Regional Childcare Availability and Individual Reproductive Behavior: A Multilevel Analysis of Second Births in Japan

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Abstract (157)

This study examines how the regional employment environment and childcare context affect individual reproductive behavior using multilevel modeling. Individual level data is sourced from the 14th National Fertility Survey and is combined with regional level data for female (aged 20-39 years) employment rate, childcare coverage rate, potential availability of childcare rate, and public and private childcare facility ratio. I prepare two regional sizes: the regional block level and the prefecture level. I analyze the determinants of the timing of the second births.

The results of the multilevel analyses suggest that regional level female employment and potential accessibility of childcare rate are positively related to the timing of the second birth at the regional block level. In the prefecture level, regional level childcare coverage rate is positively related, but female employment does not appear. In all models, random effects (between regions) and low intra-correlation coefficients are detected. Therefore, such models must be estimated by considering variations among regions.

Introduction

This study examines how the regional employment environment and childcare context affect individual reproductive behavior using multilevel modeling. The relations between a micro (individual) behavior and macro (group, area, social context) phenomena are one of the classic problems in the social science (Erbring and Young 1979). In recent years, statistical techniques to connect social contexts with individual behaviors have been developing, and studies using such technique have been increasing. There are the previous studies about analyzing the relations between the child care supports, the female labor market, and the individual reproductive behavior (Kravdal 1996, Hank 2002, Baiźan 2009 etc.). I analyze the determinants of the timing of the second births.

Regional patterns in Japanese fertility are characterized as the "High east and low west" trends during the initial demographic transition **(Figure 1)**. After the demographic transition, "Low in the metropolitan areas, high in the non-metropolitan areas" trends came to be observed. It is pointed out that the socio-economic and policy effect is different by regions (Kamata and Iwasawa 2009). This study focus on the cause of such variations by region may provide an important perspective to explain individual reproductive behavior.

Data and Methods

Individual level data is sourced from the 14th National Fertility Survey (National Institute of Population and Social Security Research 2012) and is combined with regional level data which is the Census 2010 and the “Socio-demographic Statistical System: Towns and Villages Basic Data File (1980-2009)” database provided by the Statistical Information Institute for Consulting and Analysis. I prepare two regional sizes: the regional block level and the prefecture level. I analyze the determinants of the timing of the second births.

The analytical data are 19,561 person-year cases (including 3,871 second births). The dependent variable is the second birth dummy variable. The covariates are the duration from 1st birth (year), the wife's age at 1st birth, the premarital Pregnancy at 1st birth, the wife's education, the wife's employment status, the living together with couple's mother etc.. The regional variables are female (aged 20-39 years) employment rate, childcare coverage rate, potential availability of childcare rate, and public and private childcare facility ratio **(Figure 2-1 to 2-4)**.

The method is the multilevel discrete-time logit model. This model explains the change of a second birth timing this model controlling the effects of covariates. In this analysis, the variation between regions is estimated by random intercept model.

Results

The results of the multilevel analyses suggest that regional level female employment and potential accessibility of childcare rate are positively related to the timing of the second birth at the regional block level **(Table 1)**. In the prefecture level, regional level childcare coverage rate is positively related, but female employment does not appear. In all models, random effects (between regions) and low intra-correlation coefficients are detected. Therefore, such models must be estimated by considering variations among regions.

The cross level interaction effect of the childcare coverage rate (potential availability of childcare rate) and the living together with couple's mother indicates that the childcare policy reduces negative effects of not living together with couple’s mother. These results suggest that it is needed to improve the foundations of child care services **(Table 1, model 2-3, 3-2, 3-3)**.

References

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Kravdal, Ø. (1996) "How the local supply of day-care centers influences fertility in Norway: A parity-specific approach" *Population Research and Policy Review*, June 1996, Volume 15, Issue 3, pp 201-218."

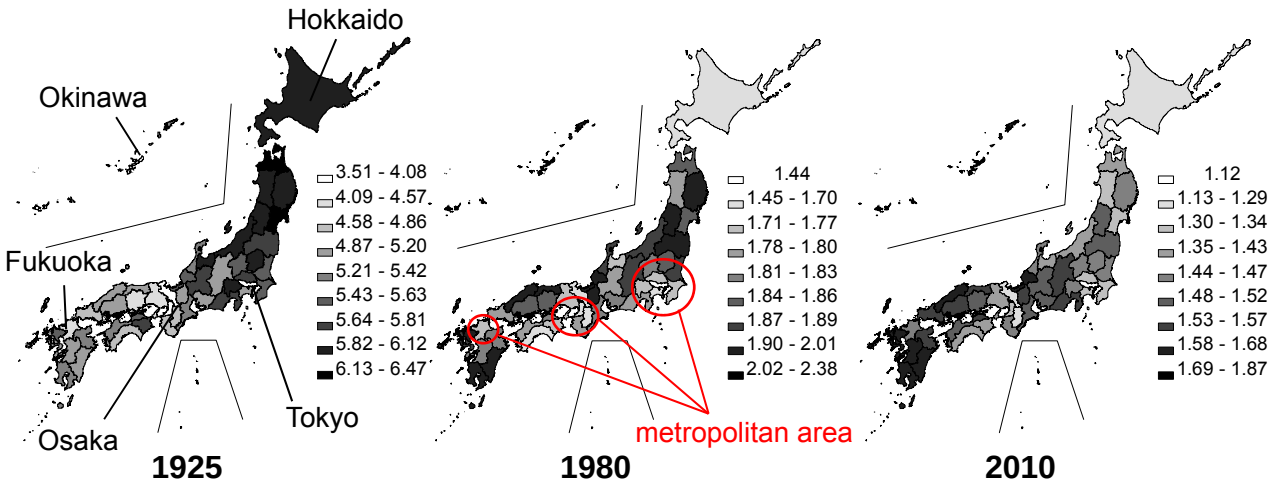

Figure 1 Total Fertility Rate (TFR) by Prefecture, 1925, 1980 and 2010

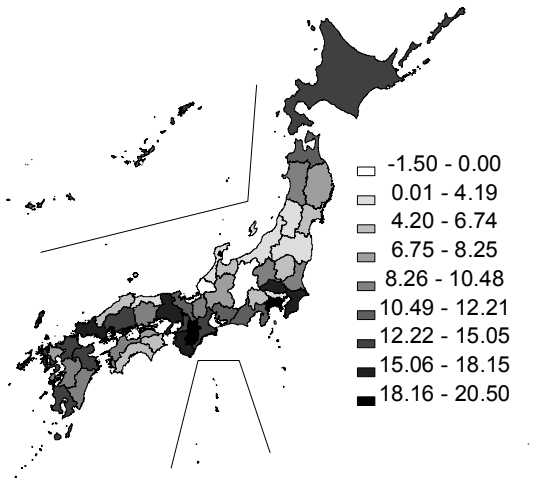

Figure 2-1 Female employment rate (%)
(1970-2010 difference)

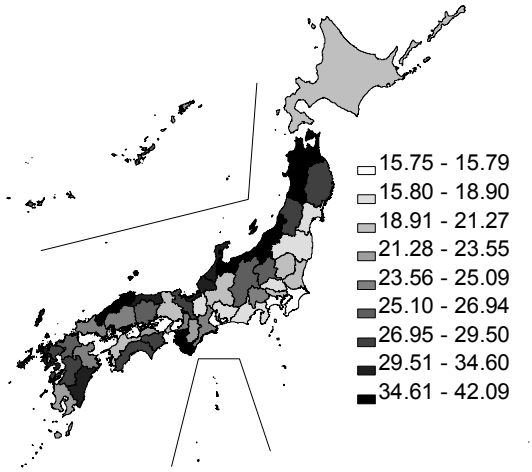

Figure 2-2 Childcare coverage rate
(per 0-4 population)
(1970-2010 difference)

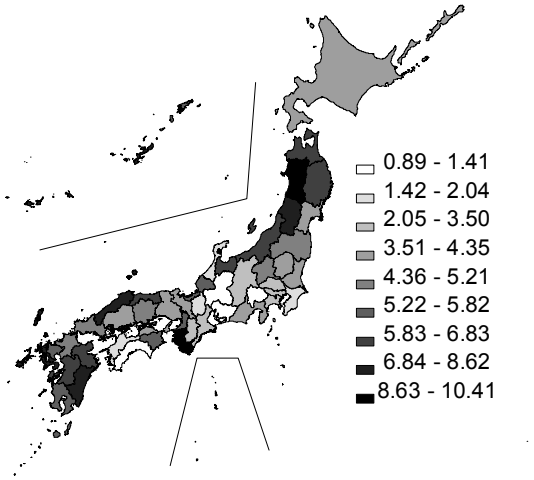

Figure 2-3 Potential availability of childcare rate
(per female aged 25-39 years old population)
(1970-2010 difference)

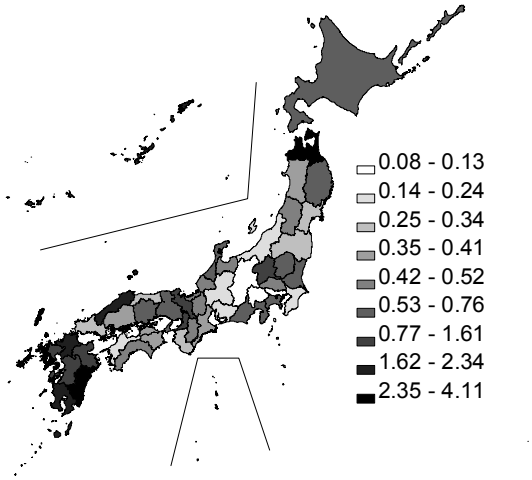

Figure 2-4 Public and private childcare
facility ratio
(1970-2010 difference)

Table 1 Discrete-time multilevel logit modeling coefficients of covariates for second birth

	Model 1-1	Model 2-1	Model 2-2	Model 2-3	Model 2-4	Model 1-2	Model 3-1	Model 3-2	Model 3-3	Model 3-4
	Regional Block					Prefecture				
	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)	exp (β)
Fixedc Effect										
Duration from 1st birth (year) (t) piecewise-linear spline										
0-2 years	5.499 **	5.505 **	5.501 **	5.504 **	5.504 **	5.511 **	5.514 **	5.512 **	5.510 **	5.514 **
2-3 years	1.463 **	1.467 **	1.465 **	1.466 **	1.464 **	1.468 **	1.471 **	1.470 **	1.470 **	1.468 **
3-4 years	0.842 **	0.843 **	0.841 **	0.841 **	0.842 **	0.843 **	0.844 **	0.842 **	0.842 **	0.843 **
4-9 years	0.644 **	0.644 **	0.644 **	0.644 **	0.644 **	0.644 **	0.643 **	0.644 **	0.643 **	0.644 **
9-15 years	0.580 **	0.580 **	0.580 **	0.580 **	0.578 **	0.579 **	0.580 **	0.580 **	0.580 **	0.578 **
Wife's age at 1st birth										
20-24 years old	1.257	1.283	1.266	1.268	1.268	1.259	1.276	1.267	1.264	1.272
25-29 years old	1.751 **	1.747 **	1.744 **	1.734 **	1.756 **	1.759 **	1.754 **	1.750 **	1.741 **	1.765 **
30-34 years old	1.558 **	1.556 **	1.553 **	1.548 **	1.555 **	1.558 **	1.559 **	1.555 **	1.552 **	1.555 **
35-39 years old (ref.)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
40-44 years old	0.345 **	0.347 **	0.344 **	0.345 **	0.344 **	0.348 **	0.350 **	0.347 **	0.348 **	0.345 **
45-49 years old	0.402 +	0.418 +	0.402 +	0.400 +	0.397 +	0.412 +	0.430	0.408 +	0.411 +	0.400 +
Premarital Pregnancy at 1st birth	1.099 +	1.096 +	1.095 +	1.094 +	1.100 +	1.096 +	1.093 +	1.090	1.092	1.095 +
Wife's education										
Junior high school	0.891	0.522	0.808	0.759	1.028	0.895	0.587	0.792	0.753	1.038
High school (ref.)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
Vocational school	1.125 *	0.303 +	1.090	1.010	1.102	1.123 *	0.319	1.082	1.006	1.103
Junior (women's) colleage, Technical school	0.999	1.455	0.905	0.957	1.006	1.004	1.509	0.917	0.968	1.010
University, Graduate school	0.998	0.830	0.955	0.926	1.174	1.001	0.902	0.962	0.933	1.173
Wife's employment status (t)										
regular employee (ref.)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
temporary worker	1.917 **	4.530 +	2.998 **	2.837 **	1.748 **	1.920 **	4.723 +	2.977 **	2.814 **	1.755 **
independent business	1.485 **	3.525	1.996 *	1.843 *	1.638 **	1.503 **	4.153	2.042 *	1.884 *	1.648 **
unemployed / housemaker	1.173 **	1.549	1.334 +	1.233	1.232 *	1.177 **	1.578	1.325 +	1.226	1.236 *
Living together with couple's mother (t)										
Living together with either couple's mother	1.181 **	2.391	1.561 **	1.447 *	1.299 **	1.156 *	2.236	1.614 **	1.442 *	1.277 *
Living apart with both couple's mother in same city	0.979	5.716 *	1.340	1.280	0.947	0.965	6.106 *	1.480 *	1.292	0.930
Living apart with either couple's mother in same city	0.923 +	1.842	1.074	1.014	0.969	0.913 +	1.830	1.117	1.023	0.955
Living apart with both couple's mother in diffecent city (ref.)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
Duration of policy for low fertility (t)										
Before declining birthrate measures (before 1993 year) (ref.)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
"Angel Plan" (1994-1999 year)	0.847 **	0.831 **	0.841 **	0.850 **	0.845 **	0.841 **	0.834 **	0.836 **	0.845 **	0.839 **
"New Angel Plan" (2000-2004 year)	0.738 **	0.721 **	0.732 **	0.744 **	0.735 **	0.735 **	0.728 **	0.731 **	0.742 **	0.731 **
"Measures to Support Raising Next-Generation Children" (after 2005)	0.656 **	0.640 **	0.639 **	0.650 **	0.647 **	0.651 **	0.644 **	0.637 **	0.647 **	0.634 **
Live in the same prefecture at 1st birth	1.351 **	1.355 **	1.341 **	1.338 **	1.359 **	1.351 **	1.358 **	1.341 **	1.343 **	1.360 **
Regional context (t)										
Female employment rate (20-39 years old)		1.025 +					1.021			
Childcare coverage rate (per 0-4 population)			1.002					1.012 *		
Potential availability of childcare rate (per female aged 25-39 years old population)				1.026 *					1.026 *	
Public and private childcare facility ratio					1.128					1.168
Regional context × Wife's education										
Junior high school		1.009	1.002	1.012	0.862		1.007	1.003	1.013	0.855
High school (ref.)		(1.000)	(1.000)	(1.000)	(1.000)		(1.000)	(1.000)	(1.000)	(1.000)
Vocational school		1.022 +	1.001	1.009	1.019		1.021 +	1.001	1.009	1.017
Junior (women's) colleage, Technical school		0.994	1.003	1.004	0.990		0.993	1.003	1.003	0.990
University, Graduate school		1.003	1.001	1.007	0.835 +		1.002	1.001	1.007	0.838 +
Regional context ×Wife's employment status (t)										
regular employee (ref.)		(1.000)	(1.000)	(1.000)	(1.000)		(1.000)	(1.000)	(1.000)	(1.000)
temporary worker		0.986	0.987 *	0.971 *	1.108		0.986	0.988 *	0.971 +	1.104
independent business		0.986	0.992	0.984	0.897		0.984	0.991	0.983	0.901
unemployed / housemaker		0.996	0.997	0.998	0.945		0.995	0.997	0.998	0.945
Regional context ×Living together with couple's mother (t)										
Living together with either couple's mother		0.988	1.001	0.982	0.898		0.989	0.990 *	0.981 +	0.898
Living apart with both couple's mother in same city		0.971 *	1.005	0.978 +	1.028		0.970 *	0.987 *	0.976 +	1.037
Living apart with either couple's mother in same city		0.988	1.010 +	0.991	0.945		0.988	0.994	0.990	0.951
Living apart with both couple's mother in diffecent city (ref.)		(1.000)	(1.000)	(1.000)	(1.000)		(1.000)	(1.000)	(1.000)	(1.000)
Constant term (β)	-4.881 **	-6.382 **	-5.240 **	-5.186 **	-4.990 **	-4.840 **	-6.098 **	-5.244 **	-5.158 **	-4.989 **
Random effect										
Variance component at macro level	0.009 **	0.008 **	0.007 **	0.007 **	0.007 **	0.017 **	0.015 **	0.014 **	0.011 **	0.011 **
N	19561	19561	19561	19561	19561	19561	19561	19561	19561	19561
Regional unit	9	9	9	9	9	47	47	47	47	47
Average number among regional unit	2173.4	2173.4	2173.4	2173.4	2173.4	416.2	416.2	416.2	416.2	416.2
Wald χ^2 values	1833.5 **	1835.5 **	1844.0 **	1846.4 **	1839.4 **	1831.3 **	1841.6 **	1843.3 **	1844.9 **	1840.1 **
Intraclass correlation ρ	0.003	0.003	0.002	0.002	0.002	0.005	0.004	0.004	0.003	0.003

significance level + 0.1 * 0.05 ** 0.01 (ref.) reference category, (t) time varying variable