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by

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IRISS Working Paper Series 2009-17 November 2009

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Reference IRISS Working Paper 2009-17, CEPS/INSTEAD, Differdange, Luxembourg

URL http://ideas.repec.org/p/irs/iriswp/2009-17.html

(CEPS/INSTEAD internal doc. #07-09-0501-E)

State Dependence in Labour Force Participation of Married Women in Japan*

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Abstract

This paper investigates state dependence in labour participation by married women in Japan. We statistically investigate whether 'true' state dependence, in which preferences, abilities, or constraints on future decisions are altered by experiencing certain events, exists in the choice between regular and non-regular work (part-time, contract, or other non-regular work). The empirical results suggest significant true state dependence for the choice of regular and non-regular work. This significant effect of true state dependence on regular work justifies 'stepping stone' policies from non-participation or non-regular work to regular work or 'maintenance' policies to support participation in temporary non-regular work. On the other hand, the significant effect of true state dependence on non-regular work indicates that non-regular work constrains the ability or preference of married women to participate in regular work. In this sense, non-regular work is exclusionary. This result suggests that policies are needed to support the movement of non-regular workers into regular work.

Keywords: Multinomial, Labour, Participation, State dependence, Stepping stone.

JEL classification codes: J22; C23, C25

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*The authors thank Philippe Van Kerm (CEPS/INSTEAD, Luxembourg) and participants at the 2009 Far East and South Asia Meeting of Econometric Society for helpful suggestions. We thank the Institute for Research on Household Economics for access to the Japanese Panel Survey of Consumers. The authors also thank Luxembourgish Institute National Research Fund (FNR).

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1 Introduction

Labour force participation by married women has a well-known M-shaped profile in Japan but an inverse U-shaped pattern in other developed countries. One reason for this difference in participation patterns lies in differences in women's transitions among regular work, non-regular work (part-time, work, or other non-regular work), and non-participation. Childbearing women employed as regular workers must leave the labour market instead of engaging in non-regular work if few opportunities to transition from regular to non-regular work are available. Even women employed as non-regular workers tend to leave the labour market during childbearing/rearing periods if good job opportunities are unavailable in non-regular work. Past studies have shown that non-regular work plays several roles in the labour market. Blank (1998) suggested that part-time work serves as a stepping stone that facilitates the transition from outside the labour market to full-time work. Alternatively, part-time work serves a maintenance function, providing a temporary alternative to full-time work during childbearing/rearing periods, allowing an individual to balance work activities with family responsibilities. However, part-time work may also be exclusionary. In this case, women are forced into unstable employment and eventually leave the labour market. In the dynamic framework of labour participation, the choice of participation state among regular work, non-regular work, and non-participation depends on the individual's past participation-state experiences. For example, an individual who participates in regular work at time t tends to participate in the same work state at time $t + 1$. Heckman (1981a) provided two possible explanations for this type of behaviour. One explanation involved "true state dependence" in which preferences, prices, or constraints on future decisions are altered as a consequence of experiencing an event. The second explanation involved "spurious state dependence" in which an individual's propensity to experience an event is correlated over time but no causation is inferred. To evaluate labour policies, it is important to distinguish between true and spurious state dependence in participation behaviour. If positive true state dependence exists in regular work, then the experience of regular work changes a worker's ability or preference to conform to regular work. This means that if some married women quit regular work to have or raise children, the economic disparity will increase between women who continue regular work and those who quit for childbearing/rearing, even if the two groups have the same observed and unobserved characteristics. As Ishikawa (2001) noted if "in the market, we say that the 'genuine wage disparity' that is problematic exists when there are workers who have the same ability and preference and yet do not obtain the same job opportunity." The existence of true state dependence in regular work produces "genuine" disparity for married women whose abilities and preferences are the same as those of working women if few opportunities to accommodate childbearing and childrearing are available for married working women. In this case, policies to support a transition back to regular work should help decrease economic disparity among married women. On the other hand, if positive true state dependence exists in non-regular work, the experience of non-regular work changes a worker's ability or preference for participating in non-regular work. In this case, the experience of non-regular work is not necessarily good for the worker's welfare because adjusting to regular work will be more difficult even if the worker wants regular employment.

Whether persistent labour force participation by childbearing/rearing married women succeeds depends on (1) the promotion of efficient transitions from non-participation to regular or non-regular work and (2) the degree of true state dependence in regular and non-regular work. In this paper, we shed light on the second point. We examine the existence of true state dependence in regular and non-regular work in a dynamic multinomial model. The existence of positive true state dependence in regular work means that experience of regular work has some effects in terms of changing a worker's inherent characteristics for participating in regular work. This suggests that even if a married woman quits her job for childbearing and rearing, she could later successively participate in regular work again by a "stepping stone" policy for labour force participation. On the other hand, if there is a positive true state dependence in non-regular work, then some effects change the worker's inherent characteristics for participating in non-regular work. This then suggests that non-regular work is exclusionary, meaning that workers' abilities or preferences are constrained by being forced to continuously engage in low-paid jobs (e.g., the so-called part-time trap). In this case, a "stepping stone" policy is needed to promote the transition from non-regular to regular work.

The remainder of this paper is organized as follows. Section 2 describes the data and variables. Section 3 presents the observed pattern of transitions among three work states: regular work, non-regular work, and non-participation. Section 4 outlines the structure of the model and empirical specifications. In Section 5, we present and discuss the results. Conclusions are given in Section 6.

2 Data

Here, we examine data from the 1993-2002 annual Japanese Panel Surveys of Consumers (JPSC). The JPSC entailed panel surveys of 1,500 women aged 24-34 in 1993 (Panel A); in 1997, 500 women aged 24-27 were added to the survey (Panel B) and in 2003, 836 women aged 24-29 were added. To focus on the dynamic aspect of work participation, we use the sample included in Panel A, which covers periods in 1993-2002. The sample consists of 340 continuously married couples. As a dependent variable, we use employment status categorized as regular, non-regular (part-time, contract, or other non-regular work), and non-participation. Age, education, number of children, permanent and transitory non-labour income, and post-school non-regular work experience (NWEP) are independent variables. Married women aged 24-34 in 1993 are included, and years of education are input as follows: junior high school = 9 years; specialized school or special training college for which junior high school graduation is an entrance qualification = 10.5 years; high school = 12 years; specialized school or special training college for which senior high school graduation is an entrance qualification = 13.5 years; junior college = 14 years; university = 16 years; and graduate school = 19.5 years. Fertility variables are defined as number of children aged 0-2, 3-5, and 6-17 (Children 0-2, Children 3-5, Children 6-17, respectively). The husband's annual earnings, reduced by the consumer price index (CPI; base year is 2005), are considered a proxy for non-labour income for married women. The 10-year average of the husband's annual earnings is used as permanent non-labour income (ymp), and deviations from permanent income are given as transitory non-labour income (ymt)[1].

[1]We follow the definition of fertility variables (Children 0-2, Children 3-5, Children 6-17) and permanent and transitory income (ymp and ymt) used by Hyslop (1999) and Islam (2007)

In Japan, the transition from school to work is the main port of entry for regular work. The school plays an important role in matching graduates and jobs. In other words, the school bears a large portion of the search cost. Failure to obtain regular work after graduation reflects poorly on an individual's ability and is likely to increase his or her search costs. Recognition of this situation may shift an individual's preference toward not participating in work activity or toward non-regular employment such as part-time or contract work. To examine such effects of the transition from school to work on subsequent work participation, this study uses a dummy variable to indicate the experience of part-time or temporary jobs or joblessness after school. This variable is called post-school non-regular work experience (NWEP)[2].

3 Observed transition patterns

Table 1 shows the transition matrix for non-participation, non-regular work, and regular work. According to this matrix, a substantial number of women remain in the same work state over time. A higher level of state dependence seems to exist in regular work: 92.6 percent of the women who were regular workers in year t remain regular workers in year $t+1$. On the other hand, 87.3 percent of the women who were non-regular workers in year t remain non-regular workers in year $t+1$. Almost 10 percent of the women who were non-regular workers in year t are not participating in year $t+1$, and almost 10 percent of the women who were non-participating in year t have transitioned to non-regular work in year $t+1$. Few cases of transitions between regular and non-regular work are observed.

These transition patterns are partly influenced by observed characteristics such as age and education as well as by unobserved heterogeneity. In the following sections, we analyse the degree of true state dependence for regular work and non-regular work by statistically controlling for observed characteristics and unobserved heterogeneity.

[2]The experience of non-regular work immediately after school may also delay the timing of marriage (Higuchi, 2001, see for example). By focusing on a sample of continuously married women, we can identify the effect of NWEP on subsequent work participation behavior conditional on the effect on marriage.

Table 1. Work Transition Matrix for Married Women in the Period 1994-2002

		State at time t+1		
		Non-participation	Non-regular	Regular
State at time t	Non-participation	88.88	10.05	0.8
	Non-regular	9.6	87.3	3.13
	Regular	3.5	4.0	92.6

Note: Numbers in rows are percentages, based on $3,060$ observations ($340 women \times 9 years$).

4 Empirical Model

We estimate a dynamic multinomial logit model with random effects to analyze the transitions among non-participation, regular, and non-regular work. The unobserved individual-specific effects are allowed to correlate with observed characteristics and to follow a discrete, non-parametric distribution.

In a dynamic multinomial logit framework Hansen and Lofstrom (2009) analyzed the transitions among social assistance, unemployment, and employment, whereas Prowse (2007) examined the transitions among full-time work, part-time work, and non-participation. We follow these papers for the econometric modelling and thus the model can be described as follows[3].

Consider a married woman (indexed $i = 1...N$) belongs to any of three mutually exclusive work states k at time $t(t = 2, 3, ..., T)$; the initial state $k = 1$ is non-participation, 2nd state $k = 2$ is employment as a non-regular worker , and 3rd state $k = 3$ is employment as a regular worker. Then the value V_{ikt} for a married woman i belonging to state k at time t can be specified as follows:

$$V_{ikt} = X_{it}\beta_k^1 + Z_i\beta_k^2 + L_{it}\beta_k^3 + \epsilon_{ikt} \tag{1}$$

$$\text{where} \quad \epsilon_{ikt} = \mu_{ik} + \nu_{ikt}$$

[3]Prowse (2007) used the maximum simulated likelihood method, but in this paper, we do not adopt simulation techniques, instead we apply latent class approach for the distribution of unobserved heterogeneity

And X_{it} is a vector of time-varying observable characteristics, including time dummies, age, number of children (aged 0-2, aged 3-5, aged 6-17), and transitory non-labour income; Z_i is a vector of time-invariant observable characteristics, including educational attainment, permanent non-labour income, and the dummy variable for NWEP; and L_{it} is a vector of previous work-participation state. The error term ϵ_{ikt} is composed of two terms: μ_{ik} represents an unobserved individual-specific and time-invariant component, and ν_{ikt} represents a serially uncorrelated error term. In the equation, parameter vectors β_k^l $l = 1, 2, 3$ are to be estimated, and for identification purposes, we normalise β_1^l $l = 1, 2, 3$and μ_{i1} to zero. The probability of observing individual i in state k at time $t(t > 1)$, conditional on X_{it} ,Z_i ,L_{it}, and μ_{ik} can be written as

$$P_t\left(k_t/\mu\right) = \frac{exp\left(X_{it}\beta_k^1 + Z_i\beta_k^2 + L_{it}\beta_k^3 + \mu_{ik}\right)}{\sum_{s=1}^{3} exp\left(X_{it}\beta_s^1 + Z_i\beta_s^2 + L_{it}\beta_s^3 + \mu_{is}\right)} \tag{2}$$

It is possible that the unobserved individual-specific and time-invariant component is correlated with number of children, transitory non-labour income, and NWEP. For this we follow Mundlak (1978) and Chamberlain (1984), and assume that the unobserved individual-specific and time-invariant component μ_{ik} is correlated with mean values (for t) of number of children, transitory non-labour income, and NWEP. Thus we define the correlated random effects (CRE) as follows:

$$\mu_{ik} = \begin{cases} \delta_1 \text{mean}\left(\text{no. of children 0-2}\right)_{ik} + \delta_2 \text{mean}\left(\text{no. of children 3-5}\right)_{ik} + \\ \delta_3 \text{mean}\left(\text{no. of children 6-17}\right)_{ik} + \delta_4 \text{mean}\left(y_{mt}\right)_{ik} + \delta_5 \text{mean}\left(\text{NWEP}\right)_{ik} + \eta_{ik} \end{cases} \tag{3}$$

where η_{ik} represent unobserved individual-specific components which is uncorrelated with number of children, transitory non-labour income, and NWEP.

At initial observation a person may be endogenous (i.e., initial observations may be correlated with unobserved heterogeneity) in the dynamic model. For this we adopt a procedure suggested by Heckman (1981b) to deal with the initial condition. Let the value for individual i in state k at the initial period $(t = 1)$, be specified as

$$V_{ik1} = X_{i1}\theta_k^1 + Z_i\theta_k^2 + \epsilon_{ik1} \quad (4)$$

where $\epsilon_{ik1} = \tau_{ik} + \nu_{ik1}$

The parameters θ_k^l $l = 1, 2, 3$ are to be estimated and as before, we normalise θ_1^l $l = 1, 2, 3$ and τ_{i1} to zero. The probability of observing individual i in state k at time $t = 1)$, conditional on X_{i1} ,Z_i, and τ_{ik} can be written as

$$P_1\left(k_1/\tau\right) = \frac{exp\left(X_{i1}\theta_k^1 + Z_i\theta_k^2 + \tau_{ik}\right)}{\sum_{s=1}^3 exp\left(X_{i1}\theta_s^1 + Z_i\theta_s^2 + \tau_{is}\right)} \quad (5)$$

The unobserved individual-specific effects, τ_{ik}, are assumed to be correlated with η_{ik}, and they can be identified through serial correlation in ϵ_{ikt}. Model estimation is then straight forward by maximum likelihood techniques. The sample likelihood for the multinomial logit with random intercepts has the following form:

$$L = \prod_{i=1}^N \int_{-\infty}^{\infty} \prod_{t=2}^T \prod_{k=1}^3 \left(P_1\left(k_1/\tau\right)\right)^{d_{ik1}} \left(P_t\left(k_t/\eta\right)\right)^{d_{ikt}} f\left(\vartheta\right) d\vartheta \quad (6)$$

where $d_{ikt} = 1$ if individual i chooses alternative k at time t and equals zero otherwise. The vector ϑ_i has η_{ik} and τ_{ik} elements. As ϑ_i is not observed, we have to integrate out this term from the conditional likelihood to obtain the unconditional likelihood function. To do this, we specify a distribution for ϑ_i following Heckman and Singer (1984). We approximate the distribution for ϑ_i by a discrete distribution with a finite number J of support points. Associated with each support point is a probability π_j, where $\sum_{j=1}^J \pi_j = 1$ and $\pi_j > 0$. We assume that J types of individuals exist and that each individual is endowed with a set of unobserved characteristics ϑ_i^j (consisting of $\tau_{ik} and \eta_{ik}$ for $k = 1, 2, 3$) for $j = 1, 2, ..., J$. The likelihood is then

$$L = \prod_{i=1}^N \sum_{j=1}^J \pi_j \prod_{t=2}^T \prod_{k=1}^3 \left(P_1\left(k_1/\tau\right)\right)^{d_{ik1}} \left(P_t\left(k_t/\eta\right)\right)^{d_{ikt}} \quad (7)$$

We report estimates based on this model where $J = 3$.

5 Empirical Results

Table 2 shows the regression results of the standard multinomial logit model. The negative effects of young children are larger in non-regular than in regular work. If childbearing/rearing has a fixed time cost, the negative effects should be larger for regular work. On the other hand, the negative effects of the husband's earnings are larger in regular work than in non-regular work, and the effects are larger for permanent non-labour income than for transitory non-labour income.

Table 2. Estimated parameter of Standard Multinomial Logit Model

Variables	Regular work	Non-regular work
Permanent non-labour income(Y_{mp})	-0.380	-0.249
	(0.170)	(0.052)
Transitory non-labour income(Y_{mt})	-0.134	-0.089
	(0.042)	(0.063)
No. of Children(0-2 years)	-0.514	-1.729
	(0.237)	(0.759)
No. of Children(3-5 years)	-0.445	-0.786
	(0.992)	(0.306)
No. of Children(6-17 years)	0.061	-0.027
	(0.121)	(0.204)
Post-school non-regular(work experience)	0.439	0.056
	(0.921)	(0.622)
Log-likelihood	-2957.86	

Note:Estimated standard errors are in parentheses. All specifications include unrestricted time effects, a quadratic in age, and years of education.

It seems that the husband's work activity and the wife's work activity substitute for each other, and married women's participation is inter-temporally optimized. On the other hand, NWEP does not affect the multinomial state choice significantly. We checked the robustness of these results by estimating several models controlling the unobserved heterogeneity and dynamic structure.

Table 3 shows the regression results for random effects and the correlated random effects multinomial logit model, which controls the unobserved heterogeneity. Columns (1) and (2) show the results of the uncorrelated random effects model, and columns (3) and (4) show the results of the correlated random effects model. If the unobserved heterogeneity is endogenous, i.e., married women's preference is influenced by number of children, husband's income, and NWEP, parameters in the simple random effect model have some biases. We then checked the goodness of fit for the CRE model by the likelihood ratio test. The test statistic for the correlated to uncorrelated random effect models was 12.08, indicating that the null hypothesis that no difference exists between correlated and uncorrelated random effect models can be rejected. We now interpret the results of the correlated random effects model.

In a simple random effect specification [columns (1), (2)], the effect of NWEP is significantly positive for choice of regular work, whereas its effect is significantly negative for the choice of non-regular work. However, in the CRE specification, the effects of NWEP are significantly positive for both regular and non-regular work. Why does the experience of NWEP increase the probability of choosing regular and non-regular work more than that for choosing non-participation? It is possible that women engaged in non-regular work tend to be married to men engaged in non-regular work, and they thus must work after marriage because of the low level of household income. NWEP is negatively correlated with unobserved heterogeneity, indicating that NWEP depresses inherent ability or preference for work. In the CRE specification, number of children has larger negative effects in regular work, except for children aged 0-2. Childcare has a fixed time cost, and number of children is more costly when working as a regular worker than as a non-regular worker. Because more opportunities for official aid exist for children aged 0-2, little cost difference between regular and non-regular work may exist. In a simple random effects specification, the negative effects of non-labour income are larger for non-regular work than for regular work. However, in a CRE specification, negative effects of non-labour income are larger for regular work. These results suggest that women's work behaviour depends on the household earnings; as the husband earns more, the woman spends less time on work activity. The estimated support points and accompanying probabilities for the model indicate unobserved heterogeneity in individual-specific preferences. For example, for regular work in the CRE model, the first support point is

Table 3. Estimated parameter of Uncorrelated and Correlated Random Effects Multinomial Logit Models

Variables	Uncorrelated RE		Correlated RE	
	Regular (1)	Non-Regular (2)	Regular (3)	Non-Regular (4)
Permanent non-labour income(Y_{mp})	0.005 (0.003)	-0.361 (0.002)	-1.011 (0.005)	-0.427 (0.003)
Transitory non-labour income(Y_{mt})	-0.508 (0.006)	-0.133 (0.003)	-0.455 (0.006)	-0.128 (0.003)
No. of Children ($0-2$years)	-0.799 (0.011)	-2.000 (0.008)	-1.783 (0.015)	-1.916 (0.012)
No. of Children ($3-5$years)	-0.747 (0.009)	-0.869 (0.006)	-1.248 (0.013)	-0.790 (0.009)
No. of Children ($6-17$years)	-0.236 (0.009)	-0.238 (0.006)	-0.473 (0.013)	-0.149 (0.009)
Post-school non-regular (work experience)	1.229 (0.022)	-0.300 (0.013)	0.734 (0.011)	1.019 (0.050)
Correlation with unobserved heterogeneity				
Transitory non-labour income(Y_{mt})			-0.492 (0.007)	-0.355 (0.004)
No. of Children ($0-2$years)			-1.600 (0.047)	0.303 (0.055)
No. of Children ($3-5$years)			1.412 (0.045)	-1.060 (0.043)
No. of Children ($6-17$years)			0.884 (0.016)	0.353 (0.014)
Post-school non-regular (work experience)			-1.119 (0.011)	-0.519 (0.050)
First support point (θ_1)	-5.059 (0.058)	-4.073 (0.020)	-6.815 (0.039)	-2.947 (0.031)
Second support point (θ_2)	-1.947 (0.054)	-0.529 (0.022)	-0.443 (0.024)	0.153 (0.044)
Third support point (θ_3)	4.381 (0.050)	0.074 (0.019)	6.276 (0.027)	1.014 (0.031)
Probability (π_1)	0.413	0.413	0.436	0.436
Probability (π_2)	0.358	0.358	0.399	0.399
Probability (π_3)	0.228	0.228	0.165	0.165
Log-likelihood	-1622.56	-1622.56	-1616.52	-1616.52

Note: Estimated standard errors are in parentheses. All specifications include unrestricted time effects, a quadratic in age, and years of education.The CRE model expresses individual-specific components as a linear function of the mean values of ymt, Children 0-2, Children 3-5, Children 6-17, and NWEP.

-6.815 with probability of 0.436, the second support point is -0.443 with probability of 0.399, and the third support point is 6.276 with probability of 0.165. These results suggest that about 16 percent of the sample has a strong inherent preference for work, 44 percent has a weak preference for work, and 40 percent has a noncommittal preference.

Table 4 shows the regression results of dynamic uncorrelated and correlated random effects multinomial logit specification. Columns (1) and (2) show the results of the dynamic uncorrelated random effects model, and columns (3) and (4) show the results of the correlated random effects model. Our main concern is whether there are true state dependencies in regular work and non-regular work. Empirically, we checked the existence of true state dependence based on the coefficient of the lagged dependent variable, controlling for unobserved heterogeneity. If the coefficient of the lagged dependent variable is significantly positive, we infer that true state dependence in the participation behaviour of married women. As the table shows, the coefficient of the lagged dependent variable is significantly positive for both regular and non-regular work, but its value is larger for regular work. This means that if married women experienced regular (non-regular) work in the last period, the probability of their participating in regular (non-regular) work activity in the current period increases as compared to women who experienced non-participation in the last period. The coefficient of lagged participation is larger for regular work, suggesting that regular work requires more skills or stronger preference than does non-regular work. These results have important policy implications. Active labour market policies such as training programs for married women can be a stepping stone to regular work, increasing women's aptitude for regular work and successively increasing their participation. However, if the reason for the true state dependence in regular work lies in the scarcity of non-regular work for childbearing/rearing women, strategies that provide opportunities for temporary non-regular work must be supported. The existence of true state dependence in non-regular work suggests that the experience of non-regular work alters married women's ability or preference in ways that do not conform to regular work. In that case, some kind of stepping stone policy is needed to provide non-regular workers with regular work experience.

We again checked the goodness of fit for the CRE model by the likelihood ratio test.

Table 4. Estimated parameter of Dynamic Uncorrelated and Correlated Random Effects Multinomial Logit Models

Variables	Uncorrelated RE		Correlated RE	
	Regular (1)	Non-Regular (2)	Regular (3)	Non-Regular (4)
Permanent non-labour income(Y_{mp})	-0.457 (0.007)	-0.314 (0.004)	-0.287 (0.007)	-0.165 (0.003)
Transitory non-labour income(Y_{mt})	-0.239 (0.008)	-0.130 (0.004)	-0.238 (0.009)	-0.152 (0.005)
No. of Children ($0-2$years)	-1.127 (0.017)	-1.506 (0.011)	-1.435 (0.027)	-1.551 (0.018)
No. of Children ($3-5$years)	-0.607 (0.015)	-0.587 (0.008)	-1.020 (0.022)	-0.704 (0.015)
No. of Children ($6-17$years)	0.324 (0.013)	0.087 (0.007)	-0.373 (0.022)	-0.171 (0.013)
Post-school non-regular (work experience)	0.504 (0.041)	0.123 (0.026)	0.394 (0.314)	0.410 (0.058)
Lagged participation	4.194 (0.021)	2.702 (0.009)	4.002 (0.017)	2.644 (0.009)
Correlation with unobserved heterogeneity				
Transitory non-labour income(Y_{mt})			0.144 (0.010)	0.070 (0.006)
No. of Children ($0-2$years)			0.392 (0.153)	-0.547 (0.057)
No. of Children ($3-5$years)			-0.722 (0.103)	0.374 (0.035)
No. of Children ($6-17$years)			1.315 (0.026)	0.522 (0.016)
Post-school non-regular (work experience)			0.517 (0.336)	-0.141 (0.060)
First support point (θ_1)	-5.256 (0.142)	-2.510 (0.073)	-6.139 (0.223)	-16.402 (0.865)
Second support point (θ_2)	-3.826 (0.148)	-0.087 (0.075)	-5.324 (0.215)	3.150 (0.253)
Third support point (θ_3)	0.100 (0.143)	0.476 (0.072)	-0.086 (0.209)	4.545 (0.257)
Probability (π_1)	0.396	0.396	0.242	0.242
Probability (π_2)	0.250	0.250	0.408	0.408
Probability (π_3)	0.355	0.355	0.350	0.350
Log-likelihood	-1374.01	-1374.01	-1366.42	-1366.42

Note: Estimated standard errors are in parentheses. All specifications include unrestricted time effects, a quadratic in age, and years of education.The CRE model expresses individual-specific components as a linear function of the mean values of ymt, Children 0-2, Children 3-5, Children 6-17, and NWEP.

The test statistic for correlated to uncorrelated random effects models is 15.18; thus, we can reject the null hypothesis that no structural difference exists, as for the static model. We then interpret the estimation results by the correlated random effects model. As columns (3) and (4) show, the number of children has large negative effects on regular work with children aged 3-5 and 6-17, but not for those aged 0-2. The effects of non-labour income are more negatively correlated with participation in regular work than in non-regular work. The effects of NWEP are significantly positive for choice of regular and non-regular work, and the coefficient is larger for regular than for non-regular work. The accompanying probabilities of the estimated support points are 0.242 for the first support point, 0.408 for the second support point, and 0.350 for the third support point, which shows greater bias for high ability or strong preference than was observed the static model.

Table 5 shows the results of the dynamic uncorrelated and correlated random effects models for the initial period. The effects of number of children aged 3-5 and 6-17 are different between the initial period and whole period for the choice of both regular and non-regular work. The effects of NWEP are negative for the choice of non-regular work in the initial period but positive for the whole period.

Table 5. Estimated parameter of Initial period of Dynamic Uncorrelated and Correlated Random Effects Multinomial Logit Models

Variables	Uncorrelated RE		Correlated RE	
	Regular (1)	Non-Regular (2)	Regular (3)	Non-Regular (4)
Permanent non-labour income(Y_{mp})	-0.515 (0.007)	-0.390 (0.008)	-0.497 (0.007)	-0.246 (0.008)
Transitory non-labour income(Y_{mt})	-0.521 (0.012)	-0.147 (0.012)	-0.574 (0.013)	-0.062 (0.018)
No. of Children ($0-2$years)	-0.859 (0.017)	-1.433 (0.023)	-0.945 (0.018)	-1.206 (0.024)
No. of Children ($3-5$years)	0.066 (0.016)	-0.252 (0.019)	0.138 (0.017)	-0.161 (0.027)
No. of Children ($6-17$years)	-0.218 (0.017)	-0.064 (0.017)	-0.164 (0.017)	0.032 (0.015)
Post-school non-regular (work experience)	0.759 (0.035)	-0.122 (0.041)	0.887 (0.035)	-0.005 (0.039)
First support point (θ_1)	-1.100 (0.001)	-3.300 (0.001)	-1.100 (0.001)	-3.300 (0.001)
Second support point (θ_2)	0.200 (0.001)	-1.600 (0.001)	0.200 (0.001)	-1.600 (0.001)
Third support point (θ_3)	2.200 (0.001)	0.300 (0.001)	2.200 (0.001)	0.300 (0.001)
Probability (π_1)	0.396	0.396	0.242	0.242
Probability (π_2)	0.250	0.250	0.408	0.408
Probability (π_3)	0.355	0.355	0.350	0.350
Log-likelihood	-1374.01	-1374.01	-1366.42	-1366.42

Note: Estimated standard errors are in parentheses. All specifications include unrestricted time effects, a quadratic in age, and years of education.

To check the robustness of the dynamic multinomial logit model, we also estimated a linear probability model, namely the instrumental variable model. In the instrumental variable model, the first difference of the lagged dependent variable is used as an instrument for the lagged dependent variable. We made two sub-samples and estimated the linear probability model separately for each; sub-sample (a) included only regular workers and non-participating women, and sub-sample (b) included only non-regular workers and non-participating women.

Table 6 shows the results of the linear probability modelling. We estimated the linear probability model by the instrumental variable method using the first difference of the lagged dependent variable as an instrument for the lagged dependent variable.

Table 6. Estimated parameter of Linear Probability Model

Variables	Regular work	Non-regular work
Permanent non-labour income(Y_{mp})	-0.038	-0.032
	(0.008)	(0.008)
Transitory non-labour income(Y_{mt})	-0.004	-0.010
	(0.004)	(0.006)
No. of Children(0-2 years)	-0.030	-0.148
	(0.012)	(0.022)
No. of Children(3-5 years)	-0.020	-0.086
	(0.012)	(0.020)
No. of Children(6-17 years)	0.010	-0.011
	(0.012)	(0.016)
Post-school non-regular(work experience)	0.033	-0.005
	(0.038)	(0.050)
Lagged participation	0.245	0.355
R-Square	0.624	0.556
No. Of Observations-Square	1599	1933

Note:Estimated standard errors are in parentheses. All specifications include unrestricted time effects, a quadratic in age, and years of education. We estimated the instrumental variable model, in which the first difference of the lagged variable is used as an instrument for the lagged dependent variable.

The qualitative results are almost the same except for post-school non-regular work experience, which is not significant in the linear probability model. The effects of lagged participation are significantly positive in both regular and non-regular work, confirming that the main results of our dynamic multinomial logit model are robust.

6 Conclusion

We investigated whether there is "true" state dependence, in which preferences, abilities, or constraints on future decisions are altered as a consequence of experiencing an event, in the choice of regular and non-regular work. If true state dependence exists in the choice of regular work, giving married women opportunities to experience regular work opens the way for their successive participation as regular workers. On the other hand, if true state dependence exists in the choice of non-regular work, the experience of non-regular work constrains the possibilities for career advancement by married women. We used panel data from the JPSC for the years 1993 to 2002 and estimated a dynamic multinomial logit model that allows for correlated random effects. We additionally applied a linear probability model to check the robustness of the multinomial logit model. The empirical results suggest that significant "true" state dependencies exist for the choice of regular and non-regular work. The significant effect of true state dependence in regular work justifies the need for "stepping stone" policies to support women's movement from non-participation or non-regular work to regular work or "maintenance" policies to support temporary non-regular work. On the other hand, the significant effect of true state dependence in non-regular work means that non-regular work constrains married women's ability or preference in ways that do not conform to regular work. In this sense, non-regular work is exclusionary. This result also suggests that policies should be developed to support the movement of non-regular workers into regular work. Prowse (2007) found the presence of true state dependence for full-time and part-time work using British Household Panel Survey data. She estimated both dynamic multinomial logit and linear probability models and showed that the degree of true state dependence depends on the specifications of unobserved heterogeneity. In our model, we assumed that transitory errors were serially uncorrelated; this is a strong assumption. Okamura and Islam (2007) estimated a binary choice model using the same data set and found strong serially correlated transitory errors and no true state dependence. Estimating the effects of true state dependence while controlling for serially correlated transitory errors in a multinomial-state model may confirm our results. This will be the subject of our future research.

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