The Effect of Unemployment on Suicide and Suicide by Employment Status in Japan*

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Abstract

A number of studies examine the relationship between macroeconomic conditions and suicide. However, the results are inconsistent and the mechanisms behind the relationship are not sufficiently revealed. Many studies use overall suicide rates and it is unclear what kind of population is affected by recessions. This study employs regional panel data for unemployment rates, suicide rates, and suicide rates by employment status to examine (i) how the fluctuations of unemployment rate impact on suicide rate in Japan and (ii) whether the effects are different by age groups and by employment status. We primarily conduct panel estimations. To check the robustness, we also conduct dynamic panel estimation and change the specifications in several ways. We find that higher unemployment increases suicide among Japanese males of prime working age. The result is robust after changing the specifications. In separate estimations using suicide rates by employment status, we find that higher unemployment increases suicide of Japanese male non-workers, while the effect on suicide rates of male workers does not exist. The results for most females are less apparent than those for males. As an exception, we find that higher unemployment rates decreases suicide rate for female non-workers aged 40-44. It is contrasting to the implication for male non-workers.

Keywords: suicide, unemployment, recessions, Japan
JEL Classification: E24, E32, I10

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I. Introduction

Many studies have pointed out that suicide is related with socio-economic conditions. Hamermesh and Soss (1974) applies economic theory to suicide behavior and reveals that social factor such as income and unemployment is key determinants of suicide behavior. Although a number of empirical studies examine the relationship between unemployment and suicide by using different data and methods, the results are inconsistent. Some studies find that higher unemployment increases suicide rate (e.g., Brainerd, 2001; Granados, 2005; Ruhm, 2000; Ruhm, 2015; Stuckler et al., 2011). On the other hand, some studies reveal the negative effect of unemployment on suicide (e.g., Andrés, 2005; Neumayer, 2004).

In Japan, suicide rates rapidly increases after 1997. Although suicide rates has a tendency to decline in recent years, the relationship between unemployment and suicide is a great concern in Japan. Sawada et al. (2010) used prefectural panel data and revealed a positive relation between unemployment and suicide rates. Ikeda and Zhang (2016) conduct dynamic panel estimation using Japanese municipality data and find that unemployment rates are weak risk factor for males. Results are inconsistent in Japanese case.

What mechanisms do exist behind the relationship between unemployment and suicide? Browning and Heinesen (2012) use micro data in Denmark and find that job loss due to plant closure increases risk of suicide. Susukida (2014) examines the effect of unemployment on not only suicide rate but also mental stress using Japanese prefectural data. The study reveals that higher unemployment increase suicide rate and mental illness. Yamauchi et al. (2013) examines the age-adjusted relative suicide risk by marital and employment status and find that unemployed and divorced men has a higher relative risk to suicide. The literature, which examines the mechanism has been less accumulated.

The present paper attempts to examine the effect of unemployment on suicide rates and suicide rates by employment status in Japan. We mainly construct five-year prefecture-based panel data spanning 1975–2010 by sex and age group. We conduct standard panel estimations and to examine the robustness of the results, we change the

specifications in several ways: using dynamic panel data model, log form of suicide rate, and different economic indicators. In addition, we use the data on suicide by employment status (workers or non-workers) and conduct separate estimations to investigate one background behind the effect of unemployment on suicide in Japan.

We find that higher unemployment increases suicide among Japanese males of prime working age. The result is robust after changing the specifications. In separate estimations using suicide rates by employment status, we find that higher unemployment increases suicide of male non-workers, while the effect on suicide of male workers does not exist. The results for female are less apparent than those for males. As an exception, the results show that higher unemployment rates decreases suicide rate of female non-worker aged 40-44.

This study contributes to the literature in three respects. First, we examine the effect of unemployment on suicide in Japan and to cultivate a better understanding, we also examine the effect on suicide by employment status. As mentioned, previous literature shows inconsistent results. We provide a new evidence of the relationship between unemployment and suicide in Japan by using different data in terms of time period and aggregate level. In addition, we provide an evidence on mechanisms behind the effect of unemployment on suicide. When we use regional data, the background behind the effect of unemployment on suicide is less clear because of using overall suicide rate. There may exist heterogeneous relationship between unemployment and suicide by employment status. We use suicide rate by employment status and examine whether the effect of unemployment on suicide is different by employment status.

Second, we handle the problem of endogeneity by conducting both panel estimation and dynamic panel estimation. We avoid the omitted variables bias by utilizing panel data model. Considering that the data covers longer time in this study, we extend standard panel estimations by using a dynamic panel data model to capture the dynamic relationship in the mortality rate.

Third, we provide a new evidence on the effects of unemployment on suicide. We find that higher unemployment increases suicide for working-age Japanese males. In separate estimations using suicide rate by employment status,

we find the positive effects on suicide of male non-workers, while the effect on suicide of male workers does not exist. That is, economic downturns in labor market have worse effects on mental health for non-workers than workers. On the other hand, there is almost no effect for females, while as an exception, the results show that higher unemployment rates decreases suicide rate for female non-workers aged 40-44. It implies that economic downturns in labor market prevent female non-worker aged 40-44 from committing suicide.

This paper proceeds as follows. Sections II and III discuss the empirical model and data, respectively. Section IV presents results. Section V discusses results and concludes the study.

II. Empirical Strategy

Our main estimation model is as follows:

$$S_{it} = \alpha + \beta U_{it} + X_{it}\delta + u_{it} \qquad \text{where } u_{it} = \mu_i + \gamma_t + \varepsilon_{it}, \qquad (1)$$

where subscript i denotes prefectures $(i = 1, 2, \dots, 47)$ and t denotes five-year-interval period $(t = 1975, 1980, \dots, 2010)$. We utilize two-way error component disturbances where μ_i denotes the unobservable prefecture-specific effect, γ_t denotes the unobservable time-specific effect, and ε_{it} denotes the white noise disturbance following i.i.d. $(0, \sigma_\varepsilon^2)$.

The dependent variable (S_{it}) is the suicide rate. The suicide rate is calculated as the number of deaths due to suicide per 100,000 in the population. The key independent variable (U_{it}) is the unemployment rate as a percentage of the unemployed in the labor force.[1] X_{it} is a vector of other control variables for regional variations, including population in densely inhabited districts, the ratio of the population aged below 15 years to those aged over 65 years, total hours worked, numbers of general hospitals per thousand population, numbers of psychiatric hospital per

[1] Alternatively, we can use finite or infinite distributed lag models, but these approaches have some problems such as the high multicollinearity. In fact, the correlation between the current and a lag of unemployment is 0.8-0.9. Instead, we conduct a dynamic panel estimations as described below.

thousand, hours of sunlight per day, the birth rate, and the divorce rate.

We initially conduct standard panel estimations. One employs a fixed effects model that assumes that the prefecture-specific and time-specific effects are non-stochastic. Another employs a random effects model in which the prefecture-specific effects are random, while the time-specific effect are fixed. We control the time effect by using year dummies. The null hypothesis of interest is that fluctuations in unemployment do not influence the suicide rate: $\beta = 0$. If the null is rejected and the sign of the coefficient is positive, higher unemployment increases the suicide rate.

We conduct estimations separately by sex and age group (in 5 year increments). This is because the effects of unemployment on suicide rates can be different among them. We investigate males aged 25–54 years, which populations likely participate in the labor market and expected to be more affected by the unemployment rate.[2] For comparison, we review the results for females.

We extend a standard panel data model by conducting a dynamic panel estimation wherein the lagged dependent variable is included among explanatory variables such as $S_{it} = \rho S_{it-1} + \beta U_{it} + X_{it}\delta + u_{it}$. Since the persistent effect of the past suicide rate on the present suicide rate is controlled for, we can examine the existence of a pure effect of changes in unemployment on changes in the suicide rate. We adopt Blundell and Bond's (1998) system generalized method of moments (GMM) estimator, enabling first-order autocorrelation in first-differenced errors. To diagnose the validity of GMM, we test for over-identification restrictions and serial correlations using Hansen J statistics and Arellano–Bond statistics, respectively.

Furthermore, we change the specifications in two ways to check the robustness of the results. First, we use the natural logarithm of the suicide rate instead of the level of suicide rate. Second, we substitute the unemployment rate for other economic indicators such as the unemployment-to-population ratio, the

[2] Persons aged below 25 years are mostly outside the labor force. Persons aged over 55 years are sometimes in labor force and sometimes not because Japan's mandatory retirement age has changed several times since 1975.

employment-to-population ratio, and the job offers-to-seeker ratio.

III. Data and Descriptive Statistics

We construct data for 47 prefectures in five-year intervals spanning 1975–2010. The data regarding the number of deaths due to suicide is obtained from Vital Statistics of Japan published by the Ministry of Health, Labour and Welfare (MHLW). It indicates deaths by sex and age group. The suicide rate by employment status is also from Report of Vital Statistics: Occupational and Industrial Aspects. This survey has been carried out once every five fiscal years. Due to data availability, we use panel data spanning 1995–2010 when we conduct estimations using the suicide rate by employment status. The employment status is classified into workers or non-workers. Non-workers include those who are unemployed and non-labor force.

The number of unemployed, employed, labor force population, and total population are from the Japanese Population Census conducted every five years. Our sample period contains five-year intervals to fit the census. We use these variables and construct the suicide and unemployment rate separately by sex and five-year age group. We also construct other economic indicators such as the unemployment-to-population ratio and the employment-to-population ratio from these variables. The job offers-to-seeker ratio is from MHLW's Report on Employment Service.

As further controls, we define variables representing demographic variations and the accessibility of medical institutions. Specifically, we construct population in densely inhabited district and the ratio of the population below 15 years to those aged over 65 years derived from the Japanese census. Total hours worked is monthly mean by sex from Basic Survey on Wage Structure. Numbers of general hospitals and psychiatric hospital per thousand population from the monthly Survey of Medical Institutions by the MHLW. Hours of sunlight per day is historical data from Japan Meteorological Agency. The birth rate and the divorce rate are from Vital Statistics of Japan.

Summary statistics for the suicide rate per 100,000 population and the unemployment rate (%) by sex, age group, and employment status appear in Table 1. Approximately, the suicide rate rises as people age, the unemployment rate is higher among younger than older populations, and males exhibit higher suicide rates than females.

Figure 1 presents the relationship between the unemployment and suicide rate (e.g., among males aged 30–34).[3] The upward sloping solid line is fitted using all observations. This implies a positive relationship between the unemployment and suicide rate. However, this may be a spurious relationship because failure to control for both year and prefectural effects generates misleading results. We thus treat both time and prefectural dimensions carefully in the next section when examining the relationship between unemployment and suicide in Japanese prefectures.

IV. Results

IV-1. The Effect of Unemployment on Overall Suicide Rates for Males

Table 2 presents the results for males from panel estimations conducted separately by age group. For each age group ((1)–(6)), Columns (a) and (b) indicate estimates for the coefficient of the unemployment rate based on the fixed effects and random effects models, respectively. All estimations include the variables of unemployment rates, demographic factors, and year dummies. Test statistics for panel specifications appear below the estimates.

The coefficient of the unemployment rate is positive and significant at 1% for males aged 35–39 and 45-49 in both Columns (a) and (b). For males aged 50-54, the effect is also positive and significant at 10% in both Columns. This implies that rising unemployment rates increase suicide rates for these males. For all other age groups, the effect on suicide is positive and significant at 5% only in the random effects model (Column (b)). For these males,

[3] For other age groups, the relationship is similar. The simple correlation coefficients between the unemployment and suicide rate become positive, say 0.45, 0.47, 0.51, 0.52, 0.48, and 0.51 respectively for each age group from 25-29 to 50-54.

the effects are less apparent.

In the previous estimations, we solve the problem of endogeneity by controlling unobservable prefectural and time effects. However, we cannot capture the dynamic relationship in the suicide rate. Considering that suicide rates have persistency, we conduct dynamic panel estimations. Table 3 shows the results. Estimations employ Blundell and Bond's (1998) system GMM estimator.

The coefficient of the unemployment rate is positive and significant at 5% for males aged 25–29 (Column (1)), 35-39 (Column (3)), and 45-49 (Column (5)). That is, higher unemployment rates increases suicide rates. Note that lagged mortality rates are insignificant. Most diagnostic results reveal the expected results, but the results for males aged 30–34 and 40–44 are not provided. We then exercise caution when interpreting these results. At least, we find that the implication is almost unchanged, even when we capture a dynamic relationship in suicide rates. That is, the recession in labor market is related to suicide rates for prime-age workers, although the fluctuation of unemployment rates does not impact on suicide for all age groups.

We conduct several estimations to check the robustness of the results. First, we use the natural logarithm of suicide rate instead of the level of that. Table 4 presents the results. Our primary results are nearly identical when the dependent variable is measured in natural log. Second, we substitute the unemployment rate for other economic indicators such as the unemployment-to-population ratio, the employment-to-population ratio, and the job offers-to-seeker ratio. Table 5 presents the results. We find that higher unemployment-to-population ratio increases suicide rates for males aged 25-29, 25-29, and 45-49. On the other hand, higher employment-to-population ratio decrease suicide rates for males aged 35-39 and 45-49. Higher job offers-to-seeker ratio decreases suicide rates for males aged 25-29 and 45-49. This finding is consistent with previous results and we obtain similar implications when we replace unemployment rate with other economic indicators. These results support that the increasing in suicide rates can be statistically attributable to labor market conditions for working age groups.

IV-2. The Effect on Suicide Rates by Employment Status

Suicide rates for each age group include any type of males such as workers and non-workers. Table 6 presents the results of separate estimation using suicide rates by employment status. Panel A shows the effect on suicide rates for male workers. In each Row, which presents estimates by fixed effects model, random effects model, and dynamic panel data model respectively, higher unemployment rates show no clear effects on suicide rates for most age group. Thus, economic downturns in labor market do not have effects on suicide for Japanese male workers. Note that higher unemployment increases suicide for males aged 45-49 at 5% significance level in Row (b). This implies that higher unemployment damages mental health for male workers.

Panel B shows the effect of unemployment on suicide rates for male non-workers. In Row (a), higher unemployment rates increases suicide rates for males aged 35-39. In Row (b), the positive effects exist for males over 35. In Row (c), higher unemployment rates increases suicide rates for males aged 35-39. In contrast to the results for male workers, the positive effect remains even when we capture a dynamic relationship in suicide rates. It implies that economic downturns in labor market have serious effects on male non-worker aged 35-39.

Although sample size is small due to data availability, the positive effect on suicide is revealed for male non-workers aged 35-39.

IV-3. The Effects for Female

We review the results for females. Females have a lower labor participation rate than males, so they might be less affected by labor market conditions. Table 7 presents the results. Panel A shows the effect of unemployment on suicide rates for all females. In Low (c), which are estimates by dynamic panel estimation, higher unemployment rates show no clear effects on suicide rates for any females. Panel B shows the effect of unemployment on suicide rates for female workers. Higher unemployment rates also show no clear effects on suicide rates for any females in either specifications (from Low (a) to Low (c)). Panel C shows the effect of unemployment on suicide rates for

female non-workers. Higher unemployment rates show negative effects on suicide rates for females aged 40-44 in both fixed and random effects model in Low (a) and Low (b). This implication unchanged when we conduct dynamic panel estimation in Low (c). That is, higher unemployment rate decreases suicide rates for female non-workers aged 40-44.

The effects of unemployment on suicide for females are less clear than males. However, contrary to the implications for males, the results show the possibility that economic downturns in labor market have good effects on female non-workers aged 40-44.

V. Conclusion

A number of studies examine the relationship between macroeconomic conditions and suicide. However, the results are inconsistent and the mechanisms behind the relationship are not sufficiently revealed. Many studies use overall suicide rates and it is unclear what kind of population is affected by recessions. This study employs regional panel data for unemployment and suicide rates to examine: (i) how the fluctuations of unemployment rate impact on suicide rate in Japan and (ii) whether the effects are different by age groups and by employment status. We primarily conduct panel estimations. To check the robustness, we also conduct dynamic panel estimation and change the specifications.

We find that higher unemployment increases suicide among Japanese males of prime working age. The result is robust after changing the specifications by controlling the dynamic relationship in suicide rates and replacing unemployment rate with other economic indicators. In separate estimations by employment status, we find that higher unemployment increases suicide of Japanese males who are non-workers, while the effect on male workers does not exist. The results for females are less apparent than those for males. However, the results show the possibility that higher unemployment rates decreases suicide rate for females aged 40-44 who are non-workers.

This study has some limitations. One is that our study does not consider migration flows. For example, healthy people may move to the region with good economic condition. However, we allow the mobility in the prefecture using prefectural data. Another limitation is that we do not sufficiently investigate the mechanisms influencing the relation between unemployment and health in Japan. To examine the mechanism further, we need more detailed data. Further studies are needed.

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Table 1. Summary Statistics

	Observations	Male				Female			
		Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Suicide Rate per 100,000									
All									
25–29	376	27.46	9.87	0	65.45	11.28	5.42	0	26.74
30–34	376	27.81	10.14	8.09	63.61	11.16	4.93	0	28.77
35–39	376	29.78	11.79	4.87	79.99	10.62	5.07	0	31.93
40–44	376	35.87	14.09	8.66	87.59	11.93	5.26	0	34.24
45–49	376	42.86	16.55	14.57	101.22	13.74	5.78	0	41.56
50–54	376	47.15	19.95	0	126.05	16.49	5.96	0	40.69
Woker									
25–29	188	15.65	6.57	0	40.09	3.56	2.73	0	14.16
30–34	188	17.65	7.65	0	49.35	3.40	2.79	0	14.30
35–39	188	20.49	9.22	2.82	50.16	3.10	2.53	0	10.04
40–44	188	24.54	10.43	4.62	65.40	3.81	2.90	0	14.58
45–49	188	30.13	12.44	4.92	72.53	4.10	2.82	0	15.41
50–54	188	34.77	13.28	10.41	79.06	5.15	3.35	0	15.67
Non-Worker									
25–29	188	11.15	5.41	0	27.93	6.23	4.04	0	24.45
30–34	188	10.53	5.79	0	31.74	7.22	3.68	0	20.23
35–39	188	10.41	5.47	0	34.65	6.43	3.74	0	20.43
40–44	188	12.59	6.60	0	42.18	6.70	3.45	0	16.13
45–49	188	14.64	6.83	1.66	36.27	7.79	3.95	0	20.61
50–54	188	17.57	7.99	0	47.67	9.84	4.26	0	22.18
Unemployment Rate (%)									
25–29	376	4.98	2.86	1.36	15.71	5.13	2.12	1.43	12.49
30–34	376	3.79	2.20	0.86	11.93	3.86	2.03	0.77	10.20
35–39	376	3.28	1.99	0.79	11.47	2.90	1.77	0.56	8.56
40–44	376	3.07	1.91	0.64	11.04	2.29	1.44	0.51	7.20
45–49	376	3.04	1.82	0.68	11.29	1.99	1.14	0.43	6.39
50–54	376	3.35	1.90	0.79	12.49	1.94	0.97	0.51	5.67

Figure 1. Scatter Plot for Males aged 30-34

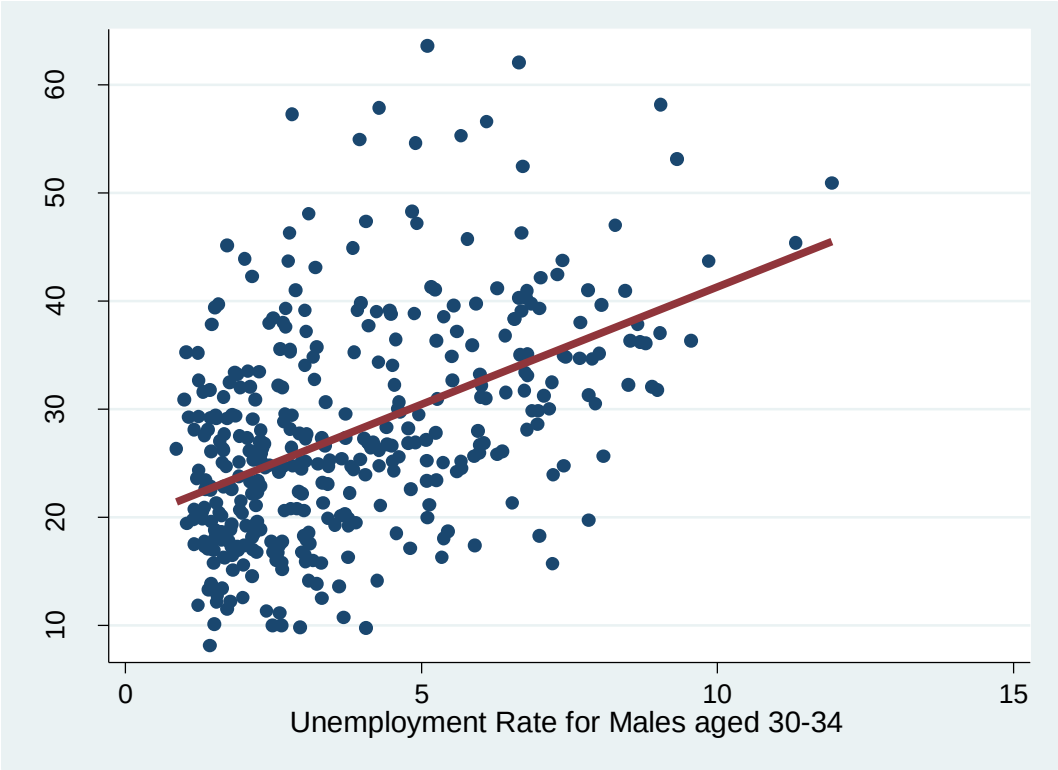

Table 2. Effects of Unemployment on Suicide for Males

Dependent Variable: Age-Specific Mortality Rate per 100,000												
	(1) 25–29		(2) 30–34		(3) 35–39		(4) 40–44		(5) 45–49		(6) 50–54	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Unemployment Rate	1.191	1.010 **	0.984	1.342 **	3.737 ***	4.005 ***	0.952	1.984 **	7.148 ***	4.505 ***	3.258 *	2.477 **
	(0.870)	(0.418)	(1.061)	(0.662)	(1.321)	(0.731)	(1.267)	(0.894)	(1.427)	(1.042)	(1.919)	(1.103)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	376	376	376	376	376	376	376	376	376	376	376	376
Number of Prefectures	47	47	47	47	47	47	47	47	47	47	47	47
R-squared	0.395		0.382		0.4		0.511		0.608		0.634	
Assumption on μ_i	Fixed	Random	Fixed	Random	Fixed	Random	Fixed	Random	Fixed	Random	Fixed	Random
F Test	1.03		2.27 ***		1.45 **		2.26 ***		3.97 ***		2.98 ***	
BP-LM Test		0		21.28 ***		0.7		15.77 ***		68.12 ***		26.28 ***
Hausman Test		16.64		8.35		21.08		19.88		26.1 *		27.43 **

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors are in parentheses. 3. All estimations include year dummies identifying 1980, 85, 90, 2000, 05, and 10 (Benchmark 1975). We report coefficients of unemployment rates only. 4. Test statistics for the F test are on prefectural dummies and those for the BP–LM test are on variance. Hausman test statistics in each column (2) are based on the contrast between the random effects model (null) and the fixed effects model.

Table 3. Dynamic Panel Estimations for Males

Dependent Variable: Age-Specific Mortality Rate per 100,000						
	25-29	30-34	35-39	40-44	45-49	50-54
	(1)	(2)	(3)	(4)	(5)	(6)
A Lag of Mortality Rate	0.016	0.031	0.163 *	0.029	-0.027	0.109
	(0.072)	(0.091)	(0.098)	(0.155)	(0.070)	(0.149)
Unemployment Rate	1.032 **	1.067	3.034 ***	0.594	4.512 ***	2.044
	(0.418)	(1.063)	(1.042)	(1.242)	(1.311)	(1.507)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	329	329	329	329	329	329
First-Order Serial Correlation	-3.08 ***	-3.71 ***	-4.12 ***	-4.5 ***	-4.78 ***	-3.36 ***
Second-Order Serial Correlation	1.33	-0.27	-0.95	-0.26	-0.16	-0.86
Hansen's J Test	3.35	11.36 *	4.64	11.41 *	6.53	8.59

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors corrected in the manner Windmeijer (2005) prescribed are in parentheses. 3. Each estimation is conducted by System GMM with year dummies.

Table 4. Changing the Suicide Rate to the Natural Logarithm of Suicide Rate

Dependent Variable: the Natural Logarithm of Age-Specific Mortality Rate per 100,000						
	25-29	30-34	35-39	40-44	45-49	50-54
	(1)	(2)	(3)	(4)	(5)	(6)
a. Fixed Effects Model	0.041	0.037	0.099 **	-0.002	0.127 ***	0.064
	(0.030)	(0.038)	(0.040)	(0.030)	(0.029)	(0.039)
b. Random Effects Model	0.033 **	0.047 *	0.115 ***	0.043 *	0.087 ***	0.040
	(0.017)	(0.025)	(0.027)	(0.026)	(0.023)	(0.025)
c. Dynamic Panel Data Model	0.032 *	0.045	0.092 ***	0.015	0.082 ***	0.018
	(0.017)	(0.040)	(0.033)	(0.032)	(0.024)	(0.025)

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors are in parentheses. 3. All estimations include control variables and year dummies identifying 1980, 85, 90, 2000, 05, and 10 (Benchmark 1975). We report coefficients of unemployment rates only. 4. Dynamic panel estimation is conducted by System GMM.

Table 5. Changing the Unemployment Rate to Different Economic Indicators

Dependent Variable: Age-Specific Mortality Rate per 100,000						
	25-29	30-34	35-39	40-44	45-49	50-54
	(1)	(2)	(3)	(4)	(5)	(6)
A. Unemployment to Population						
a. Fixed Effects Model	2.084 **	1.062	4.011 **	1.494	7.438 ***	3.509 *
	(0.862)	(1.036)	(1.502)	(1.400)	(1.544)	(2.024)
b. Random Effects Model	1.351 ***	1.360 *	4.197 ***	2.324 **	4.767 ***	2.687 **
	(0.460)	(0.705)	(0.780)	(0.945)	(1.111)	(1.212)
c. Dynamic Panel Data Model	1.376 ***	1.106	3.120 ***	0.630	4.799 ***	2.163
	(0.428)	(1.081)	(1.125)	(1.289)	(1.417)	(1.649)
B. Employment to Population						
a. Fixed Effects Model	0.261	0.009	-0.647 *	0.008	-1.515 **	-0.989
	(0.297)	(0.260)	(0.363)	(0.503)	(0.672)	(0.867)
b. Random Effects Model	-0.057	-0.335	-1.273 ***	-0.283	-1.285 ***	-0.754
	(0.189)	(0.254)	(0.323)	(0.396)	(0.466)	(0.534)
c. Dynamic Panel Data Model	-0.062	-0.116	-1.324 ***	-0.667	-1.614 **	-1.090
	(0.225)	(0.316)	(0.447)	(0.607)	(0.664)	(0.719)
C. Job Offers to Seeker RatioEmployment to Population						
a. Fixed Effects Model	-8.430 ***	-0.369	-3.082	-2.204	-5.275 *	-0.194
	(2.063)	(2.295)	(2.427)	(2.763)	(2.883)	(3.866)
b. Random Effects Model	-4.509 ***	-0.517	-2.727	-3.258	-5.839 **	-5.170 *
	(1.584)	(1.814)	(2.032)	(2.250)	(2.577)	(2.954)
c. Dynamic Panel Data Model	-4.465 ***	1.753	-3.707 *	-4.473 *	-6.770 **	-5.811 *
	(1.349)	(2.535)	(1.896)	(2.576)	(3.072)	(3.208)

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors are in parentheses. 3. All estimations include control variables and year dummies identifying 1980, 85, 90, 2000, 05, and 10 (Benchmark 1975). We report coefficients of unemployment rates only. 4. Dynamic panel estimation is conducted by System GMM.

Table 6. Separate Results by Employment Status

Dependent Variable: Age-Specific Mortality Rate per 100,000						
	25-29	30-34	35-39	40-44	45-49	50-54
	(1)	(2)	(3)	(4)	(5)	(6)
A. Males Employed						
a. Fixed Effects Model	0.446	-0.222	-0.188	0.540	3.800	1.459
	(0.867)	(1.051)	(1.538)	(1.875)	(2.575)	(2.215)
b. Random Effects Model	-0.433	-0.227	0.929	1.312	2.652 **	0.963
	(0.461)	(0.671)	(0.833)	(1.016)	(1.206)	(1.110)
c. Dynamic Panel Data Model	-0.803	-0.448	0.628	1.108	0.412	0.415
	(0.516)	(0.686)	(1.118)	(1.135)	(1.460)	(1.402)
B. Males Out of Work						
a. Fixed Effects Model	0.143	0.679	2.072 **	-0.074	1.279	0.703
	(0.839)	(1.252)	(0.798)	(1.613)	(1.481)	(0.664)
b. Random Effects Model	0.428	0.547	0.939 **	1.129 *	1.310 *	1.753 **
	(0.353)	(0.481)	(0.472)	(0.592)	(0.688)	(0.701)
c. Dynamic Panel Data Model	0.029	0.648	1.152 *	-0.517	1.000	0.581
	(0.504)	(0.780)	(0.681)	(0.803)	(0.918)	(0.675)

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors are in parentheses. 3. All estimations include control variables and year dummies identifying 1980, 85, 90, 2000, 05, and 10 (Benchmark 1975). We report coefficients of unemployment rates only. 4. Dynamic panel estimation is conducted by System GMM.

Table 7. Results for Female

Dependent Variable: Age-Specific Mortality Rate per 100,000						
	25-29	30-34	35-39	40-44	45-49	50-54
	(1)	(2)	(3)	(4)	(5)	(6)
A. All Females						
a. Fixed Effects Model	-0.998 *	-0.119	-0.524	1.272	0.695	-0.247
	(0.507)	(0.839)	(0.854)	(1.127)	(1.237)	(1.405)
b. Random Effects Model	0.055	1.117 **	0.245	0.77	0.988	0.902
	(0.365)	(0.445)	(0.581)	(0.674)	(0.886)	(0.986)
c. Dynamic Panel Data Model	-0.62	0.807	0.049	0.099	0.821	-0.726
	(0.391)	(0.809)	(0.682)	(0.624)	(0.858)	(1.169)
B. Females Employed						
a. Fixed Effects Model	0.33	0.469	0.47	0.351	0.032	-0.163
	(0.643)	(0.655)	(0.624)	(0.886)	(0.985)	(0.844)
b. Random Effects Model	-0.068	-0.024	-0.243	-0.105	0.328	0.216
	(0.297)	(0.359)	(0.378)	(0.433)	(0.520)	(0.691)
c. Dynamic Panel Data Model	0.022	0.271	-0.074	0.061	0.607	0.467
	(0.425)	(0.379)	(0.540)	(0.788)	(0.537)	(0.712)
C. Females Out of Work						
a. Fixed Effects Model	-0.884	-1.532 **	1.266	-2.725 **	1.780	3.186 **
	(0.908)	(0.710)	(0.886)	(1.028)	(1.546)	(1.321)
b. Random Effects Model	0.041	-0.033	0.579	-0.830 *	-0.268	1.128
	(0.416)	(0.445)	(0.550)	(0.498)	(0.779)	(0.847)
c. Dynamic Panel Data Model	-1.238 **	-0.459	0.968	-1.288 ***	-0.071	1.52
	(0.544)	(0.541)	(0.806)	(0.457)	(1.140)	(0.986)

Notes: 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. 2. Robust standard errors are in parentheses. 3. All estimations include control variables and year dummies identifying 1980, 85, 90, 2000, 05, and 10 (Benchmark 1975). We report coefficients of unemployment rates only. 4. Dynamic panel estimation is conducted by System GMM.