	304,016
2010~11	1.927	301,150
2011~12	1.927	306,025
2012~13	1.951	311,441

Australian Demographic Statistics, Sep 2013 , Australian Bureau of Statistics

- Thank you very much for your attention.