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"Analysis of the Socioeconomic Difficulties Affecting the Suicide Rate in Japan"

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Analysis of the Socioeconomic Difficulties Affecting the Suicide Rate in Japan

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Analysis of the Socioeconomic Difficulties Affecting the Suicide Rate in Japan

ABSTRACT

This paper focuses on the drastic increase observed in the Japanese male suicide rate in the late 1990s and early 2000s and confirms unemployment and personal bankruptcy to be the associated socioeconomic factors behind the male suicide variation. Personal bankruptcy is also confirmed to be significant in the female suicide variation. The relationship is confirmed through a pooled data analysis by a middle-aged group and by prefecture.

Further, the paper focused on the association between the unemployment rate and suicide mortality by incorporating the reasons for unemployment in the monthly regression. Next, we identified a significant association between male suicide variations and changes in some of the reasons for being unemployed. The interpretation of the results implies that the risk of unemployment among men has been mitigated by the unemployment insurance rather than the bias in the reasons reported and/or mental disorder in Japan.

Analysis of the Socioeconomic Difficulties Affecting the Suicide Rate in Japan

INTRODUCTION

According to the "5th Statistics Concerning Suicide Deaths (Special Report on Demographic Statistics)[1,2]," a surprising increase was noted in the frequency of suicide mortality in Japan in 1998; and remains a 40-year-high in eight years. According to the World Health Organization (WHO), as of 2002, the frequency of suicide in Japan—particularly with respect to middle-aged men—ranked highest among countries faced with the issue of increasing number of suicides. People, concerning that high frequency, tried to seek reasons in financial crisis in the late 1990s, fierce retrenchment in the labor market, or the economic doldrums during that decade." Unfortunately, none of these reasons have successfully explained the immediate rise in the frequency of suicide. Therefore, in this paper, we made an effort to examine the relationship between the frequency of suicide and the representative socioeconomic risk factors that were mainly examined in earlier studies.

The postwar variation in suicide mortality revealed three major highs in Japan; among these three, the oldest high was observed between 1953 and 1959 and is stated to be associated with the high suicide rate among demobilized soldiers and women aged between 20 and 30 years. However, the recent peaks were observed from 1983 to 1986; this peak is believed to be the result of the high suicide rate among men aged between 35 and 60 years.

In 2003, the age-adjusted suicide rate for men was 33.2. This rate continued to be high since the

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[1]   According to the World Health Organization, suicidal behavior is classified as completed suicide, attempted suicide, and suicidal ideation. Due to our limited access to nonfatal suicidal data in Japan, this article analyzed only the suicide mortality rate.

[2]   The frequency of suicide is expressed in terms of population per 100,000, as given in the Vital Statistics. The frequency of suicide among Japanese men is $23.4_{(1995)}$, $35.2_{(2000)}$, and $38.2_{(2003)}$ and among Japanese women, $11.3_{(1995)}$, $13.4_{(2000)}$, and $13.5_{(2003)}$. Considering that the frequency of suicide differs based on age and gender, we basically employ the age-adjusted suicide rate by gender in our regression analysis on the annual data. The age-adjusted rates of men and women for the year 2003 are $33.2_{/100,000}$ and $10.9_{/100,000}$, respectively.

1960s (i.e., 38.5 in 1955 and 38.0 in 1985). However, the age-adjusted suicide rate for women was comparatively lower at $10.9_{/100,000}$ (i.e., 22.4 in 1955 and 13.5 in 1985).

On examining the major motives for suicide in the official data obtained from the National Police Agency[3], it was found that 34.3% of suicides were accompanied by suicide notes stating that the action was taken due to health-related reasons. This ratio is not significantly different from the ratios obtained in 1998 (30.7%) and 1997 (33.2%). On the other hand, the ratio of those who had experienced economic hardships increased significantly from 19.5% in 1997 and 24.2% in 1998 to 34.3% in 1999.

Many of the earlier studies were dependent on Durkheim's endeavoring works (1897)[4] regarding the association between suicidal behaviors and the components of different surroundings. He characterized suicidal behaviors such that individuals are integrated into a society. With regard to the socioeconomic aspects, by quoting typical examples[5], Durkheim hypothesized that both economic boom and crisis were associated with the high frequency of suicide. However, Henry and Short (1954) advocated that the frequency of suicide was negatively correlated with the business booms.

In economics and politics, Hamermesh and Soss (1974)—who studied fatal suicidal behavior with rational individuals in an attempt to determine whether these individuals would choose to continue living or would end their lives even when they disliked the idea of committing suicide—concluded the significance of income factors and unemployment among the middle-aged individuals. Moreover, in his cross-sectional analysis of 68 countries, Neumayer (2003) implies the significant association between

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[3] One of the most probable motives for suicide is determined based on suicide notes, interviews with the bereaved, or acquaintance with policemen. With regard to the suicide statistics in many countries, experts have questioned the validity of official data. However, we believe that it is less likely that the increase in suicide since 1998 has been caused by the over-registration of undetermined deaths in the official data. Among the deaths inspected at the Tokyo inspection office of a doctor, the number of undetermined deaths has been fewer than that of suicidal deaths since 1998.

[4] It is well known that the various suicidal phenomena in a society have been examined and conceptualized into egoistic, altruistic, and anomie-like notion in his study. Among other elements, he compares the frequency of suicide in different types of families, religions and cultures, economic booms and crisis, and during peace and at the time of war.

[5] His quotation indicates a higher frequency of suicide in the opening period of the Paris international exposition in 1978 and at the time of unification in Italy around the 1870s.

unemployment and suicide.

In epidemiology and public health, it has been found that the fear of being unemployed results in a higher tendency for self-harm or suicide in the U.K. (Sloggett and Lewis 1998), the U.S. (Yang 1992), and New Zealand (Beautrais, Joyce, and Mulder 1998). Some time-series analysis revealed an association between suicide and unemployment among men (Platt and Hawton 2000)[6]. In the case of Japan, Motohashi (1991) examined the frequency of suicide in Japan during 1953 and 1986 and determined that it is associated with the unemployment rate, which was a risk factor for suicide prior to 1972.

The steep rise in the frequency of suicide and the constantly high frequency since the late 1990s is strange when considered with the variation observed in the number of suicides committed in Japan in the past 40 years. It is important for Japanese society to identify the factor that explains and predicts the national suicide rate. Therefore, this paper focuses on the period between the late 1990s and early 2000s, examining the relationship between the suicide mortality rate and the socioeconomic factors behind it. The remainder of the paper consists of the following: Introduction, Data and Methods, Results and Interpretation, and Conclusion.

DATA AND METHODS

Our empirical estimation consists of the following three parts. First, in order to confirm the relationship, we conduct a multivariate regression of male and female suicide rates on the major socioeconomic factors found in the monthly data[7]. Second, we conduct a pooled regression of male and

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[6]   Besides, studies on suicidal behavior often center on the accessibility of firearms and of harmful substances and excessive alcohol consumption.

[7]   Since we are uncertain about whether the specification is linear or nonlinear a priori, we apply the ordinary least squares (OLS) method to retain consistency in the estimators.

female suicide rates by prefecture [Appendix A] for three consecutive periods between 1993 and 2004. This regression is conducted to confirm the socioeconomic factors that affect local variation. Finally, we conduct a pooled regression of male and female suicide rates by age between 40 and 60 years from 1970 to 2002. This regression is performed to confirm the relationship by focusing on middle-aged groups. With regard to the socioeconomic variables considered in the estimation, we selected personal bankruptcy and the rates of unemployment and divorce as the control variables. In addition, we included the number of bankruptcy firms in the monthly regression.

We considered the first-order difference of the original series in the presence of a unit root based on the augmented Dickey-Fuller (ADF) test. In treating heteroskedasticity, we utilized the White robust estimator for obtaining the standard deviation of the estimated coefficients.

Regression of Male and Female Suicide Rates

Suicide mortality, denoted as Sui_m "Suicide (men)" and Sui_w "Suicide (women)," is regressed on the monthly socioeconomic variables between July 1997 and December 2004. In this paper, we examine the number of unemployed individuals (UN), the number of those experiencing personal bankruptcy (Pb), the number of bankruptcy firms (BF), and the number of divorces (Dvc). UN in ten thousand, denoted as UN_m "Unemployed (men)" and UN_w "Unemployed (women)," is obtained from the Labor Force Survey. Pb indicates the number of personal bankruptcy cases that are newly admitted by local judicial courts[8]. The variable is a proxy for the ratio of individuals who find it difficult to repay debt each month. On examining earlier individual studies, it can be confirmed that a significant number of suicidal people experienced difficulty in repaying debt [Appendix B]. BF is obtained from Tousan Geppo.

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[8]   The number of personal bankruptcy cases (Shinki-Hasan-Juri in Japanese) newly admitted to local courts every year divided by population per 1,000.

Compared to the annual data, the correlation between UN and BF is substantially lower in the monthly data. Following this, Dvc is employed for controlling the social factors.

As an extended analysis, for the men and women considered in the Labor Force Survey $^{\text{Appendix C}}$, we replace $UN_{(m,w)}$ with the unemployed who are categorized separately based on their reasons for seeking a job: $UN_{(m,w)}^{VOL}$ "Unemployed due to voluntary reasons," $Q_{(m,w)}^{INV}$ "Quitting involuntary," $UNMM_{(m,w)}$ "Need to earn more living expenses," $UNSC_{(m,w)}$ "Yet to be employed after graduation," and $UNetc_{(m,w)}$ "Reasons other than the above." The regression is conducted on the monthly data obtained for the period between 2002 and 2004 because further classification is not available for the period before January 2002. Q^{INV} is based on two types of reasons—one results from deteriorating business circumstances and the other from the retirement age. Previous literatures of other countries (Agerbo et al. 1998) have closely examined the interrelation between the psychological status and unemployment[9]. The classification of the above might provide more information if the association between unemployment and suicide is observed.

Multivariate Pooled Series by 47 Prefectures for Male and Female Suicide Rates

The pooled regression of age-adjusted suicide rates for men and women by prefecture during the periods between 1993 and 1997, between 1998 and 2002, and between 2003 and 2004 is conducted on the major socioeconomic variables.

The age-adjusted suicide rates by prefecture, denoted as $Suim^{Pref}$ "Suicide(men)$_{/100,000}$ by Prefecture" and $Suiw^{Pref}$ "Suicide (women)$_{/100,000}$ by Prefecture," is obtained from the "Data recollection based on the Vital Statistics regarding the Understanding of Suicide." $Suim^{Pref}$ and $Suiw^{Pref}$ are then

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[9]   The paper indicates that the possibility of a person with a mental disorder becoming unemployed and committing suicide will affect the observed association between unemployment and suicide.

adjusted to be estimated for the periods between 1993 and 1997, between 1998 and 2002, and between 2003 and 2004[10].

The socioeconomic variables employed in this paper are personal bankruptcy$_{/1,000}$ (Pb), the unemployment rate (UN), and the divorce rate$_{/1,000}$ (Dvc). UN$^{\text{Pref}}$ represented as "Unemployment rate by prefecture" is available from 1997 to 2004 in the Labor Force Survey. The UN$^{\text{Pref}}$ in 1997 is then applied as an average unemployment for the period between 1993 and 1997. Again, Pb$^{\text{Pref}}$ "Personal Bankruptcy$_{/1,000}$ by Prefecture" is obtained from the Judicial Statistics of the Supreme Court in Japan. In addition, Dvc$^{\text{Pref}}$ "Divorce rate$_{/1,000}$ by Prefecture" is used as a control variable for the social factors.

Multivariate Pooled Series by Age for Male and Female Suicide Rates

Finally, the regression of suicide rate for men and women, both aged between 40 and 60 years (pooled by 5 years of age), during 1970 and 2002 is conducted on the major socioeconomic variables. Suicide rates by age, denoted as Sui$_m^{40-60}$ "Suicide Rate (men)$_{/100,000}$" and Sui$_w^{40-60}$ "Suicide Rate (women)$_{/100,000}$," are again obtained from the "5th Statistics Concerning Suicide Deaths (Special Report on Demographic Statistics)."

With regard to socioeconomic variables, we construct UN$_m^{40-60}$ "Unemployment Rate (men)" and UN$_w^{40-60}$ "Unemployment Rate (women)" for people aged between 40 and 60 years from the Labor Force Survey. Further, we consider "Personal Bankruptcy Rate$_{/1,000}$," denoted as Pb$^{40-60}$ and obtained from the Judicial Statistics of the Supreme Court, and "Divorce rate$_{/1,000}$" *f*or people aged between 40 and 60 years as Dvc$^{40-60}$ from Vital Statistics as the control variables.

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[10]   The data recollection is a study subsidized by Japan's Ministry of Health, Labour and Welfare (MHLW). In the study, the annual average suicide rates by gender, age, and prefecture are available for the periods between 1973 and 1982, between 1983 and 1987, between 1988 and 1992, between 1993 and 1997, between 1998 and 2002, and between 2003 and 2004.

RESULTS AND INTERPRETATION

Multivariate Regression by Gender in the Monthly Data

Table 1 presents the descriptive statistics of the series. Table 2 shows the result of the regressions. We confirmed a positive correlation between a change in UN_m and in Sui_m in the late 1990s and early 2000s with 1% significance; this correlation is not significant for UN_w and Sui_w. Further, a change in Pb is significant for both men and women with 1% significance. A change in Dvc is not significant for male and female suicide rates.

The result of the extended estimation indicates that as far as the estimated period (between January 2002 and December 2004) is concerned, Q_m^{INV} is not correlated with Sui_m. This is contrary to our expectation. However, UN^{VOL} is significantly and positively correlated with Sui_m. $UNMM_m$ and Pb are positively associated with Sui_m with 1% significance. Sui_w is positively correlated with UN^{VOL} as well as with Pb and Dvc. UNSC and UNetc are positively correlated with male suicide rate with 5% and 10% significance, respectively.

Multivariate Regression of the Pooled Data by Prefecture

Table 3 provides the result of the pooled regression with cross-sectional (prefecture-specific) fixed effects between 1998 and 2004. Among the socioeconomic variables selected for this regression, the unemployment rate (UN^{Pref}) and the personal bankruptcy rate (Pb^{Pref}) are positively correlated with the male suicide rate (Sui_m^{Pref}) with 1% significance. Personal bankruptcy (Pb^{Pref}) is also correlated with the female suicide rate (Sui_w^{Pref}) with 10% significance. The divorce rate (Dvc^{Pref}) is, however, not significant for both men and women. A significant fixed effect indicates that a prefecture-specific difference remains unidentified for a prefecture-level difference.

Multivariate Regression by Gender and Age on Pooled Data

Table 4 presents the result of the multivariate regression of the male and female suicide rates pooled by ages between 40 and 60 years from 1970 to 2002[11]. The unemployment rate (UN^{40-60}) continues to be positively correlated with the male suicide rate (Sui_m^{40-60}) with 1% significance. Personal bankruptcy (Pb^{40-60}) is not correlated with both male and female suicide rates. The divorce rates (Dvc^{40-60}) is only positively correlated with the male suicide rate.

CONCLUSION AND IMPLICATIONS FOR SUICIDE PREVENTION

With regard to the increased motive for male suicide in Japan since the late 1990s, we examined the typical socioeconomic risk factors such as unemployment and personal bankruptcy rates. These factors were found to be associated with a higher risk in earlier studies[12, 13]. We then examined whether the suicide variations for men since 1998 is explained by the change in the typical socioeconomic factors. Even if we put aside the demographic factors, as seen in Appendix D, a large part of the increase remains unexplained.

Our empirical estimation elucidates the significant association between the unemployment rate and suicide mortality among middle-aged men in Japan during the late 1990s and early 2000s; the association of these two was once confirmed in previous studies in the early 1970s. In addition, this association is consistently observed for the prefecture-level difference and for yearly variation among

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[11]   In comparison, we found an insignificant, positive association between suicide mortality and unemployment among men aged 65 and above. There was no positive association found among people in their 20s and early 30s.

[12]   The frequency of suicide among the owned business in the Tokyo metropolitan area is three to four times larger than that among the employed. The suicide frequency among the unemployed is about twice as high as that among the employed.

[13]   The number of patients having some type of psychological problem or depression has been twice (54.6 thousand) as high as compared with that of 1996. However, it is stated that this increase is the result of the suffering individuals' unwillingness to visit psychiatrists.

middle-aged men. The difficulty in repaying debt, as represented by personal bankruptcy, is also significant for increasing the risk of suicide in both men and women in that period. The divorce rate is positively but insignificantly correlated with suicide variation for both men and women.

We then focused on the association between the unemployment rate and suicide mortality by considering the reasons for being unemployed. The result provided in Table 2 indicates that the suicide variation for men during the period between 2002 and 2004 is significantly associated with the difficulty in repaying debt (Pb), unemployment due to voluntary reasons (UN^{VOL}) in part associated with divorce (Dvc), UNMM, UNSC, and UNetc. Regarding the suicide variation for women, fewer socioeconomic factors such as difficulty in Pb, UN^{VOL}, and Dvc are found to have a significant association.

A significant association between Sui_m and UN_m^{VOL} is interpreted as resulting from probable factors such as (1) the presence of bias in the reasons being reported, (2) strong interrelation between mental disorder and unemployment, (3) mitigation of risk by unemployment insurance, etc. The association between Sui_m and UN_m^{VOL} is strengthened with the inclusion of Dvc, which implies that a person experiencing divorce has a high tendency for being included in UN_m^{VOL}. This tendency does not hold in the association between female suicide rate (Sui_w) and Unemployment due to voluntary reasons among women (UN_w^{VOL}).

We regard the effects of (1) and (2) as relatively smaller. The most probable bias in (1) is that a person who belongs to the category of Q^{INV} reports that he/she is in UN^{VOL} or UNetc and vice versa. We are almost certain that this tendency will not cause any difference in the association between UN^{VOL} and Q^{INV}. The result, however, implies that only UN^{VOL} is significantly associated with suicide mortality. If a person loses his job due to some mental disorder, as in the case of (2), he would report his unemployment status in the categories of UN^{VOL}, UNMM, and UNetc rather than other categories. The result implies that

a number of men appear to be looking for a new job in UN^{VOL} and UNMM. However, we are still uncertain whether most of these individuals begin seeking new jobs or abandon the labor market forever. This topic will be covered in future studies. The several individual studies in Appendix B imply that a substantial number of males who committed suicide in this period experienced social or economic problems rather than psychological problems $^{\text{Appendix B}}$. Finally, if the association between Q_m^{INV} and Sui_m is lowered by the unemployment insurance, as seen in (3), then the association between $UNSC_m$ and Sui_m is, in particular, identified because the individuals in $UNSC_m$ are not covered by this insurance. The result implies that the unemployment insurance might have mitigated the risk of unemployment among men.

In conclusion, with regard to the period between 2002 and 2004, it is found that male suicide mortality was affected by several socioeconomic factors such as UN^{VOL}, Pb, UNMM, and UNSC. This implies that an individual with an "unemployment" status is likely to have experienced associated risks previously. This coincides with the observation made in Appendix B: suicidal behavior is mostly observed among people who experience several risk factors. An individual reported in UN^{vol} is, in this respect, likely to have a preceding risk of mental disorder, divorce, and others.

The above interpretation implies that the efforts made to reduce and decumulate suicide risk among people who experience socioeconomic risk events are important[14, 15]. In this respect, it is important to support the measures taken to reduce the suicidal risk by providing an appropriate mental health service for both employers and employees. In a broader sense, it is important to encourage a businessman by providing him with the opportunity to communicate with people outside his field of work so that he can broaden his perspective. For a more accurate prediction of the suicide rate, the accumulation of

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[14] A relative increase in the duration of unemployment is confirmed to be significant for an increase in the number of suicide among middle-aged men in that period. As general assumption, long-term unemployment should be avoided in terms of the risk of suicide.

[15] A relative increase in the duration of unemployment is confirmed to be significant for an increase in the number of suicide among middle-aged men in that period. As general assumption, long-term unemployment should be avoided in terms of the risk of suicide.

individual data regarding motives and the socioeconomic status should be available for research purposes.

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TABLES

Table 1: Summary Statistics

	Monthly Time Series Data	
	Mean	Std. Dev.
Suicide (Men)	1806.4111	226.233
Suicide (Women)	713.856	82.983
Unemployment (Men)/10,000	194.944	23.971
Unemployment (Women)/10,000	124.022	15.072
Involuntary Unemployment (Men)/10,000	86.542	17.127
Involuntary Unemployment (Women)/10,000	33.903	5.836
Personal Bankruptcy	13697.978	4820.966
Firm Bankruptcy	1429.778	214.57
Divorce	22191.044	2533.085
N	90	

Note: Regression Analysis Using Involuntary Unemployment, Sample Size = 37

Table 1 (Continued)

	Prefecture Pooled Data		Age Group (40–60) Pooled Data	
	Mean	Std. Dev.	Mean	Std. Dev.
Suicide Rate (Men)/100,000	37.296	7.854	38.102	12.556
Suicide Rate (Women)/100,000	12.162	1.878	14.739	3.054
Unemployment Rate (Men) (%)	4.276	1.173	2.192	1.070
Unemployment Rate (Women) (%)			1.846	0.775
Personal Bankruptcy/1,000	4.284	0.644	3.848	5.540
Divorce Rate (Men)/1,000	4.060	0.680	2.204	1.372
Divorce Rate (Women)/1,000	3.828	0.654	1.651	1.233
N	376		132	

Table 2: Regressions for Monthly Time Series Data

Variables	Coefficient (Std. Error)			
	1		2	
	Men	Women	Men	Women
Unemployment (men, women)/10,000	6.980*** (2.06)	0.959 (0.65)	– –	– –
– Involuntary Unemployment Rate (men, women)/10,000	– –	– –	−1.605 (2.85)	−4.329* (2.12)
– Voluntary Unemployment Rate (men, women)/10,000	– –	– –	11.197*** (2.90)	3.490*** (1.15)
– Need to earn more money for living expenses (men, women)/10,000	– –	– –	37.282*** (11.82)	0.499*** (2.50)
– Yet to be employed after graduation (men, women)/10,000	– –	– –	– –	– –
– Unemployed due to other reasons (men, women)/10,000	– –	– –	−23.097* (11.98)	0.746 (4.48)
Personal Bankruptcy (−1)	0.026*** (0.01)	0.010*** (0.00)	0.029*** (0.01)	0.014*** (0.00)
Firm Bankruptcy	0.462*** (0.17)	0.165*** (0.05)	0.208 (0.22)	0.118 (0.10)
Divorce	0.010 (0.01)	0.005 (0.00)	0.029*** (0.01)	0.008* (0.00)
Intercept	−0.843 (15.19)	−0.666 (6.30)	1.153 (21.38)	−0.756 (6.36)
N	88		34	
R-square	0.463	0.376	0.616	0.662

***: p < 0.001, **: p < 0.05, *: p < 0.1

Table 3: Regression for Prefecture Pooled Data

Variables	Coefficient (Std. Error)	
	Men	Women
Unemployment Rate (%)	2.446*** (0.78)	−0.101 (0.30)
Personal Bankruptcy Rate/1,000	6.515*** (1.23)	1.064*** (0.47)
Divorce Rate/1,000	−0.244 (1.47)	0.239 (0.60)
N	329	
R-square	0.237	0.026

***: p < 0.001, **: p < 0.05, *: p < 0.1

Table 4: Regression for Age Group (40-60) Pooled Data

Variables	Coefficient (Std. Error)	
	Men	Women
Unemployment Rate(%)	3.732*** (1.15)	0.083 (0.39)
Personal Bankruptcy Rate/1,000	0.000 (0.00)	0.000 (0.00)
Divorce Rate/1,000	6.584** (2.56)	0.239 (0.60)
N	128	
R-square	0.209	0.01

***: p < 0.001, **: p < 0.05, *: p < 0.1

Appendices

Appendix A: The 47 prefectures (administrative local areas) considered in this study are as follows:

Name of prefecture	Regional location
Hokkaido	*Hokkaido*
Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima	*Tohoku*
Saitama, Chiba, Tokyo, Kanagawa	*Southern Kanto*
Ibaraki, Tochigi, Gunma, Yamanashi, Nagano	*Northern Kanto/Koshin*
Niigata, Toyama, Ishikawa, Fukui	*Hokuriku*
Gifu, Shizuoka, Aichi, Mie	*Tokai*
Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama	*Kinki*
Tottori, Shimane, Okayama, Hiroshima, Yamaguchi	*Chugoku*
Tokushima, Kagawa Ehime, Kochi	*Shikoku*
Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa	*Kyusyu*

Appendix B

An overview of several individual studies during the late 1990s and early 2000s indicates that among several risk factors, the most highly observed factor across many regions in Japan is "social or economic problems" rather than "psychological problems."

Appendix B Socioeconomic characteristics in some existing individual researches on suicidal cases

	Survey A	Survey B	Survey C	Survey D	Survey E
	Survey on applicants for high school scholarship designated for economically difficult youth.	Cases reported from the Tokyo Medical Examiner's Office	Medical doctors' network for suicide prevention in prefecture A.	A region in prefecture B, cases from the police data.	Suicides certified as workmen's accidents.
Period surveyed	24 cases [year:1998~2001] [applicants from the bereaved family]	1,858 cases detected during the year 200X.	June 2001~May 2002 [139 cases, 28.6% of the 486 cases reported by police office].	1,630 cases [year: 2002~2004], of which 1,198 are men and 432 are women.	27cases [year: 1999~2003].
Age structure	16: aged between 40 and 49, 5: aged between 35 and 39, 3: aged between 50 and 59.	Aged between 50 and 54 [the 308 cases] form the largest percentage, some have jobs.			4: 20s (15%), 9: 30s (33%), 5: 40s (19%), 8: 50s (30%), 1: 60s (4%), 70s and over (1%).
Region (or prefecture)	Hokkaido 2, Tohoku 4, Kanto 2, Tokyo Metropolitan 3, Shinetsu 1, TokaiHokuriku 1, Kansai 4, Chugoku 1, Kyushu 6.	23 special administrative wards in Tokyo	Prefecture A	Prefecture B	whole country
Occupation	Most were small-and-medium sized business owners.	512: employed, 226: own business, 698: those who live on pension, savings, dependents, etc.		532 cases with jobs [47.0%], 592 cases without jobs [52.3%].	Profession- 14: manager, 2: engineer, 9: expert engineer, 2: sales, etc. Firm size- L: 11, M: 3, S: 8. Industry- 8: construction, 6: manufacture, 4: telecom, 4: wholesale or retail.
Causes and Motives	Multiple causes and motives- 16: Debt-ridden problems, of which 6: difficulty in business, 2: loan sharks, 1: psychiatric illness, 2: repayment by life insurance receipt, 1: spouse death in accident 7: business failures or closure 3: problems on the job 2: unemployment due to retrenchment 2: health concern, i.e. ill health.	Single and direct motive- 479: psychiatric, 394: social problem, 210: health concern, etc.	Multiples in causes and motives- 56: economic problem, 55: own issue, 44: ill health, 35: family, 32: work-related, 18: human relationships, 6: accidents.	Motive for male suicides- 495: economic reasons, 243: health concern, 79: family, 61: work place, 18: opposite sex, 7: school, 27: others, 21: unknown.	Causal event- 10: business failure and heavy responsibility [37%], 11: tight job [41%], 3: change in role or position [11%], 2: experience of acident, disaster [7%], 1: trouble in relationship [4%]. (※ Chronic overwork over 100h/month 20 [74%])

(Source) 1. Survey on applicants for high school scholarships among the bereaved children whose fathers committed suicide (Ashinaga Ikueikai 2001).

    2. Studies on suicide prevention and life surroundings (Nomura and Yamazaki), 2001. 3. Studies on monitoring suicidal behaviors (Shimizu).

    4. Studies on suicide intervention based on the comparison of suicides in Kuji City and Iwate Prefecture during the period between 2002 and 2004 (Aoki). 5. Studies on suicide prevention for the employed (Kuroki), which is based on the recipients of working disaster insurance due to by work-related suicide between 1999 and 2003.

(Note) Surveys B, C, and D are funded by the Ministry of Health, Labor and Welfare. Overtime work in Survey E is more than 80 hours/month on an average in the past two to six months.

Appendix C: The following data have been obtained from the Annual Labor Force Survey (2005).

Classification by reason for seeking a job, etc. (millions in 2005)	
Number of unemployed (UN)	**(2.94 mil.)**
(1) Involuntary quitting of the previous job (Q^{inv})	**(1.04 mil.)**
(1-1) Mandatory retirement or termination of employment contract	**(0.29 mil.)**
(1-2) Employer- or business-related circumstances	**(0.74 mil.)**
·bankruptcy or closure of office	(0.21 mil.)
·personal retrenchment or encouraged retirement	(0.26 mil.)
·slump in business and an uncertain future	(0.16 mil.)
(2) Voluntary quitting of a previous job (UN^{vol})	**(1.08 mil.)**
(3) Need to earn more living expenses	**(0.36 mil.)**
(4) Yet to be employed after graduation	**(0.15 mil.)**
(5) Reasons other than the above	**(0.27 mil.)**

*The breakdown of the first reason is available only for 2002 and the subsequent years.

Appendix D: Effect of demographic factors

It is generally believed that the suicide rate tends to increase with age. To examine the extent of this demographic effect on the suicide rate, we consider the ratio of a change in the age-weight component against a change in the raw suicide rate as the aging factor. A change of 2.7% (=14.6–11.9 ($33.2_{(2003)}$–$21.3_{(1995)}$)) in the male age-adjusted rate is merely a fractional 18.5% change of 14.6% (=$38.0_{(2003)}$–$23.4_{(1995)}$) in the male suicide rate of men. We compute the ratio for women as 27.2% (+0.6/+2.2) from 1995 to 2003, which implies that aging in population could explain about 18–27% of the suicide increase in this period.

In Japan, a higher increase in suicide is stated to have been found in a group of cohort members between 1931 and 1934, which made the largest contribution to the suicide increase during the periods between 1954 and 1960 and between 1983 and 1987. In 1998 and thereafter, the cohort members aged between 60 and 64 were estimated to contribute about one-eighth (about 5%) of the increase in the average suicide increase from 1997 to 1998. An annual change of approximately 70% increase between 1997 and 1998 is noted for this age group, and its share in the total population is approximately 7%.

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