

# Fertility Decline and Work-Life Balance: Empirical Evidence and Policy Implications

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October, 2009 at Seoul

# Legal Supports for the WLB in Japan

- 1. Child-care and Family-care Leave Laws
  - 1992 (one year leave, fathers as well as mothers are entitled)
  - 1995 (25% income compensation for childcare leave)
  - 1999 (one year and a half leave under the condition of no availability of public day care)
  - 2001 (40% income compensation)
  - 2007 (50% income compensation)
  - 2009 (2 extra month “papa quota”; firms’ obligations for approving for requests of short-time work or no over-time work for mothers and fathers with a child of less than 3 years old; entitlement of childcare leave for parents with a fulltime homemaking spouse)
- 2. Community and employers’ supports for child-rearing
  - Inter-Ministry Angel Plan (1994), The New Angel Plan (1999),
  - Law for Nurturing the Next Generation (2003), etc.
- 3. Work-life Balance: Charter on Work-Life Balance (2007)
  - Some basic facts
    - (1) The TFR is still at around 1.3.
    - (2) Women who leave employment due to childcare are still about 70%.
    - (3) While the majority of women who do not leave employment take a child-care leave, men who take a child-care leave are less than 2%.

# Study 1 : Determinants of Fertility and Birth Desire among Married Women in Japan (published in *Kakei Keizai Kenkyu* in 2005)

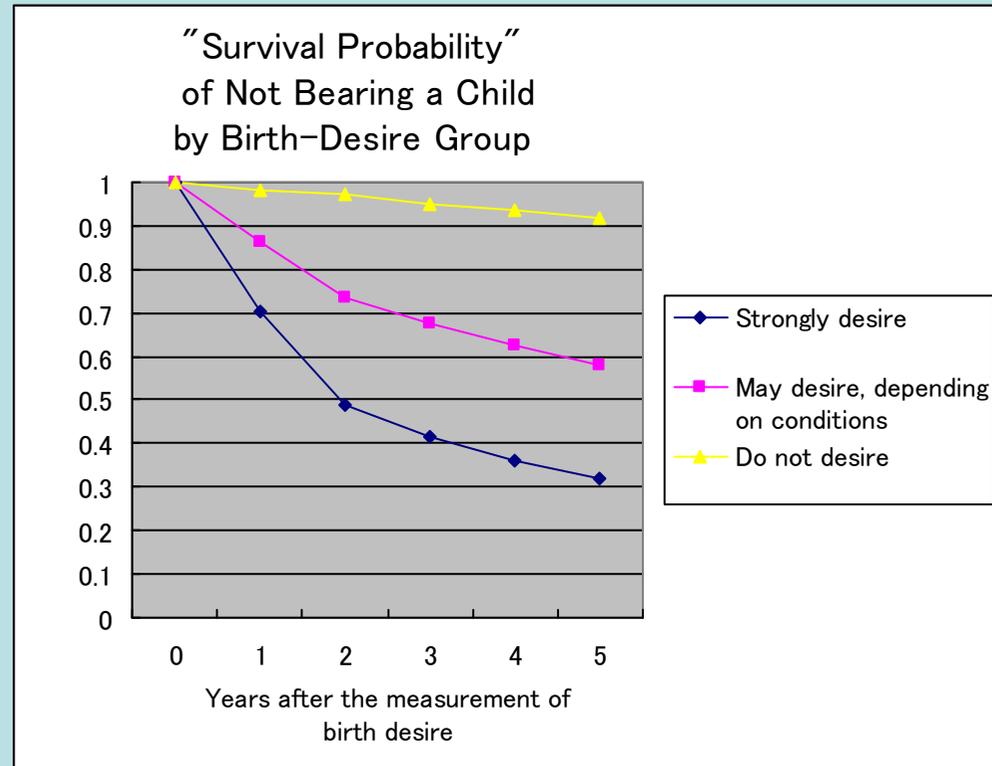
- Data: *Panel Survey of Consumer Life*, collected by the Institute of Household Economics. 1994-1999 waves. Women 25-35 in 1994.
- Objectives
- ① To demonstrate that family-friendly work environment, the availability of childcare leaves in particular, increases fertility rate.
- ② To demonstrate the strong association between birth desire and subsequent birth rate and to identify the determinants of birth desire.
- ③ To demonstrate, using the Japanese data, that Gary Becker's theory on the "quality price" of children, which predicts a negative interaction effect of household Income and parity on birth rate, holds empirically.

# Statistical Methods

- ① survival analysis (for the relationship between birth desire and birth rate)
- ② multinomial logit analysis (for birth desire)
- ③ latent class analysis (for clustering of reasons for not wanting any more child)
- ④ hazard rate models (for birth rate)
- ⑤ IPTTE (inverse probability treatment estimation) based on the propensity score for the causal analysis of the effect of childcare leave on hazard rate

# Analysis 1

- Birth desire strongly affects birth rate among married women with 0-2 children. It is indispensable for raising birth rate to have a societal environment where women's birth desire is high.



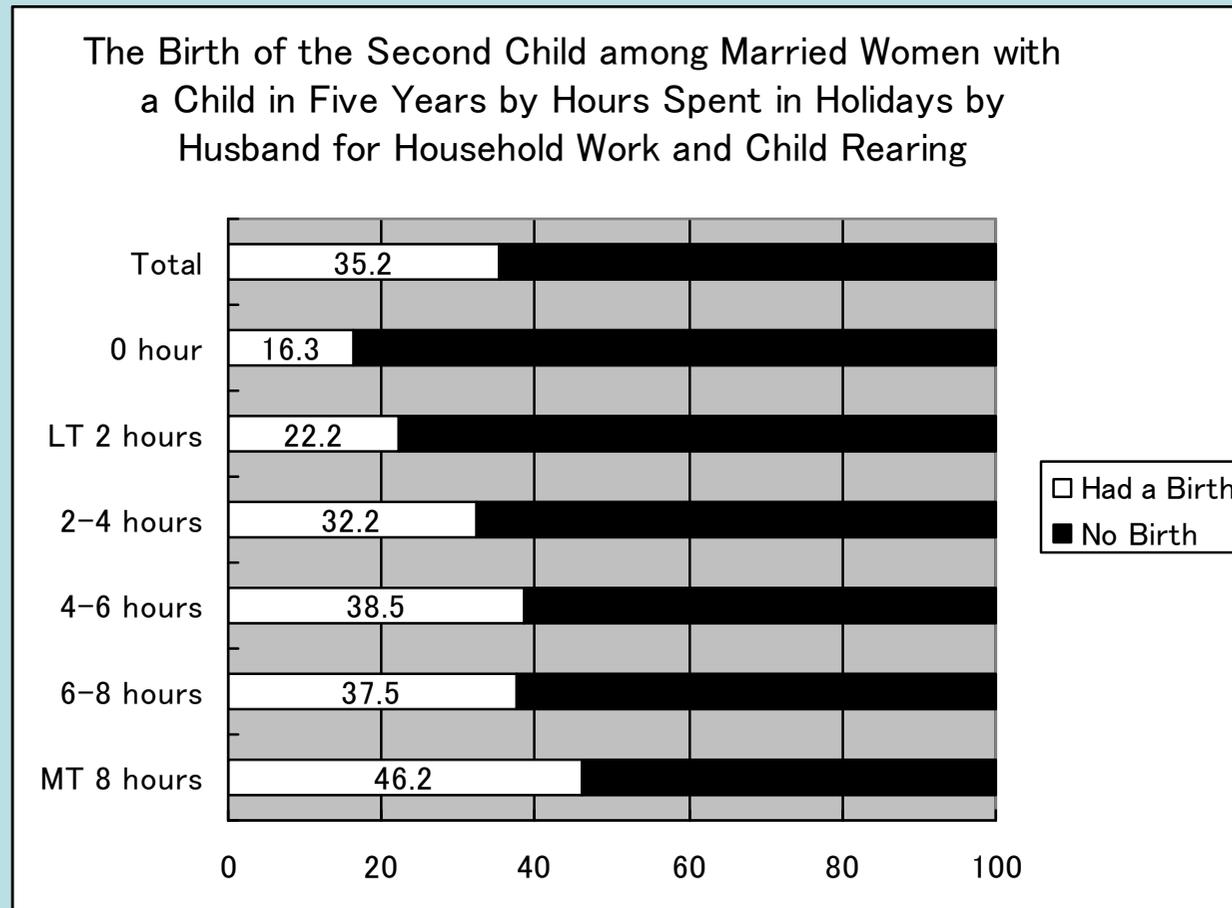
## Analysis 2: Latent-Class Analysis of Not Wanting Another Child among Married Women with 0-2 Children

- Indicators: 9 dichotomous reasons of not wanting another child
- Four latent classes are identified.
- Class 1 (50%). Give economic reasons (“cannot afford educational and childrearing expenses”, etc.). 89% of women in this class are with 2 children, 11% with one child, and 0% with no children.
- Class 2: (28%). No association with any specific reason. 100% are women with 2 children. Apparently women who consider 2 children as ideal belong to this class.
- Class 3: (12%). Reasons indicate negative child-rearing experiences, such as a lack of the husband’s cooperation in child care. The majority are those with only 1 child.
- Class 4 (10%). Reasons indicate the Importance of other lives than family lives (such as “wish to value own private life”, “wish to value one’s work life”). The majority of women with no children belong to this latent class.

# Implication: Psychological Barriers to Birth Desire Vary with Parity

- 1. The major barrier to bearing the first child is the incompatibility of child rearing with work life or with other private lives.
- 2. The major barrier to bearing the second child is a negative child-rearing experience, such as stress due to a lack of husband's participation in child rearing.
- 3. The major barrier to bearing the third child is economic burden, that is, the burden of educational and child-rearing expenses.

# A related finding in a subsequent government survey



Source: The 21st Century Panel Survey of Adults  
(The Welfare and Labor Ministry, Japan, 2007)

## Analysis 3: Hazard-rate Analysis of the effects of child care leave and firm size on fertility

- The hazard rate of marital childbirth for women employed by large firms does not differ significantly compared to that of non-employed women if childcare leave is available from the employer, but is significantly lower if childcare leave is unavailable.
- The hazard rate of marital childbirth for women employed by medium and small sized firms is significantly higher compared to that of non-employed women if childcare leave is available from the employer, but is significantly lower if childcare leave is unavailable.
- The availability of childcare leave increases the hazard rate of marital childbirth ( $p < .001$ ). Those working for employer with childcare leave available for them have 2.6 times higher odds (or rates) of having marital childbirth at each age compared to those working for employers without.
- Women employed by large firms have a significantly lower hazard rate of marital childbirth compared to women employed by medium or small sized firms
- The effects of childcare leave did not change qualitatively under the use of the IPTTE that controls for selection bias more effectively.
- Note: The hazard rate models include many control variables.

# Implications

- Family-friendly workplaces, the availability of childcare leave in particular, increased fertility rates during 1994-1999, when women who were qualified for the paid leave, or were aware of this availability, gradually increased.
- Even though the macro trend of TFR did not show any recovery during that time, the declining tendency of fertility rate would have been sharper without the childcare leave law.
- Larger opportunity costs of bearing a child among women who are employed in large firms seem to be a cause of low fertility.

## Analysis 4. A Test of Gary Becker's Hypothesis on the Effects of the Price of Child Quality.

In Becker's theory, "child consumption" is expressed by  $\pi NQ$ , where  $N$  stands for the number of children and  $Q$  stands for child quality, which indicates the amount of time and expense that the family spends for the "quality" of each child, such as for education or health.  $Q$  is assumed to increase with household income.  $\pi$  denotes the unit "quality price" per child.

Since the "price effect" of child quality,  $p_Q = \pi N$ , increases with the number of children, while the income effect does not, higher income may have a positive effect on the birth rate of the first child (because the income effect likely exceeds the price effect), but it likely has a negative effect on the birth rate of the third and later childbirths (because the price effect likely exceeds the income effect).

I examined such negative interaction effects of income and the existing number of children using Japanese data.

- Results 1. Income effects on birth desire: The effect of husband's income depends on the present number of children ( $p < .01$ ):
  - (1) The wife's 'desire to have another child' decreases with husband's income when the existing number of children is 2.
  - (2).The wife's 'desire to have another child' does not vary significantly with husband's income when the existing number of children is 0 or 1.
- Results 2. Income effects of fertility hazard rate :The effect of the husband's income varies significantly ( $p < 0.05$ , one tail test) with the existing number of children.
  - (3) Husband's income has a significant positive effect on marital fertility ( $p < 0.1$ ) when the couple has no children.
  - (4) Husband's income has no effect when the couple has one or two children.
- Conclusion; Becker's theory is largely consistent with empirical results in Japan.

# Implications

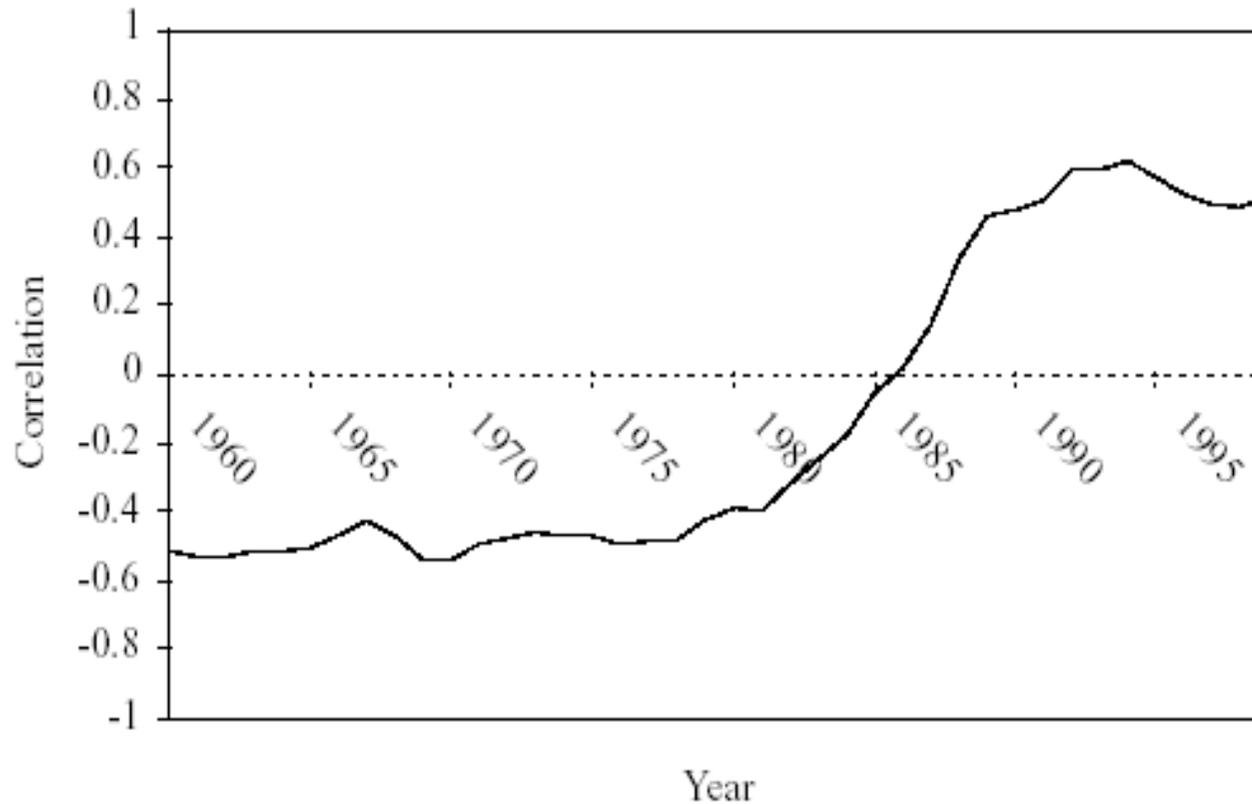
- (1) Reducing the “price” of child quality (reducing educational and child-rearing expenses) will be an effective policy in raising fertility, and more so among couples who plan to have a larger number of children than among other couples.
- (2) While the child allowance also reduces the quality expense of children, it will increase the incentive for having another child more for couples whose intend to spend less expense for children than other couples because the reduction by the child allowance  $A$  in the unit quality price of children is greater for couples with smaller  $Q$ .

$$I + NA = \pi NQ + p_z Z \Rightarrow I = (\pi - A/Q)NQ + p_z Z$$

## Study 2: On the Change in the Relationship between Total Fertility Rate and Women's Labor-Force Participation among the OECD Countries: The Role of Work-Life Balance

- Objectives:
- To demonstrate that the historical change in the correlation between fertility rate (TFR) and female labor-force participation rate (FLPR) is explained as a result of increases in the WLB among the OECD countries.
- To control for the country-specific unobserved heterogeneity in the fertility rate, by fixed effects, in the analysis, thereby eliminating the selection bias in FLPR regarding its effect on TFR.

## Background: The change in the correlation between FLPR and TFR



Source: Engelhardt, Kögel, and Prskawetz (2004), page 111

- Recent studies by Kögel (*Population Economics 2004*; Engelhardt, Kögel, and Prskawetz, *Population Studies*, 2004) indicate that
  - (1) When the fixed-effect method is used to control for unobserved country heterogeneity in fertility, the relationship between FLPR and TFR is still negative.
  - (2) However, the negative association between the two became smaller after about 1985 than before.
- Limitations of Kögel's studies:
  - (1) There is no explanation by covariates for the change in the relationship between FLPR and TFR.
  - (2) Due to data availability, they used the labor-force participation rate of women aged 15~64, rather than that of women in typical reproductive ages.

- A question: If the negative relationship between FLPR and TFR became smaller after 1985, what was the major cause of this historical change?
- What will be the implications for this change for work and family policies, especially regarding policies to mitigate fertility decline while assuring/promoting gender equity?

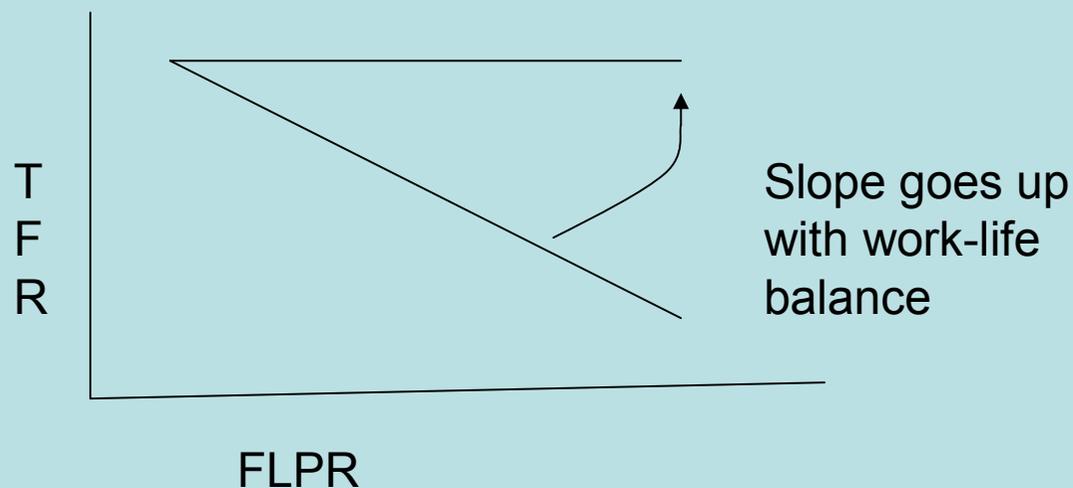
- Main Theoretical Hypothesis
- Opportunity costs of childrearing depend on (I) individual earning ability and (II) the extent to which employed workers engaged in childrearing experience a reduction in income by either leaving their jobs or changing their jobs to those with lower income due to the present job's incompatibility with childrearing.
- If the weakening of negative association between FLPR and TFR is due to a reduction in the opportunity costs of childrearing, it should not be due to change in women's earning ability (because women's earning has increased over time thereby having increased the opportunity costs). Hence, it should be due to an increase in the compatibility of work and family roles, or due to a promotion of social environment for balancing work and family (or private life).

# A hypothesized mechanism of decrease in the negative association between FLPR and TFR

- Interaction-Effect Hypothesis

The negative effect of FLPR on TFR decreases with the extent of work-life balance in the society (H-A1). Since the work-life balance has been promoted over time, the average negative effect has decreased (H-A2).

Note: H-A1 will be tested directly, while H-A2 is inferred from historical evidence.



- Desirable characteristics of statistical models for this analysis
  - (1) We wish to employ fixed effects models to control for unobserved country heterogeneity in fertility level.
  - (2) We wish to employ the labor-force participation rate for women aged 25~34 as a covariate of fertility rate.  
⇒ We wish to employ statistical models that can employ data with different starting years of observation.
  - (3) For the work-life balance, the OECD Employment Outlook published related indices only in 2001. No information on change in those work-life balance indices is available. Hence, we have to make an assumption on the pattern of historical change in the extent of work-life balance, but we wish to make it a weak assumption.
  - (4) The model must be able to test the interaction effect of FLPR and work-life balance on fertility.

## A Model of Fertility

$$\log(F_i(t)) = \alpha_i + g(t) + f(p_i(t), v_i(t)) + \varepsilon_i(t),$$

where  $F_i(t)$  is the TFR of country  $i$  at year  $t$ ,

$\alpha_i$  is a country-specific fixed effect,

$g(t)$  is the period effect on fertility which is common among countries,

$p_i(t)$  is the FLPR of country  $i$  at year  $t$ , and.

$v_i(t)$  is the extent of work-life balance of country  $i$  at year  $t$ .

This model thus assumes that the logarithm of fertility rate is a linear additive function of (a) a time-constant country-specific unobserved factor, (b) a time-varying common factor, and (c) a function of country-specific and time-varying FLPR and the extent of work-life balance.

## The Equation that Eliminates the Fixed Effects

Let  $S_i$  denote the time where the data of labor-force participation rate for women aged 25~34 became available for country  $i$ . Let  $T$  be anytime after that, then we obtain:

$$\begin{aligned} \log(F_i(T) / F_i(S_i)) &= g(T) - g(S_i) \\ &+ f(p_i(T), v_i(T)) - f(p_i(S_i), v_i(S_i)) + \varepsilon_i(T) - \varepsilon_i(S_i) \end{aligned}$$

Hence, the rate of change in fertility rate does not depend on the country-specific fixed effects, and we will estimate the parameters of this equation with empirical data.

The model of  $g(t)$  and  $v_i(t)$ , which is common between models A and B given in the next slide.

$$g(t) = a + bt$$

$$v_i(t) = (r_i(T) + c)(t / T) + d$$

Where  $r_i(T)$  is the *relative* extent of work-life balance among countries at time  $T$ . We assume here that (1) the time-trend effect is a linear function of time, and (2) the extent of work-life balance has increased monotonically over time, and its rates of growth are heterogeneous among countries and are given by the sum of observed relative extent of work-life balance of each country at time  $T$  and an unknown constant parameter  $c$ . Note that the absolute extent of work-life balance at time  $T$  is given by  $r_i(T) + c + d$ , and therefore, differs from the relative amount by a constant  $c + d$ . Parameters  $c$  and  $d$  are introduced to make the assumption of a monotonic change in  $v_i(t)$  weak.

Two alternative models of  $f(p_i(t), v_i(t))$  on the interaction effect of FLPR and work-family balance on  $\log(\text{TFR})$

1. Model A: The interaction effect exists between  $p_i(t)$ , and  $v_i(t)$ .

$$f(p_i(t), v_i(t)) = \beta_1 p_i(t) + \beta_2 v_i(t) + \beta_3 p_i(t) v_i(t)$$

The parameters of this model cannot be estimated without knowing parameters  $c$ ,  $d$  and when the time 0 is, and its application requires strong additional assumptions. (See the technical appendix.)

2. Model B: The interaction effect exists between the change rate of  $p_i(t)$ , and  $v_i(t)$

$$\frac{df(p_i(t), v_i(t))}{dt} = \beta_1 \frac{dp_i(t)}{dt} + \beta_2 \frac{dv_i(t)}{dt} + \beta_3 \frac{dp_i(t)}{dt} \frac{dv_i(t)}{dt}$$

The parameters of this model can be estimated without knowing either parameters  $c$  and  $d$  or when the time 0 is, and its application does not require any additional assumption.

- Three specific hypotheses that can be tested by using the significant test of the parameter estimates of model B.

Hypothesis 1: An increase in the rate of female labor-force participation decreases the rate of fertility ( $\beta_1 < 0$ ).

Hypothesis 2: The greater extent of work-life balance in the society increases the rate of fertility ( $\beta_2 > 0$ ).

Hypothesis 3: The negative effect of an increase in FLPR on fertility rate becomes weaker as the extent of work-life balance in the society increases ( $\beta_3 > 0$ ).

# Data

- The indices of work-life balance are based on Table 4.9 in Chapter 4 (Balancing Work and Family Life) of 2001 OECD Employment Outlook. The total composite index aggregates the indices of (1) childcare coverage for children under 3 years old, (2) maternity pay entitlement, (3) voluntary family leave in firms, (4) flexible-time working, and (5) voluntary part-time working. We also employ “**compatibility**” index that represents the first three elements and the “**flexibility**” index that represents of the last two elements.
- FLPR for women aged 25~34 (25~39 for Italy): OECD Labor Force Statistics 1980-2000 and OECD Labor Force Statistics 1982-2002.
- TFR: World Bank WDI data base.

Table 1 : Data of 18 OECD Countries

Country	Starting Year S	FLPR at year S	FLFP 2002	TFR at Year S	TFR 2002	Balance: Total	Balance: Factor 1	Balance: Factor 2	TFR 1980
Canada	1980	62.8	80.3	1.74	1.52	0.2	0.5	-0.3	1.74
USA	1980	65.5	75.0	1.84	2.01	1.2	-0.3	1.5	1.84
Japan	1980	48.7	66.0	1.75	1.33	-2.9	-2.3	-0.6	1.75
Denmark	1983	88.1	83.1	1.38	1.72	2.9	3.3	-0.4	1.55
Finland	1980	81.8	80.3	1.63	1.72	-0.3	1.5	-1.8	1.63
Sweden	1980	81.3	82.1	1.68	1.64	3.3	2.5	0.8	1.68
Greece	1983	46.7	71.9	1.94	1.27	-3.4	-1.3	-2.1	2.23
Italy	1980	50.5	64.7	1.64	1.26	-1.9	-0.3	-1.6	1.64
Portugal	1980	64.8	84.0	2.19	1.42	-2.2	0.0	-2.2	2.19
Spain	1980	34.0	73.3	2.22	1.26	-2.5	-0.7	-1.8	2.22
Ireland	1981	36.4	77.6	3.07	1.97	-1.1	0.0	-1.1	3.23
Great Britain	1984	61.2	75.3	1.77	1.63	1.3	-0.3	1.6	1.89
Austria	1994	76.2	79.0	1.44	1.40	-0.6	-0.3	-0.3	1.62
Germany	1980	61.1	76.1	1.44	1.34	1.3	-0.2	1.5	1.44
Netherlands	1980	40.9	79.8	1.60	1.73	2.7	-0.8	3.5	1.60
Belgium	1983	70.9	80.1	1.56	1.62	0.2	0.1	0.1	1.67
France	1980	68.7	78.6	1.95	1.88	-0.1	0.4	-0.5	1.95
Australia	1980	52.8	70.7	1.90	1.75	1.9	-2.0	3.9	1.90

(1) Work-life balance Factor 1 represents the compatibility between employment and childrearing and includes, as its components, indices on childcare coverage, maternity pay entitlement, and voluntary family leaves in firms.

(2) Work-life balance Factor 2 represents flexibility of working as indicated by flexible-time working and voluntary part-time employment.

# Result 1 based on the use of the total WLB index

- (1) An increase in the rate of female labor-force participation decreases the rate of fertility. (A support for Hypothesis 1, with  $p < 0.01$ ).
- (2) The greater extent of work-life balance increases the rate of fertility. (A support for Hypothesis 2, with  $p < 0.001$ ).
- (3) The negative effect of FLPR increase on the increase of fertility-rate becomes smaller with greater extent of work-life balance. (A support for Hypothesis 3, with  $p < 0.01$ ).

## Result 2 based on the use of the Compatibility Index and the Flexibility Index of WLB

- When we decompose the extent of work-life balance into the compatibility between work and child-rearing and the flexibility of workplace/employment, both aspects of work-life balance increase fertility rate. But the effect of flexibility has about twice as much explanatory power as the effect of compatibility (in the magnitude of the standardized regression coefficient).
- The negative effect of FLPR increase on the increase of fertility-rate becomes weaker as flexibility in workplace/employment increases (with  $p < 0.01$ ). No such an interaction effect exists between FLPR increase and the extent of compatibility between work and childrearing. This elaborates Hypothesis 3 and indicates that the interaction effect hypothesis holds only for the role of the flexibility component of work-life balance.

## Policy Implications

Although many OECD Countries, other than the Netherlands, Germany, and English-speaking countries, have been primarily concerned with legal supports for childrearing through the promotion of public daycare centers, paid childcare leaves, and child allowances, policies also need to promote a social environment for a greater flexibility of work/employment, which may include, but is not limited to, a promotion of (1) high-quality part-time employment, (2) flexible work places, and (3) re-employments in firms for job leavers for the purpose of childrearing.

# A Major Question

- Whether the flexibility of workplaces should be promoted by the private-sector's initiatives as in the U.S.A. Canada, and Australia, or by the government legal regulations of firms' employment practices as in the EU countries.
- Some legal regulations in the EU.
- The EU Working Time Directive (1993), the maximum hours of work/week = 48 hours
- The EU Part-time Work Directive (1997)
- Adjustment of Hours Law (The Netherlands, 2000)
- Acts on Part-time Work (Germany 2001; Denmark, 2002)
- Flexible Working Law (Great Britain, 2003)

# Related Issues of Employment and Labor Markets in Japan

- Dysfunction of Japanese Employment System under low demand for labor (and its difficulty of change because of strategic complementarity of its components)
- Polarization of workforce (high-wage, high security regular employees, and low-wage, low security irregular employees) with an increasing expansion of the latter.
- Strong association of irregular employment with women and the youth
- Over-employment with respect to hours of work among male regular employees
- Persisting statistical discrimination against women in workplaces