

Procrastinators and hyperbolic discounters:

Transition probabilities of moving from temporary into regular employment

Sun Youn Lee (Presenter)*, Fumio Ohtake**

*Faculty of International Studies, Meiji Gakuin University

E-mail: sylee@k.meijigakuin.ac.jp

**Institute of Social and Economic Research, Osaka University,

E-mail: ohtake@iser.osaka-u.ac.jp

Background Literature

■ “Stepping stone” towards stable full-time employment

- Facilitate the matching between firms and on-the-job searchers, shorten unemployment spell and thus improve the welfare of both the employers and employees. (Guell and Petrongolo, 2007; Ichino et al., 2005; Malo and Munoz-Bullon, 2002)

■ “Dead-end”

- Receive less work-related training, get more difficult for the TAW employees to find a better job with stable position as time progresses and thus, longer duration of temporary contracts lead to a reduction in workers’ average intensity for job search to move into full-time employment (Autor and Houseman, 2010). Furthermore, longer temporary contracts lead to a reduction in workers’ average job search intensity (Kahn, 2009),

Background Literature

■ DellaVigna and Paserman (2005) and Paserman (2008) found that the exit rate from the unemployment status is affected by the degree of impatience, which varies based on the assumptions of exponential and hyperbolic discounting.

■ Impatient individuals with exponential time preferences tend to lower the **reservation wage**, and this may increase their unemployment exit rate. On the other hand, those exhibiting hyperbolic attitudes are likely to **defer job search activities**; moreover, as they may not lower the level of reservation wages when they finally search for a job, they tend to experience longer periods of unemployment.

Regulations on the TAW workers

■ Regulations on the dispatched

- ✓ **Enactment of “*The Worker Dispatch Law*” in 1985** allows project-based employment and enables to dispatch temporary workers to demanders, the number of temporary workers has rapidly increased.
- ✓ **After the Lehman shock** in 1998, however, many temporary workers were laid off in no time and this has drawn the public attention to the issues of their unstable employment status and the need for legal protection.
- ✓ **New rigid legislation** was then enacted in 2010 to impose the limitation on the contract term to the temporary workers who are registered at the TAW and who are dispatched to manufacturing companies.

Temporary Agency Work (TAW) employment in Japan

■ **Persistence** within the dual labor market In Japan

- ✓ Dual labor market that is comprised of a sector of highly stable employment and a much less stable sector of part-time, temporary contract workers, has emerged since 1970s and starting one's career in less stable rather than regular employment reduces one's probability of being in regular employment in the future

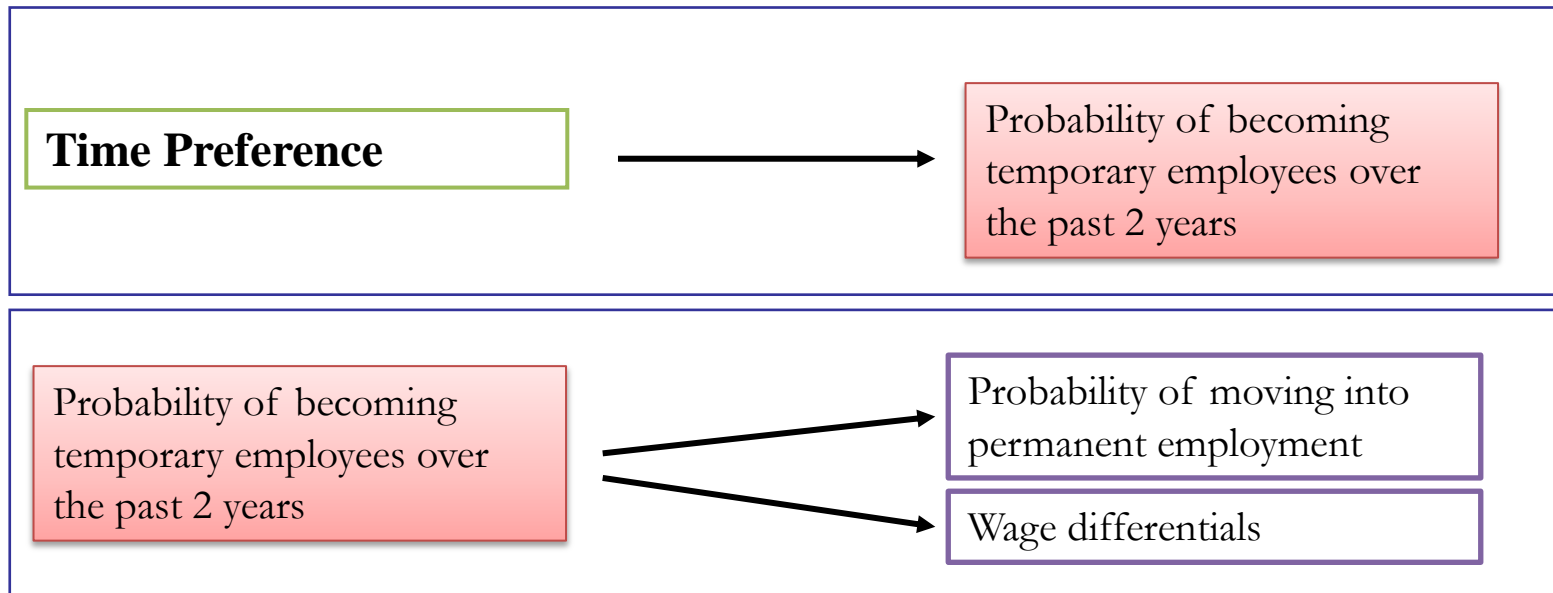
2008-2011 (Whole)	Permanent	Part-time	Dispatch	Self- employed Family businesses	Unemployed	Not employed (no job search)	Average Obs.
Permanent	90.6%	4.2%	0.2%	1.7%	1.5%	1.8%	1373.5
Part-time	6.9%	78.9%	1.3%	3.7%	4.6%	4.6%	669
Dispatch	7.1%	30.4%	48.6%	0.0%	9.3%	4.6%	33.75
Self-employed Family business	4.8%	5.5%	0.0%	83.3%	1.6%	4.8%	525.25
Unemployed	4.4%	19.6%	1.5%	3.0%	42.1%	29.4%	246
Not employed (no job search activities)	2.0%	3.4%	0.1%	2.0%	6.2%	86.2%	912

Transition matrix of employment turnover

Research Plan

Aims of Research

1. Examine what determines the probability of engaging in the Temporary Agency Work (TAW) from a time preference perspective
2. Investigate how the past work experience in the TAW sector affects the transition to a permanent position and hourly wages



Time Preferences

■ Discount Function

□ Exponential discounting (Paul Samuelson, 1937)

$$U^t(u_t, u_{t+1} \dots, u_T) = \sum_{k=0}^{T-t} \delta^k u_{t+k}, \text{ where } \delta^k = \left(\frac{1}{1+\gamma}\right)^k \quad (1)$$

□ Quasi-hyperbolic discounting (Laibson, 1997)

$$U^t(u_t, u_{t+1} \dots, u_T) = u_t + \beta \sum_{k=1}^{T-t} \delta^k u_{t+k}, \text{ where } 0 < \beta < 1 \quad (2)$$

■ (β, δ) Preferences

➤ (β, δ) : The exponential discounting parameters (δ) captures time-consistent and long-run impatience. The hyperbolic discounting parameters (β) captures time-inconsistent and short-term impatience. When $\beta = 1$, agents' (β, δ) preferences are time consistent and capture standard discounted-utility model and when $\beta < 1$, agents' (β, δ) preferences follow quasi-hyperbolic time discounting function.

➤ $(\beta\delta, \delta)$: The implied discount factor from now to the next period $\beta\delta$, while the discount factor in the sufficiently distant future is simply δ .

➤ Declining discount rate: The per-period discount rate between now and the next period is $\frac{1-\beta\delta}{\beta\delta}$ and the per-period discount rate between any two distant future periods is $\frac{1-\delta}{\delta}$.

Contributions

1. It focuses on the effect of **behavioral characteristics** on the probability of entering the TAW sector, using a unique data set.
2. This study analyzes **the Japanese labor market**. In Japan, a dual labor market comprises of a sector of highly stable employment and a considerably less stable sector of part-time, temporary contract workers (Rebick, 2005).
3. This study can be further analyzed **in the policy context**. Since the enactment of “*The Worker Dispatching Act*” in 1985 in Japan, which allows project-based employment and the dispatching of temporary workers upon request, the number of temporary workers has rapidly increased.
4. This study **employs the PSM methods** to better examine the effect of TAW experience on the subsequent employment status. Those that have never engaged in TAW employment might have different baseline characteristics, which lead to gaining regular employment. Thus, to reduce this selection bias, we attempt to estimate how TWA-experienced individuals would have performed if they had never worked in the TAW sector.

Main Results

- ❑ Time preferences affect individual decisions to enter the TAW sector.
 - The effect of impatience on the probability of engaging in the TAW can be interpreted as indicating that impatient individuals put more weight on gaining immediate rewards from temporary employment.

- ❑ This TAW experience has a negative effect on the job transition to regular employment. On the other hand, **when time preferences are additionally controlled for using the PSM methods**, the negative effect is reduced and may even lose statistical significance.
 - This suggests that the transition probability for TWA-experienced can be partly or substantially explained by a higher degree of impatience.

- ❑ In contrast to the finding that those with TAW experience are less likely to find regular employment, we could not find any significant wage differences between those with TAW experience and those without.

Global COE Panel data

■“Preference and Life Satisfaction Survey”

- ✓ A panel survey that started in February 2004 as part of the Osaka University 21st Century Center of Excellence Program
- ✓ Conducted annually using a random sample drawn from 6,000 individuals by a placement method

For this study, we used the **2009-2010 data** to create the dependent variable concerning job transitions and the 2007-2008 data to investigate the change in employment status before TAW experience. The responses about the TAW experience in the past two years and the hourly wages are obtained from the 2010 survey data.

The sample includes only the individuals that were aged between 21 and 60 in 2010 (the year in which the survey was conducted) and excluded those who may choose to be in the TAW sector and/or may not attempt to move into regular employment, such as students, retired persons, and housewives/househusbands.

Data : Definitions

■ Definitions

Regular employment (hereafter referred to as RE) denotes “direct employment, open-ended, full-time” jobs, and thus pertains to individuals that satisfy the following conditions: being directly hired by employers on a not-predetermined contract, working for scheduled hours and receiving the public insurance benefits without some exceptional cases (Asao, 2011).

TAW employees are defined as those who are registered with temporary agencies with the aim of obtaining temporary work assignments of the following duration: (i) one day, (ii) 2–10 days, (iii) 10 days–3 months, or (iv) more than 3 months. The TAW experience is a binary indicator of whether they engaged in the TAW sector at some point over the past two years. With or without the samples of housewives/househusbands, on the other hand, the estimation results do not significantly differ.

Data and Measurement

■ Measure for time preferences

- ✓ The responses indicated on a 5-point scale to “when respondents carried out their summer vacation homework and when they planned to do it”, ranging from 1 (at the end) up to 5 (in the beginning)
- ✓ Hypothetical question: Find a point where respondents feel indifferent between A and B options over two different time periods.

From each question, the discount rate of each row (γ) was first computed: $t_A = (1/1 + \gamma) t_B$, where $t_{A(B)}$ is the length of the shortened time of option A (B). Next, the discount rate of an individual is computed by estimating a log-normal distribution for the discount rate's $\log(1+\gamma)$ of options (Kimball et al., 2008).

Econometric Framework

■ Average Treatment effect on the Treated (ATT)

$$\begin{aligned} E[Y_i(1) - Y_i(0) | T_i = 1] &= E[E(Y_i(1) - Y_i(0) | T_i = 1, p(X))] \\ &= E(E[Y_i(1) | T_i = 1, p(X)] - E[Y_i(0) | T_i = 1, p(X)]) \end{aligned}$$

- ✓ **To estimate how treated agents would have performed if they had not received the treatment**, the untreated agents that have similar characteristics are substituted for the counterfactual group. The PSM approach is used to construct this unobserved or counterfactual group.
- ✓ The average treatment effect of the program is then calculated as the mean difference in outcomes across treated group and the statistical counterfactual group that have similar observed characteristics to those of treated group.

Two Assumptions of ATT

■ First Assumption: “Conditional independence” or “Unconfoundedness”

$$Y_i^C \perp T_i \mid X_i.$$

For a given propensity score, exposure to treatment—work experience as TAW employees over the past 2 years—should be random and therefore treated and control groups differ only in their error term which is approximately independent of the X .

■ Second Assumption: “Common Support”

$$P(T_i = 1 \mid X_i) < 1$$

The substantial region of propensity score distribution should be overlapped between those who have an two years experience of TAW employment and those who not.

Descriptive statistics

Variables	Mean	Standard deviation	Minimum	Maximum
<i>Dependent Variables (ATT estimation)</i>				
RE (Transition to regular employment=1)	0.215	0.411	0	1
Hourly wage in logarithmic form	6.910	0.408	6.247	9.348
<i>Dependent Variable used for estimation of the propensity score</i>				
TAW experience in the past 2 years (=1)	0.155	0.363	0	1
<i>Main independent variables: Behavioral Characteristics</i>				
Childhood time preference	3.403	1.323	1	5
Present time preference	0.173	0.471	-0.464	0.978
<i>Demographic Variables</i>				
Age	43.714	9.586	21	60
Household income (excluding oneself)	4.387	3.485	0	19.5
Household property (Land / Housing)	15.209	18.086	0	100
Household financial assets	7.771	11.443	1.25	100
Household housing loans	6.003	8.687	0	30
Household other debts	0.742	1.834	0	10
Number of children	1.714	1.075	0	5
Married (=1)	0.775	0.418	0	1
Educational Level	0.042	0.201	0	1
	0.494	0.500	0	1
	0.274	0.446	0	1
	0.182	0.386	0	1
Female (=1)	0.009	0.093	0	1
	0.785	0.411	0	1

Treated vs Control Groups

■ Descriptive statistics of treated and control groups

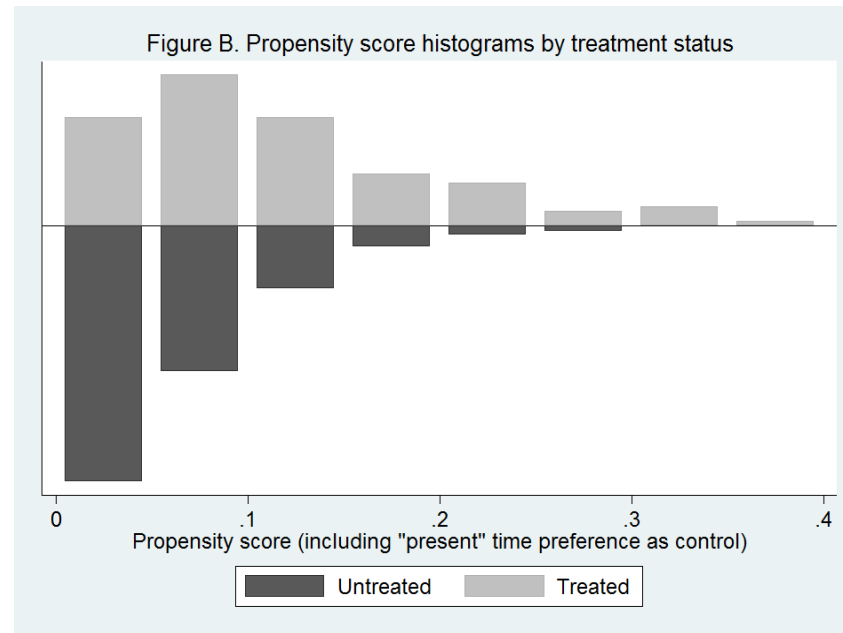
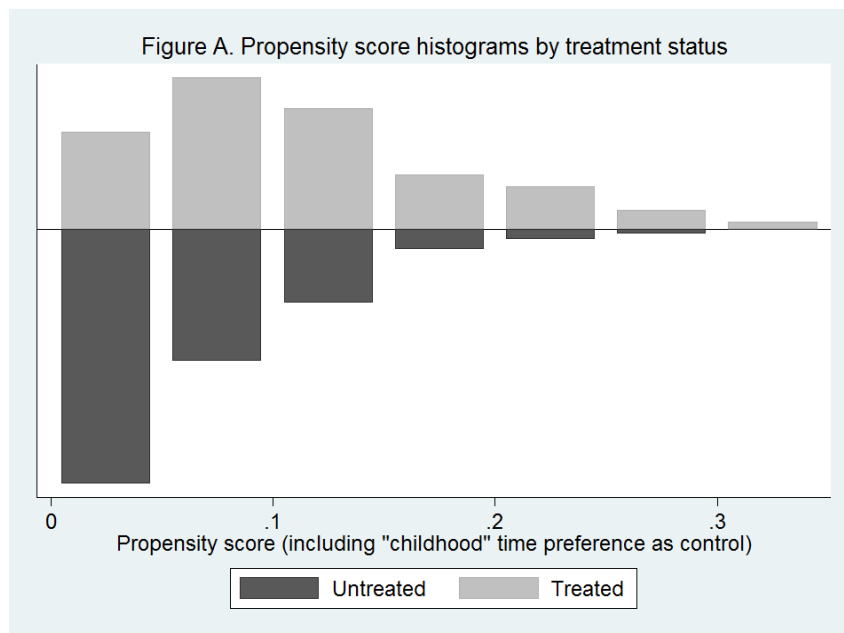
TAW experienced (Treated) versus non-TAW (Matched)						
Variables	Treated		Matched Controls		All Controls	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
<i>Dependent Variable (ATT estimation)</i>						
RE (Transition to regular employment=1)	0.135	0.344	0.227	0.420	0.230	0.421
Hourly wage in logarithmic form*	6.893	0.390	6.898	0.389	6.911	0.406
<i>Dependent Variable used for estimation of the propensity score</i>						
TAW experience in the past 2 years (=1)	1.000	0.000	0.000	0.000	0.000	0.000
<i>Main independent variables: Behavioral Characteristics</i>						
Childhood time preference	3.693	1.342	3.455	1.330	3.431	1.340
Present time preference	0.293	0.503	0.188	0.455	0.181	0.456
<i>Time inconsistent preferences**</i>						
Near Future (inter-temporal choices between today and in 7 days)	0.293	0.503	0.188	0.455	0.181	0.456
Distant Future (inter-temporal choices between in 90 days and in 97 days)	0.272	0.488	0.192	0.440	0.182	0.443

Time preference variables indicate that individuals with TAW experience have a higher time discount rate (e.g., present time preference: treated = 0.293; matched controls = 0.188). This suggests that TAW employees are likely to be procrastinators.

In addition, those with TAW experience have a higher time discounting rate about near future choice sets (today vs. in 7 days: 0.293) than the distant future choice sets (in 90 days vs. in 97 days: 0.272)

Histograms for propensity scores

■ Histograms for propensity scores by treatment status



This figure presents the existence of the substantial overlapped propensity distribution between the treated and the untreated.

Propensity Score

Dependent Variables	RE (Transition to regular employment=1)		TAW experience (=1)	
Models: Logit Regression	(1)	(2)	(3)	(4)
TAW experience in the past 2 years (=1)	-1.1091*** (0.400)	-0.7798* (0.414)		
<u>Discounting parameters</u>				
Childhood time preference	0.1295 (0.097)		0.1036** (0.052)	
Present time preference		-0.0989 (0.295)		0.2817* (0.155)
\approx				
Number of Observations	573	488	573	488
LR statistic	145.46***	132.26***	26.51***	25.08**
Log-Likelihood	-225.267	-187.984	-234.185	-193.396

(1) and (2) : Binary indicator that equals one if a respondent was unemployed/ a non-regular worker in 2009 but became regular worker in 2010, and zero

(3) and (4) : Probability of engaging in TAW sector

Results obtained by controlling for demographic variables (educational attainment, the household income, financial/real assets, housing loans/debts, age, marital status, number of children and gender) Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Estimation Results

■ The impact of TAW employment experience: Transition probability & Wages

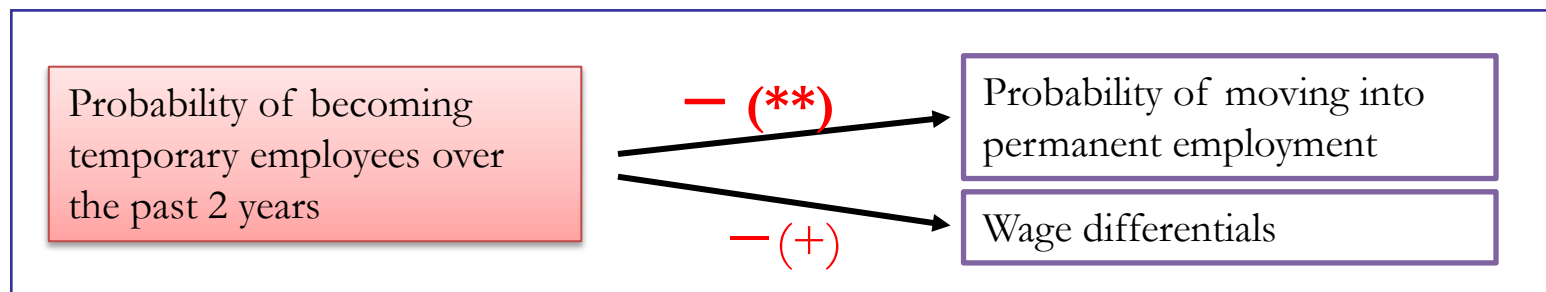
4-C. Estimation with samples who answered both childhood and present time preferences

Model: ATT estimation (Mean difference), Dependent Var: : Transition to regular employment (=1)

		Treated Group	Control Group	ATT	Std. Err.	T value
(1)	No independent var.	68	404	-0.081	0.048	-1.679
(2)	Only demographic var.	68	60	-0.147	0.074	-1.974
(3-1)	Childhood time preferences	68	55	-0.103	0.079	-1.304
(3-2)	Present time preferences	68	57	-0.103	0.078	-1.325

The row (i) : a base model that includes no observatory characteristics when predicting the propensity score and further estimating the ATT

The following rows (ii) throughout (iii): include the behavior patterns of impatience and time inconsistency as well as individual characteristics



Discussions

■ The impact of TAW employment experience: Transition probability & Wages

Model: ATT estimation (Mean difference), Dependent Var: : Transition to regular employment (=1)						
		Treated Group	Control Group	ATT	Std. Err.	T value
(1)	No independent var.	89	484	-0.155	0.04	-3.892
(2)	Only demographic var.	89	74	-0.169	0.066	-2.545
(3)	Childhood time preferences added to row (2)	89	75	-0.124	0.065	-1.906
ATT Estimation With Restricted Samples (Controlling for all confounding variables)						
		Treated Group	Control Group	ATT	Std. Err.	T value
(4)	Male	17	14	-0.353	0.18	-1.966
(5)	Female	70	61	-0.114	0.059	-1.926
(6)	Young cohort (less than the median age)	49	41	-0.163	0.086	-1.906

To investigate whether the gender and age differences have a significant effect on the transition probability, we examine the effect of the TAW employment with the sample grouped by sex and the different range of age (younger cohort aged less than the median age)

Significant negative effects remain even when the sample is grouped by gender or age

Sensitivity Analysis

Propensity-score matching estimators are not consistent estimators for treatment effects if unobserved variables that affect the assignment process are also related to the outcomes

$$\frac{\frac{P_i}{1 - P_i}}{\frac{P_j}{1 - P_j}} = \frac{P_i(1 - P_j)}{P_j(1 - P_i)} = \frac{\exp(\beta x_i + \gamma u_i)}{\exp(\beta x_j + \gamma u_j)} = \exp\{\gamma(u_i - u_j)\}$$

If both units have identical observed covariates—as implied by the matching procedure—the x vector cancels out. To eliminate any hidden bias, u_i should be equal to u_j , implying that there are no differences in the unobserved variables; alternatively, γ should be zero, implying no influence of unobserved variables on y .

An unmeasured variable (upward or downward bias) does not appear to cause the odds of receiving the treatment to differ between the treatment and comparison groups

Effect of “calibrated” confounders

Dependent Var.: Probability of transition to regular employment (=1)										
	Fraction U=1 by treatment/outcome				Fraction U=1 by treatment		Childhood Time Preference		Present Time Preference	
	p11	p10	p01	p00	p1.	p0.	ATT	s.e.	ATT	s.e.
No confounder	-	-	-	-	-	-	-0.124	0.065	-0.055	0.071
U like:										
Female	0.60	0.84	0.39	0.90	0.81	0.78	-0.126	0.08	-0.090	0.089
Married	0.50	0.70	0.72	0.82	0.67	0.79	-0.123	0.083	-0.095	0.085
Junior College	0.00	0.30	0.13	0.32	0.27	0.27	-0.105	0.077	-0.072	0.083
University	0.40	0.16	0.29	0.15	0.19	0.18	-0.098	0.081	-0.080	0.087
Graduate School	0.10	0.01	0.01	0.01	0.02	0.01	-0.128	0.078	-0.084	0.086
Childhood Time Preference	0.80	0.68	0.65	0.57	0.70	0.59	-0.109	0.079		
Present Time Preference	0.30	0.49	0.34	0.35	0.47	0.34	-	-	-0.080	0.087

The last four columns present the ATT estimates obtained when the binary confounding factor U is calibrated to match the observed characteristics and is then included in the set of matching variables. Under a deviation from *unconfoundedness* with a binary indicator for childhood and present time preference (it equals 1, if it is higher than the mean value, and 0 otherwise), the ATT is estimated at -0.109 and -0.080 , respectively.

Implications and Conclusion

First, we found that time preferences play a significant role in identifying the behavior of individuals who decided to engage in the TAW sector at some point in the past two years.

Next, the baseline ATT estimates reveal that the probability of moving into regular employment is lower for those with TAW experience; however, the negative effect becomes small or statistically insignificant when time preferences are additionally controlled for.

⇒ If we could consider the TAW employment as an extension of unemployment status, the lower exit rate from unemployment and/or non-regular to regular employment can be viewed as an indicator that such individuals tend to **postpone job search activities** and keep the reservation wage rate constant when they finally find a job (Paserman, 2008).

Limitations and Future Studies (1)

First, our time preferences **may capture some elements other than impatience**, such as human capital, a taste for leisure, or some other unobserved behavioral traits (e.g., human capital).

⇒ In our study, we used more direct measures of impatience employing both retrospective and hypothetical questions; moreover, two different time preferences produce similar results even after we control for observed characteristics associated with human capital.

Secondly, we used **a small sample whose gender and age composition is somewhat different** from the government statistics.

⇒ Although this may limit the generalization of the estimated results to the representative TAW workers, the results with the restricted sample by gender and age group is similar with the main results.

Limitations and Future Studies (2)

Thirdly, as previously noted, the lack of information about the career progression restricts our ability to examine the career choice process of the TAW workers in the exponential and hyperbolic discounting models separately.

⇒ However, our results imply a significant role of time preferences in identifying the difference in the subsequent career choices between those with and without TAW experience.

Lastly, our data does not ensure that the selection to treatment is not affected by some other unobserved traits.

⇒ This paper, however, attempts to control for the individual heterogeneity in time preferences as one of unobserved traits to find more direct effects of the TAW experience on the transition probability; moreover, the sensitivity analysis, albeit indirectly, suggests that the estimated results do not violate the assumption of *unconfoundedness*.