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Work Hours and Anxiety toward Karoshi

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Akiko Kamesaka and Teruyuki Tamura

Economic and Social Research Institute
Cabinet Office
Tokyo, Japan

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Akiko Kamesaka[23] Teruyuki Tamura[4]

Abstract

In November 2014, the "Act to Accelerate Moves for the Prevention of Karoshi" was enforced, making the prevention of *karoshi* (death from overwork) an urgent issue in Japan. This study uses the 2012 Household Survey on the Quality of Life to analyze the impact work hours have had on anxiety about death associated from working long hours. It finds that anxiety significantly increased for men who worked more than 60 hours and for women who worked more than 45 hours per week. These results regarding the impact of working hours on anxiety about death from overworking in Japan are robust and statistically significant.

For the purpose of improving the situation, policy discussions propose either the use of indirect regulation, primarily in the form overtime wage rates or the use of direct regulation, primarily in the form of an upper limit on working hours. Although some indirect regulation has been implemented, it has failed to bring about a reduction in work hours. The empirical results of this paper confirm this pattern and suggest that a government imposed limit on work hours is needed. The analysis further suggests that other policies be implemented on account of the diversity in labor market outcomes. These include: the appropriate management of working hours; sex-specific work hour limits that reflect important work hour differences between men and women; corrective action toward a single-track career path leaning toward the hiring of new graduates; flexible work style catering to various stages in life; and promotion of a societal view where all members are positively motivated to work.

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[2]Professor, School of Business Administration, Aoyama Gakuin University, Tokyo, Japan.
[3]Visiting Research Fellow, Economic and Social Research Institute (ESRI), Cabinet Office, Government of Japan, Tokyo, Japan.
[4]Research Associate, School of Management, Kochi University of Technology , Kochi, Japan. Teruyuki Tamura is now at the Keio Advanced Research Centers (KARC), Keio University, Tokyo, Japan.

1. **Introduction**

In June 2014, the Japanese government continued to pursue measures that would decrease the occurrence of death by overworking (*Karoshi*) by enacting the *Act to Accelerate Moves for the Prevention of Karoshi*. The purpose of this act was "to pursue measures for the prevention of *karoshi*, and to contribute toward the realization of a *karoshi*-free society, with a healthy work-life balance and fulfilling jobs. Even with this most recent measure, however, the general feeling is that severity of the problem of *karoshi* has not been sufficiently recognized.[5]

The United Nations has also noted the problem of *karoshi* in Japan. In May 2013, the committee investigating the status of the implementation of the *Covenant on Social Rights*[6], part of the International Covenants on Human Rights, commented that "there is concern over the continuous occurrences of suicides due to *karoshi* and suicides due to mental harassment in the workplace." Karoshi and suicides attributed to *karoshi*, are regarded as violations of human rights as stipulated under Article 7 of the *Covenant on Social Rights*, and corrections thereof are sought from the Japanese government. Relatedly, the *International Organization for Standardization* (ISO) is expected to implement in the fall of 2016 a new management system, (ISO 45001), that will make improvements in worker safety and health a global issue. In the future, companies wishing to acquire ISO 45001 certification will need to take measures to decrease the number of industrial accidents. Japanese companies will need to comply with these measures.

Needless to say various measures have been taken, primarily by Japan's government, to reduce the problem of *karoshi*. For example, in 1998 the Japanese Cabinet through its *Five-Year Plan for Economic Management within a Global Context* reduced the workweek to 40-hours and reduced annual working hours from 2,100 hours to 1,800 hours. Additionally in that same year, the Ministry of Labour announced in its "Proposal regarding the reduction of working hours," a need to improve labor productivity through a more efficient work structure. Moreover, a nationwide emergency call system known as *Karoshi 110* service was established by lawyers and physicians to ameliorate the problem. All of the above policies reflected a greater awareness of *karoshi* as a pressing social problem in Japan.

Additionally, the *Labor Standards Act* stipulated that an employer, as a rule, could not force employees to work in excess of 8 hours per day, 40 hours per week, and must give 1 day off per week and 4 or more days off over per 4-week period. The revised *Labor Standards Act of 2008* imposed a premium wage rate for overtime work exceeding the limit (for example, 45 extra hours in a month, 360 extra hours

[5] For details relating to the provisions under the "Act to Accelerate Moves for the Prevention of Karoshi (Act No. 100 of 2014), please refer to the following homepage of the Ministry of Health, Labour and Welfare.
http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000053525.html

[6] "International Covenant on Economic, Social and Cultural Rights"

in a year, etc.), to a rate exceeding the legal overtime pay rate. Furthermore, regarding overtime work exceeding 60 hours per month, it raised the wage premium raised from the traditional 25% or more to 50% or more. However, as will be explained in more detail in the next section, although "standards on the limit for overtime work" are specified in the *Labor Standards Act*, they remain under administrative guidance without any legal binding enforcement by means of the *36 Agreement*. According to Morioka (2013), even with the guidelines set by the government regarding the reduction of work hours, and even with an emphasis on self-sustaining efforts or efforts to increase productivity by labor and management, restrictions on overtime work have consistently and discretely been ignored. In contrast, in European countries, policies that set an upper limit to working hours have been implemented and strictly enforced. Many experts have repeatedly argued that Japan needs to follows Europe's lead in this regard (Kawahito 1998, 2014; Obata & Sasaki 2008; Tsuru Higuchi & Mizumachi 2010; Morioka 2013; Yamamoto & Kuroda 2014).

Having documented the strong efforts on the part of both foreign and domestic agencies to reduce the incidence of *karoshi* in Japan, we turn to the data on work hours and *karoshi*. Whereas average work hours for both men and women have shown secular declines in recent years, a significant fraction of men and a significant fraction of woman still work in excess of 60 hours per week.[7] Figure 1 documents this property. Even though these fractions have declined since 2000, 13.7% of men and 3.0% of women still worked more than 60 hours per week in 2012 period. Next, examining the breakdown by age for work hours by men, Figure 2 documents that men in their 30s are most likely to work more than 60 hours per week (18.2% in 2012). This group is followed by men in their 40s (17.5%), men in their 50s (12.9%), men in their 20s (12.6%), and finally men in their 60s (8.2%). Despite the lengthy discussion to limit work hours in Japan, the problem still persists.

＜Insert Figure 1＞

＜Insert Figure 2＞

Turning to the data pertaining to *karoshi*, the *Ministry of Health, Labour and Welfare* keeps statistics on the number of claims for industrial accidents associated with brain/heart diseases, i.e., cases of *karoshi*. In 2013 it reported 784 claims total claims, of which 306 resulted in pay outs. Of that number, 133 involved deaths. Figure 3 shows the trend in this industrial compensation status over the last 10 years.

＜Insert Figure 3＞

[7] According to Yamamoto & Kuroda (2014), the reason the average Japanese work schedule has declined is that the percentage of part-time workers has increased; the average working hours for full-time employees has hardly changed from 25 years ago. The average working hours per week for full-time employers was estimated to be approximately 50 hours in 1986 and 2011, and no significant statistical differences were observed between the two periods.

Figure 4 documents the relationship between anxiety toward *karoshi* and suicidal tendencies using data from the *Internet Survey on the Quality of Life Fiscal Year 2011* conducted by the Cabinet Office. Of the men and women who responded that they "always feel" anxiety toward *karoshi*, approximately 20% replied that they "tried to die" or "have seriously felt that they wanted to die" within the last year. The survey reveals that a great number of respondents contemplated suicide in comparison to respondents who chose other options to cope with anxiety toward *karoshi*. It is well known that Japan's suicide rate is among the highest in the OECD. This may reflect that the fact that there are comparatively many low-income workers who increase their work hours to the detriment of their physical and mental health, and workers who take on too many tasks with heavy responsibilities, thus ruining their physical and mental health. If these factors are behind the high suicide rate in Japan, it may be possible to improve the overall welfare of Japanese workers by lessening the tasks of some workers and reducing the hours of others while also improving work conditions of those who work long hours at low wages. In addition, worker's health can be improved by inquiring about anxiety toward *karoshi* at regularly scheduled health checkups and counseling those who indicate that they "always feel" anxiety toward *karoshi*.[8]

This paper is organized as follows: Section 2 surveys the empirical literature that use epidemiological measures and subjective mental health indexes to examine the impact of long work hours on *karoshi*. Additionally, Section 2 addresses the issue of government regulation with respect to work hours. It does this in two parts. First, it provides a summary of the theories that justify government regulation of work hours. Second, it provides a summary of the regulations or lack thereof used in various countries. Sections 3 and 4 pertain to the analysis of the paper, that is novel in that it exploits individual data from the *Survey on the Quality of Life Fiscal Year 2012* (household survey: placement method)" implemented by the Cabinet Office. This data set allows for a better measure of the extent to which individuals feel anxiety toward *karoshi*. Section 3 describes the survey data and explains the main variables used in the estimation. Section 4 presents the results of estimation. In Section 5, policy implications based on the analysis results are discussed.

＜Insert Figure 4＞

2. **Prior research**

1. Impact of long working hours on health

1.1. Epidemiological studies

The industrial accident certification criteria regarding brain/heart disease in Japan (i.e., cases of *karoshi*,

[8] Refer to Kuwahara et al. (2016).

etc.) dates back to 1961.[9] According to this criteria, requirements for approval were stipulated to be immediately before the incident or the day of the incident. In the 1987 revised industrial accident certification criteria for brain/heart diseases, the concept of overload (i.e., abnormal occurrence and excessive workload) was introduced, and the requirements were extended to one week prior to the incident. In 2001, the *Ministry of Health, Labour and Welfare* set the so-called *karoshi line* defined as overtime work hours that exceed 80 hours a month on average. Specifically, the revised industrial accident certification criteria[10] states that "if overtime work hours were generally 100 hours one month prior to the incident, or if hours generally exceeded 80 hours between two to six months prior to the incident, it can be inferred that a strong correlation between work and the incident exists."

The *karoshi-line* of 80 overtime workhours per month in the revised criteria is based on multiple epidemiological studies (*Ministry of Health, Labour and Welfare* 2004a). The revision was led by Professor Isao Wada (Professor Emeritus of the University of Tokyo), a leading researcher on this subject having surveyed four studies on the correlation between working hours and health, most importantly Wada (2002). For a survey of these studies and the methods employed see Iwasaki (2008).

In another epidemiological study, Uchiyama et al. (1992) conduct a follow-up survey (average 2.8 years) on 899 male workers in their 50s who reported that they took antihypertensive drugs in order to verify the risk of brain/heart diseases associated with long work hours. Using a multivariate analysis to calculate the hazard ratio (relative risk of brain/heart disease onset), they find that the risk becomes 2.7 times higher in working 11 hours or longer compared to working a 7 to 10 hour a day. Sokejima and Kagamimori (1998) find a similar number (2.9 times more likely) by comparing a group of 195 male patients between 30 and 69 years of age who suffered acute myocardial infarction (average age 55.5 years) with a control group of 331 men of similar ages and professions who did not suffer from a myocardial infarction. Liu et al. (2002) take a similar control group approach with 260 men between the ages of 40 and 79 who suffered acute myocardial infarction and 445 men with no incidence of myocardial infarction with the same ages and residences. They find that in men working more than 61 hours per week were 1.9 times more likely to develop myocardial infarction compared to men working 40 hours or less on weekdays. In instances where work hours exceeded 55 to 60 hours or more, the risk of developing brain/heart diseases increased from an epidemiological standpoint.

Studies have also been undertaken using hours of sleep, which are inversely related to individual fatigue from long work hours. The *Annual Report on Health, Labor, and Welfare* (2004 version) summarizes the organization and findings of these studies (see Ministry of Health, Labour and Welfare 2004b). It reports that: when hours of sleep are less than 6, the prevalence rate of angina and myocardial infarction rises; that when hours of sleep are 5 or less, the incidence rate of brain/heart diseases rises; and that when hours of sleep are 4 hours or less, the mortality rate from coronary heart diseases is more than

[9] For the history of industrial compensation with regard to "karoshi" in Japan, refer to Ishii (2001).
[10] Officially, "Certification criteria for cerebrovascular disease and ischemic heart disease, etc. (excludes those attributed to injuries)" (Ministry of Health, Labour and Welfare, Labor Standards Bureau)

twice the rate when hours of sleep are between 7 and 8 hours. Long-term sleep deprivation, therefore, increases the prevalence of brain/heart disease and mortality from those diseases.[11]

1.2. Studies using mental health indexes

We next provide an overview of the studies, both foreign and domestic in nature, which are based on subjective mental health indexes. In Japan, there are relatively few studies that analyze the relation between these subjective indexes and long work hours. Ogura & Fujimoto (2007) and Yasuda (2008) both used questionnaire items (4 stages: "strongly feel" to "does not feel at all") as their independent variables. Controlling for a variety of factors including gender, educational background, managerial position, number of employees, both studies found that long working hours significantly raised the stress level of workers. Ma (2009) and Toda & Yasui (2010) both defined and verified mental health indexes through multiple questionnaire items. Ma (2009) used mental health indexes consisting of 12 questionnaire items (MHD score), and reported that mental health indexes were significantly lower in individuals working long hours employed in large companies with unskilled work forces. Toda & Yasui (2010) conducted factor analysis on five questionnaire items related to "stress," "depression," and "insomnia," and using the score as the independent variable found that long work hours led to a deterioration in mental health. Yamamoto & Kuroda (2014), after controlling for individual effects not observable from a fixed-effects model on panel data, reported that overtime work with no pay, in particular, resulted in significant deterioration of workers' mental health.

Outside of Japan, studies reach similar conclusions. Liff (1981) conducted evaluations on female workers in the U.K. using *GHQ* (*General Health Questionnaire)* scores as mental health indexes finding that the mental health of full-time workers was significantly worse in comparison to part-time workers, thereby suggesting that long work hours had a negative effect on mental health. Martens et al. (1999) used the VOEG score (*VOEG-21: Vragenlijst Onderzoek Ervaren Gezondheid*) consisting of 21 questionnaire items on health data from Belgium, and proved that workers with long working hours and short-term workers suffered from a deterioration in mental health. Perrucci et al. (2007) indicated that in the U.S., those working long hours and irregular hours (e.g., weekend work, shift work) had a tendency to have mental health problems.

As this summary shows, for the purpose of analyzing the association between long work hours and health, the common approach is to use mental health indexes based on multiple questionnaire items, such as the GHQ scores. However, in this study, the purpose is to evaluate the risk of karoshi using self-assessed "anxiety toward karoshi" data. Analysis using other questionnaire items related to health included in this questionnaire survey will be a future research subject.

[11] These statements from the Annual Report on Health, Labor and Welfare are based on the analysis results of multiple epidemiological studies. For details of each study results, refer to the Ministry of Health, Labour and Welfare (2001b).

2. Theoretical Justifications for Government Set Limits on Work Hours

According to traditional economic theory, work hours are determined by the profit maximization decision of firms and by the utility maximization decision of individuals. Furthermore, government intervention in the labor market is seen as a distortion leading to misallocation of resources. Challenging the traditional approach, Higuchi (2010) states the following conditions which justify government intervention in the labor market: (1) low wages/long work hours occur; (2) long work hours lead to expansion in company profit; (3) the labor market is not fluid, and labor-management negotiations become an "arm's length transaction"; and (4) when a "negative externality" occurs between other workers. Condition (1) represents the case where labor supply actually may have a downward sloping component at low wages. According to standard theory, an excess supply of labor, for example, would quickly be eliminated as the wage rate would decrease and people would choose to work fewer hours. However, if there is a minimum subsistence level of income, people may be willing to work more hours at these low wages, possibly to the detriment of their health. Condition (2) refers to the case where a company that faces an increase demand for its product finds it cheaper to increase production by increasing the work hours of its existing workers rather than by hiring new employees. As long as the company has a stronger bargaining position relative to its works, then worker will be made to work long work hours. With regard to condition (3), when the labor market is not fluid, the cost of changing jobs is high, making the hold-up problem more likely. In the case of condition (4), the externality arises when an influential superior typically in a managerial position works long hours, thereby effectively setting the standard that subordinates have no choice but to follow. Yamamoto & Kuroda (2014) find indirect evidence of these conditions in the Japanese labor market. Using a workplace panel data set they find that the person who believes "his workplace is not conducive to leaving while others are still remaining," is more likely to have a significantly worse mental health (as measured by the GHQ score).

In addition to these four conditions, which are non-voluntary in nature, Tsuru (2010) outlines the following three cases in which an individual "voluntarily" works long hours. These are: (1) workaholic, namely, the individual who genuinely loves their job and willingly chooses to work long hours; (2) financial incentives, namely, the choice of working long hours for the financial incentive of a higher wage rate for overtime hours; and (3) career aspirations, namely, the choice of currently working long hours for the purpose of positive evaluations and future promotions. In addition, there are cases where output is difficult to measure, and so emphasis is placed on the effort level input, namely working hours.

3. Regulation of work hours across countries

3.1. The 36 Agreement in Japan

An important factor that has contributed to the current state of Japan's labor market is the failure of Japan to ratify the *International Labour Organization's* treaty on work time regulations. Had Japan ratified this treaty, Japan's unique system of long work hours working hour system would have been far less likely to have developed (Kawahito 1998, 2014). As previously mentioned, although the current *Labor Standards Act* prohibits work exceeding 8 hours per day and 40 hours per week (Article 32), the Act does not apply if a written agreement with a representative majority of workers is reached, what is termed a labor-management agreement, and notification is presented thereof, what is termed Article 36 or the *36 Agreement*. In addition, according to the *Standard on the limit to overtime work*, under the *36 Agreement*, if an "Agreement with special clauses" is included that covers unusual circumstances, such as a busy work period, a pressing deadline, or machinery breakdowns, etc., hours can be extended to 45 hours in 1 month, for example. However, due to the absence of a strong administrative system to enforce the provision, cases where extensions exceeding 150 hours in a month have been approved have been reported (Morioka 2013; Kawahito 1998, 2014).

3.2. Working hour regulations in Western countries

In Europe, the *Working Time Directive*, established in 1993 and subsequently revised in 2000, applies to all EU member countries. The Directive includes four main stipulations. These are: (1) Rest period within a day, specifically, a minimum of 11 consecutive hours of rest per 24 hours; (2) Weekly holiday, specifically, a minimum of 24 consecutive hours and 11 hours per 7 days (total of 35 hours); (3) Weekly working hours, specifically, an average of 48 hours or less including overtime over a 4 month period, although this can be extended to a 12 month period through a labor-management agreement); and (4) Annual holiday, specifically, a minimum of 4 weeks annual paid holiday. This Directive stipulates the minimum standard, and the degree of enforcement varies across EU countries.[12] In France, for example, the statutory work hours per week is set to 35 hours, and overtime work exceeding this limit requires approval from the labor standards inspector. In special circumstances, upon inquiring of the corporate committee or the representative of the employees, the labor standards inspector can approve hours that exceed 60 per week. Accordingly, work hours per day can be extended to a maximum of 12 hours with the approval of the labor standards inspector. Among other industrialized EU countries, Germany is known to have the shortest work hours. As a rule, Germany does not approve of overtime work, and the average total working hours during an adjustment period (6 months (24 weeks)) is not allowed to exceed 48 hours per week (8 hours per day, 6 work days per week with no work on Sunday)) (the maximum work hours per day is 10 hours). In contrast, the U.K. is known to have the longest work hours, with the statutory limit set at 48 hours a week (average of 17 weeks). However, if there is a labor-management

[12] For further details, refer to Ogura (2008), Kajikawa (2008) and the Japan Institute for Labor Policy and Training homepage http://www.jil.go.jp/foreign/labor_system/index.html

agreement, an exemption can be granted, a so-called “opt-out”. According to the *British Trades Union Congress*, much of the problem of long work hours in the U.K., is the result of this opt-out system that give labor-management a great deal of freedom in setting work hours.[13]

In the U.S., the statutory working hours are stipulated to be 40 hours a week, and work exceeding that limit merely requires an overtime payment premium equal to 50% of the worker’ wage rate. From a legal standpoint, long hours are not a problem as long as the overtime rate is paid. However, as noted in a study by Perrucci et al. (2007), long work hours and irregular work hours in the United States are problems in terms of workers’ mental health. A survey, however, by Sasaki (2008) found the effects of an increase in extra pay rate on overtime work to be inconclusive. In addition, some companies apparently impose penalties on workers who exceed a certain quota of overwork time. With such conflicting findings, it seems that the design of a new wage mechanism that will reduce inefficient overtime work must wait for additional theoretical and empirical studies on the subject.

3. Data and analysis target variables

Towards this end, we exploit a data set constructed from individual information from the *Survey on the Quality of Life Fiscal Year 2012*. The Survey was administered nationally to general households nationwide to those 15 years and older by the placement method (survey period February-March, 2013). The household survey response rate was 62.3%[14]. For the purpose of our analysis, we included only those individuals who responded to all the questions in the survey. With this criteria, we arrive at a data set consisting of 1,836 working men and 1,710 working women between the ages of 18 and 69.

For the purpose of our analysis, anxiety toward *karoshi* is the dependent variable in the regression. The value for this variable is based on the answer respondents gave to the survey question, “With regard to the following, to what degree do you have anxiety?” Respondents were given five answer choices: (“always feel,” “somewhat feel,” “cannot say,” “hardly feel,” and “never feel”). Table 1 shows the distribution of responses to this question about anxiety toward *karoshi* by gender. For men, 11.4% of the respondents replied that they “always feel” anxiety toward *karoshi*, whereas for women this figure is 9.8%. In addition, when the 5-choices are assigned numerical values from 1 to 5, with a value of 1 for never having felt anxiety and a value of 5 for always feeling anxiety, the mean value is 2.99 (S.D.=1.18) for men and 2.86 (S.D.=1.17) for women. The difference in means is statistically significant at the 1% level, implying that men on average are more likely to suffer anxiety toward *karoshi*. Figure 5 shows the ratio of respondents who responded that they “always feel” or “somewhat feel” anxiety toward *karoshi* in each working hour category. As the figure shows, the ratio of workers feeling anxiety toward *karoshi* is generally increasing in hours worked per week. The relation is not strictly monotonic as there is a fall in

[13] For the background on opt-out thus far, refer to the Japan Institute for Labor Policy and Training homepage. (http://www.jil.go.jp/foreign/jihou/2006_8/england_01.html)

[14] For details on this survey, refer to Kuwahara, Ueda, & Kawano (2013).

this ratio for men the work hour category of “70-74 hours”, and for women in the “60-64 hours” and “65-69 hours” categories. One possible factor contributing to this pattern is the small sample size of worker in these hour categories.

＜Insert Table 1＞

＜Insert Figure 5＞

Arrangement of various variables

We now discuss in detail the main explanatory variables used in the estimation. First, regarding work hours, responses to the question “what were your work hours last week?”[15] are selected from the categories: 35-39, 40-44 , and 45-49 hours, etc. For the samples used in the estimation, the ratio of those who responded 40-44 hours is 21.5% for males and 20.5% for females. In contrast, the ratio of those who responded 60 hours or longer for weekly working hours is 18.9% for males and 4.6% for females. Regarding forms of employment, the categories are defined as narrowly as possible given the survey questions. The categories are: “regular employee/worker,” “part-time worker,” “dispatched worker,” “contract worker,” “fixed-term worker,” “company executive,” “owner of an independent business” and “helper to an independent business”[16]. Under this categorization scheme, the ratio of “regular employee/worker” is 60.7% for males and 32.6% for females.

In addition to work hours, the analysis attempts to determine the impact that progress in the workplace for achieving a better work-life balance has had on anxiety toward *karoshi*. For this variable, we make use of the responses to the question, “for those who have childrearing and nursing care responsibilities, the workplace environment is conducive to balancing work and other duties.” Specifically, we construct a dummy variable for the responses “do not think so at all,” “do not think so, relatively speaking,” “neither” “do think so, relatively speaking,” and “definitely think so.” In the estimation, the reply, “do not think so at all” is stipulated as the default (Tables 6, 7).

For individual annual income and household income, responses to the following questions are used: the variable for individual annual income is based on question: “what is your approximate annual income (including tax and social insurance premiums)?” and the variable for annual household income is based

[15] This questionnaire survey inquired about the working hours for the “past week.” Therefore, it cannot be determined whether the long working hours are temporary or constant. In order to proceed with the relevant analysis, further data construction is imperative. For example, if the construction of a long-term panel data with more comprehensive information is possible, enabling the tracking of individual health conditions, more useful information could be acquired.

[16] However, in this analysis, due to the restriction of the question items not being included in the questionnaire survey, the following point are not considered. First, other variables showing industry types and job types as well as the company scale, which typify the working environment, are not considered in the analysis. In addition, Hara & Sato (2008) and Yamaguchi (2009) in their analysis of excessive employment discuss the mismatch between the actual working hours and the desired working hours of the individual. However, in this data, it cannot be determined whether the long working hours are voluntary or involuntary.

on the question: “what is your annual household income (including tax and social insurance premiums)?” As in the case of work hours, responses are provided in categories, namely, 3-4 million yen, 4-5 million yen,” etc. The value of the variable is determined by using a logarithmic conversion of the respective income class associated with the response. With regard to the household income variable, a logarithmic conversion divided by the square root of the number of people in the household is used. Other variables used as controls in the analysis are educational background, age, gender, marital status, age of the youngest child, and place of residence. Descriptive statistics of each variable are shown in Table 2.

＜Insert Table 2＞

4. Estimation results

The purpose of this study is to determine what type of people suffer anxiety from *karoshi*. As such, anxiety toward *karoshi* is treated as the dependent variable in the estimation exercises. As the anxiety toward *karoshi* variable takes on integer values between 1 and 5, with a 5 being assigned to respondents who “always feel anxiety toward *karoshi*”, and a 1 for those that “never feel any anxiety toward *karoshi*, a sequential probit model is used in the estimation. The estimation is done separately for men and for women.

Tables 3 and 4 summarize the results of the analysis of the impact that work hours have on anxiety toward *karoshi*, with Table 3 pertaining to the sample of men and Table 4 pertaining to the sample of women. There are six regressions or models summarized in each table. They differ as follows: Model 1 only considers the impact of work hours whereas Model 2 adds annual income, household income, and educational background to the regression. Model 3 includes form of employment as an additional explanatory variable and Model 4 adds to this list the marital status of respondents. Model 5 adds a variable for the age of the youngest child as well as a number of other variables that may contribute to anxiety. Model 6 is the same as Model 5 except that it excludes logarithmic equivalent household income.

Table 3 shows that when other factors are controlled for, anxiety for *karoshi* rises significantly for men when working hours exceed 60 hours per week compared to working hours that less than 15 hours per week. In the case of women, Table 4 shows that when other factors are controlled for, anxiety toward *karoshi* rose significantly when the working hours per week exceed 45. In addition, for women, in all the models anxiety for *karoshi* rises when work hours are between 35 and 39 hours, indicating there is a gender gap bias to anxiety toward *karoshi*.

A very plausible explanation for this gender gap bias is the relatively larger burden on woman in home production activities. According to *National Time Use Surveys* compiled by the OECD[17], the hours

[17] Data for each country may be obtained from the following OECD homepage.

spent on housework by Japanese men in 2011 was an average of 62 minutes a day, which constitutes the lowest among the 26 OECD member nations. In contrast, Japanese women spent an average of 299 minutes per day, which constitute the 6th highest housework time allocation among the 26 nations. (The average for OECD member nations was 274 minutes). Considering both market work and homework, a large fraction of Japanese women appears to lead an unhealthy work/life balance. In studying the division of labor by gender in Japan, Tsutsui (2014) indicates that even after adjusting for various conditions between genders, such as work hours and income, women are not only spending more hours on housework, but doing more than their fair share. A number of factors that inhibit women's full participation in the workforce are likely to have contributed to this phenomenon. These include an informal (custom) system that emerged from Japan's rapid growth period whereby women were burdened with the bulk of house work, and an inflexible the work style regarding full-time labor that does not allow for changes over the life cycle.[18] Relatedly, Kato, Kawaguchi, and Owan (2013) and Owan (2014) argue that the "social norm of the domestic division of labor", which places the burden of housework and childrearing on women, the "norm of long work hours", which easily condones adjustment to work outside business hours, and the practice of "delayed promotion, which leads to long-term competition and long working hours, all have inhibited women's social progress. To add to the problem, commuting times in Japan tend to be long, averaging 1 hour 20 minutes (round-trip). In the metropolitan areas, where this time requirement is even more pronounced, the length of commuting time (husband or wife) affects childbirth and employment activities (Kohara 2000; Higuchi Matsuura & Sato 2007; Hashimoto & Miyagawa 2008; Takeishi 2011). From this perspective, a reevaluation of the idea that Japanese lead an inherently rich life is warranted, a regional revitalization should be considered.

Using the Employment Status Survey data, Hashimoto & Miyagawa (2008) found a large number of respondents who cited "burden of housework/childrearing" as the reason why women cannot work (more than half responded in the 25–34-year age group). Additionally, the burden of nursing care is expected to become a more serious issue in the future, creating another potential factor inhibiting women's full participation in the labor force.

Returning to the results in Tables 3 and 4, first consider the effect of age on anxiety toward *karoshi*. For men, the linear term on age in all the models has a positive coefficient and the quadratic term has a negative coefficients, indicating that anxiety toward *karoshi* first increases significantly and then decreases significantly with age. The same pattern applies to women, although in Models 5 and 6 the coefficient on age-squared is no longer significant.

Turning to the effect of income, greater individual average income lowers anxiety toward *karoshi* in men whereas greater household income seems to have no effect. These results apply across the various models. For women, the opposite relations hold: higher household income lowers anxiety toward *karoshi*

http://www.oecd.org/gender/data/balancingpaidworkunpaidworkandleisure.html

[18] Other factors may be spousal deduction or the 3rd insured person category of the national pension plan.

whereas individual annual income does not seem to matter. This is clearly an important gender gap: associated with the impact that income has on; in the case of men, individual income is vital in determining the level of anxiety toward *karoshi*, whereas in women, household income (spouse's income) is vital. The result reflects the reality that work hours for married men and women are the outcome of a dual labor supply decision. Women who belong to a household with high income are less likely to have to work long hours, and so are less prone to feeling anxiety toward *karoshi*.

Regarding education, men who are either "junior high school" or "high school graduates" tended to experience more anxiety toward *karoshi* then men who are "graduate school graduates". These findings, albeit consistent with those of Ma (2009), would seem at odds with numerous studies that suggest that the problem of *karoshi* is more severe for higher educational backgrounds (e.g., Hamamura 2015). Clearly, further research on this issue is required; however, analysis focusing on educational background shall be conducted in future studies.

In the case of women, education does not have any significant effect on anxiety toward *karoshi*. Marital status, in contrast, is important, with single and divorced women being far more likely to feel anxiety toward karoshi compared to married respondents. Two other variables that might be particularly relevant for women, namely, "age of youngest child" and "living with biological parents" had no significant effect on the level of anxiety felt by women toward *karoshi*. Type of employment, included in the regressions of Models 3 - 6, also displayed no statistical significance. Clearly, employment type and work hours are strongly correlated, and so there is little left to be explained by employment type after work hour differences are taken into account.

＜Insert Table 3＞

＜Insert Table 4＞

Exploring the sources of anxiety toward *karoshi* among women further, we proceed by dividing the sample of women into two groups, those who have children and those who do not. The estimation results are shown in Table 5.[19] Interestingly, the results for the group without children are more similar to the results documented for men, specifically in the significant increase in anxiety toward *karoshi* for respondents working "60 hours or longer." Some caution in the interpretation of these results is warranted, however, due to the decrease in the number of respondents in the sample to approximately 600. Turning

[19] The ratio of the form of employment in each group is as follows: Group without children: Full-time employee/worker (46.8%), part-time worker (35.1%), dispatched worker (3.2%), contract worker (6.7%), fixed-term worker (1.2%), corporate executive (1.8%), independent business owner (3.4%), helper of independent business (2.0%)
Group with children: Full-time employee/worker (24.8%), part-time worker (49.0%), dispatched worker (1.2%), contract employee (4.5%), fixed-term worker (1.9%), corporate executive (3.5%), independent business owner (3.4%), helper of independent business (11.6%)

to the results for the group of women with children, we find a significant increase in anxiety toward *karoshi* when working "45 hours or longer." Furthermore, for this group, the form of employment variable turns out to be significant with anxiety toward *karoshi* being higher in "full-time employees/workers." These results suggests that childrearing places a large burden on working women (particularly, regular employees), making anxiety toward *karoshi* a much greater problem. The problem is particularly acut for mothers with children who are "single" or "divorced" as they tend to have especially higher cases of anxiety toward *karoshi*. This suggests the need for support programs targeted to single-mother households, something that has been discussed in the past.

＜Insert Table 5＞

To conclude the analysis, we examine the impact that anxiety toward *karoshi* has on work-life balance. We do this because there is a subjective element to some of the variables used in the regressions. As pointed out by Hamermesh (2004), using subjective variables to explain a subjective variable is problematic, with the consequence that understanding the behavior of interest is not always possible. In addition, the effect of the correlation in measurement errors between subjective dependent and independent variables needs to be considered. Therefore, in this study, based on the results of Tables 3-4 which do not include subjective variables in the explanatory variables, in order to compare the results an attempt will be made for an estimation of Tables 6-7 which include variables with subjective judgments dealing with the status of the work-life balance in the workplace as part of the explanatory variables. In other words, with regard to the estimated formula for Model 1 to Model 6 as indicated in Tables 3-4, only variables which help determine the work-life balance status in the workplace will be considered in order to estimate the model formula for Tables 6-7, and a comparison of the results of Table 3-4 and Tables 6-7 are be made.

Concerning the status of the work-life balance in the workplace, analysis of the questionnaire item "the environment in the workplace is conducive to balancing work and other duties for those who have childrearing and nursing care responsibilities," was conducted by comparing these results to respondents who replied, "do not think so at all (default)." As a result, Tables 6-7 show the need for improvement in the work-life balance environment, while roughly maintaining the effects of the variables representing working hours, age, marital status, etc., obtained in Tables 3-4 for both men and women, respectively. Regarding the variables related to the environment improvement in the workplace, the coefficients of dummy variables according to the response options were estimated, revealing that the more the work environment improved, the greater the decrease in the potential for workers to develop "anxiety toward karoshi" was, and the effects thereof were observed for both men and women alike.[20]

[20] In cases where estimations were made of sub-samples for both men and women according to whether or not they have children, in both groups, when the work-life balance is maintained, anxiety toward *karoshi* was confirmed to have decreased significantly.

＜Insert Table 6＞

＜Insert Table 7＞

5. Summary and future outlook

This study uses the 2012 Household Survey on the Quality of Life to analyze the impact work hours have had on anxiety about death associated from working long hours. It does this not only for men, but also for women. For men, the findings of this study confirm the findings of the epidemiological research in this area. In particular, we find that that anxiety significantly increased for men who worked more than 60 hours and for women who worked more than 45 hours per week. This means that the responses to the subjective questions included in the questionnaire survey regarding anxiety toward *karoshi* could possibly provide useful indicators at company sites and for policy proposals. For women, our findings are novel. Our study reveals that anxiety toward *karoshi* in women increased significantly when weekly work hours exceed 45 hour. Because women bear a larger burden in housework and childrearing activities, they are clearly prone to feel anxiety toward *karoshi* at lower work hours. Importantly, these findings suggest that policies to reduce the problem of *karoshi* should be designed to reflect these important differences between men and women.

In writing the memoirs of a person who unfortunately died from overwork, Kawahito (1998, 2014) notes the strong sense of responsibility felt by this individual to the very end and his solitary struggle to "keep going just a little longer". [21] It is difficult for an individual to solve the problem of *karoshi* by his or own self. Support and understanding from family and friends, although helpful, are not likely to eliminate the problem. This leaves government intervention as the only real recourse to solving this important issue.

The regulations that have been proposed are one of three types: (1) regulations that increase the extra wage pay rate for overtime work, (2) regulations that set a rigid upper limit on the amount of overtime work hours, and (3) regulations that set minimum rest periods. With regard to (1), the 2008 revision in the *Labor Standards Act* implemented exactly this by setting an overtime wage rate premium of 50% for work exceeding 60 hours in one month. However, as pointed out in several papers including Obata & Sasaki (2008) and Sasaki (2008) an increase in the overtime wage rate alone does not provide an adequate restraint on work hours. Regarding (2), economic theory calls for a limit on work hours when the labor market is not perfectly competitive, inadequate, or when a minimum health of the citizens needs to be maintained. Our findings pointed out that an increase in the overtime wage rate alone does not ensure

[21] In the first and second editions, different cases of *karoshi* are discussed, respectively, revealing the actual state of karoshi according to the background of each era.

adequate restraint in working hours. The results of this study strongly suggest that long work hours pose a serious threat to the development of anxiety toward *karoshi*, and that the government should at the very least begin to enforce the limits specified in the Labor Standards Act and the *Standard on the limit to overtime work*, punishing violators. Finally with regarding (3), if holiday work is a prerequisite, there is the question of whether the entire industry should be required to review such a custom (Ministry of Health, Labour and Welfare 2001a).

Beyond regulation, there is the possibility of reducing work hours by increasing efficiency of firms and improving worker morale. According to Yoshikoshi (2007) work that is not completed within business hours may reflect an overly large volume of work, wastefulness in the way work is completed, or low motivation among employees, requiring improvement measures of the entire workplace. It is often said that in Japan, the starting time is strict but the finishing time is lax. It is imperative to compare this with the smooth running of meetings, etc., with a strong awareness of time restrictions. A set finishing time benefits everyone in the workplace.

A similar caution needs to be heeded when individuals voluntarily choose to work long hours. There are documented cases where workers have not been able to go home when some of their superiors believe in the value of working long hours. Unwittingly, the superior becomes the cause of an externality. An important concept in work-life balance is the mutual understanding of different values and respect for others' work styles and lifestyles (Yamaguchi & Higuchi 2008). The individual may be concentrating on work, and may not be aware of the situation at the time; however, there is also a possibility that accumulation of fatigue from long work hours may affect their future health.

We should all recognize that the problem of long hours is not a problem confined to only the workplace defined in a traditional sense. It exists in the service sector, say for delivery companies that promise next day delivery, and convenience stores, family restaurants and supermarkets that operate 24-hours. These enterprises are operated on the sacrifices of certain individuals. In addition, once those services become commonplace, further pursuit of convenience ensues. Whereas "competitiveness" and "survival" are vital, on the other hand, there exist a certain number of enterprise managers who indicate that the "Japanese work lackadaisically." A problem exists when "competitiveness" is based on the sacrifice of certain individuals who work long and not the thorough pursuit of labor productivity improvements over time. If those individuals sacrificed are members of our family, the problem is even more serious. In the future, through labor market reforms such as the proper management of working time including that of men, utilization of the female work force, and flexible work style according to various life stages, it is desired that a society in which everyone is motivated to work will be realized.

There is also reason to think that the results derived from this study may motivate women to become more active members of society. If the burden of housework cannot be more evenly distributed between men and women, then it may be necessary for employer to direct the reduction of working hours toward women in order to bring about a more even allocation of leisure between married men and women.

However, as pointed out, such a policy may give rise to the problem in which women's vocational skills cannot be cultivated (i.e., the *Mommy Track problem*). For mothers, it may be important to enhance the environment in which early return to work can be made possible, and to promote reduced work hours for men as well so they may participate in housework and childrearing. Considering the burden these policies impose on the employers, it may be necessary to construct an adequate employment and wage system. However, if flexibility in work hours can be improved by these measures, perhaps women would be more positive about balancing marriage and childbirth with work. Interestingly, according to several surveys, even among Japanese women, many feel that the woman should do more than her fair share of housework and childrearing. At the same time, this is consistent with the reasoning of Professor Gary Becker et al., who stated that in a household, there are more opportunities for men to earn higher wages than women, and it is economically more rational for women to allocate more time to housework and childrearing than men. In other words, in order to increase the overall household income, on the premise that women spend more time in housework and childrearing, would it not be effective to create more opportunities and mechanisms for the employment of women to be promoted to the extent that they are not overloaded? Whereas it may be difficult to simultaneously respect people's values and promote women's activities outside of the home, it is vital to drastically enhance the flexibility in women's choice over work hours. With regard to men, it is imperative that they reevaluate the tendency to be overcommitted to their market work and undercommitted to their household work. This is extremely important for men facing mandatory retirement when they need to define a new role and a niche (Okamura 2006).

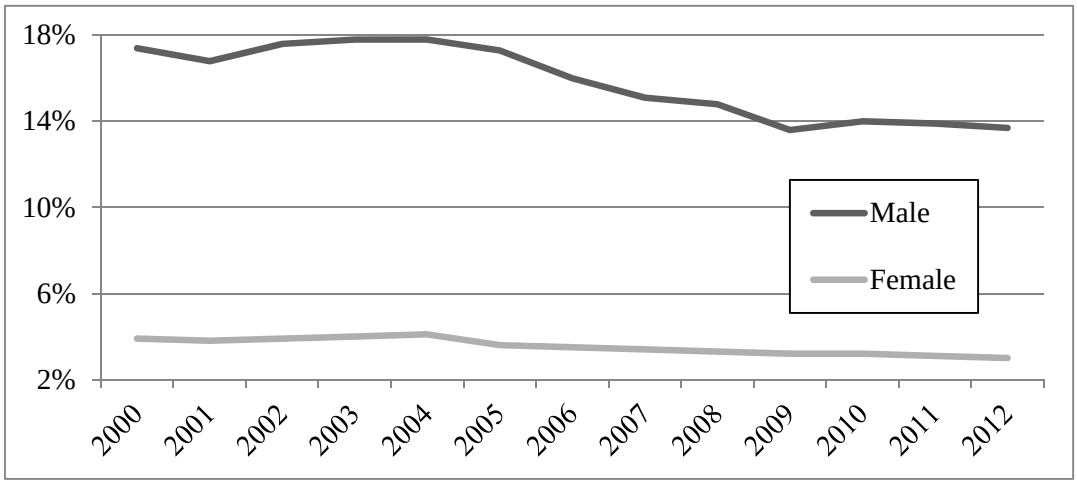
The social norm established after Japan's rapid economic growth period, in which men work outside and women take care of the house, has been passed down to future generations. According to a survey administered by the *Ministry of Health, Labour and Welfare*, whereas approximately 20% of single men want women to be full-time homemakers, over 1/3 of single women desire to become full-time homemakers after marriage (Ministry of Health, Labour and Welfare 2013). The concept of a division of labor by gender perpetuated through generations has affected systems and customs up to the present, and has hindered the social progress of women (Kato, Kawaguchi, & Owan 2013; Owan 2014 etc.). Relatedly there are few opportunities in Japan for one to acquire life-planning knowledge by the end of high school or university, and so it is necessary to create more opportunities to for young people to think about work and their career choice.

This became apparent to us in a seminar in which one of us served as the host of a visiting lecture series. When university students were each asked to design their lifetime financial plan, several stated that they believed the family finances would suffer considerably if a woman remained a lifetime homemaker. As the seminar progressed, more students became aware of the importance of women working. In financial education, thus far, promoting the social progress of women has not been a focus, but in Japan, where the ratio of companies relying on newly graduated employees is high, the impact that such pre-employment financial education could be great. As Yoshikuni (2015) indicates, in the average household where a

couple has two children, it is no longer viable that the wife be a full-time homemaker. In most developed countries, various systems are designed with the idea that women work throughout their lifetime. Should not Japan redesign their systems with this same idea in mind?

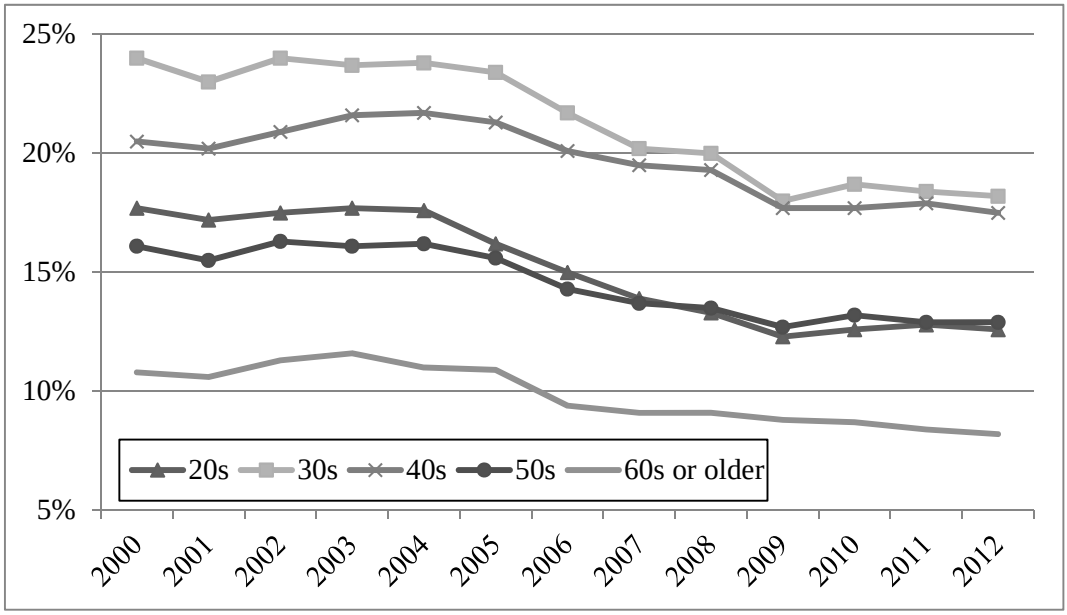
As previously mentioned, many Japanese women, in comparison to women in other countries, have a tendency to spend greater amounts of time on housework and childrearing. However, in order to lessen the load of housework, it may be effective to expand domestic help businesses in order to facilitate the social progress of women. Whereas some households may still feel reluctant about using domestic services, more are choosing schools with cafeterias and a variety of food choices. Presently, most public schools, as a rule, require students to bring their lunches. However, for mothers who travel for work or who care for parents living in distant areas, packing a lunch everyday can pose a great burden. Whereas family situations vary, should not the sales of packed lunches, which include traditional Japanese food or local food ingredients, become more acceptable? Additionally, if more families chose this option, then more women will be able to work in local lunch-making companies, which may have the effect of allowing women to achieve a better work-life balance. As part of a more comprehensive policy, if transportation services are provided for children whose parents both work and thus cannot take them to various extracurricular classes, more employment and business opportunities will be created. Such policies may have a positive ripple effect on the Japanese economy. Lastly, although the burden of housework and childrearing has been the focus of this study, the burden of caring for one’s elder is another important issue to both men and women that we have not addressed here. Because of the future uncertainty regarding this issue, balancing this responsibility with work may become an increasingly serious problem. Enhancing work style flexibility will be vital for workers who will face the problem of caring for elders, and are anxious about this future responsibility.

Figure 1. Ratio of employees whose weekly work hours are 60 hours or more



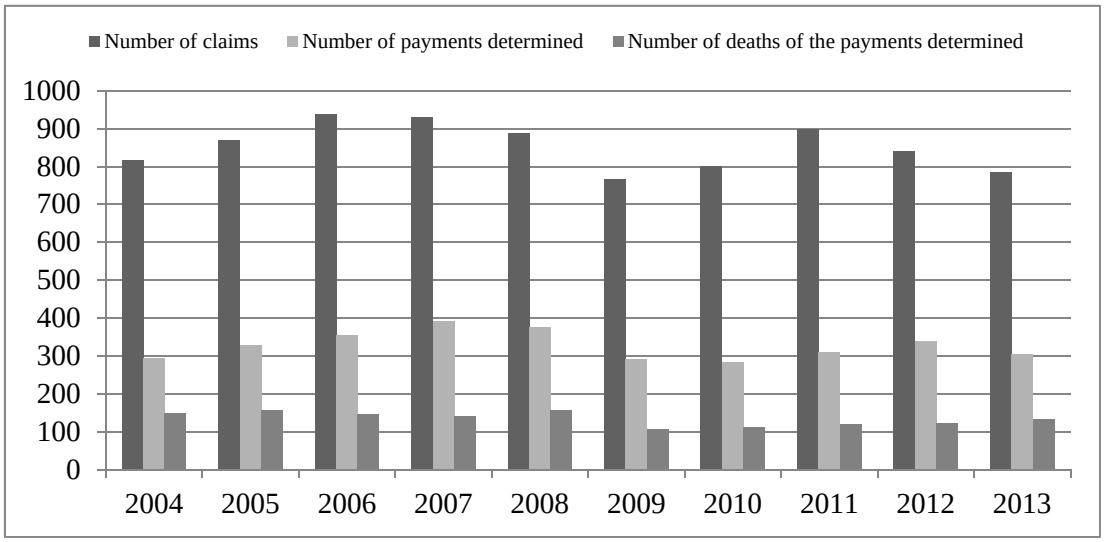
Source: Compiled by the authors based on "Work-life Balance Report Fiscal Year 2013" by the Cabinet Office.

Figure 2. Ratio by age of men whose weekly working hours are 60 hours or longer



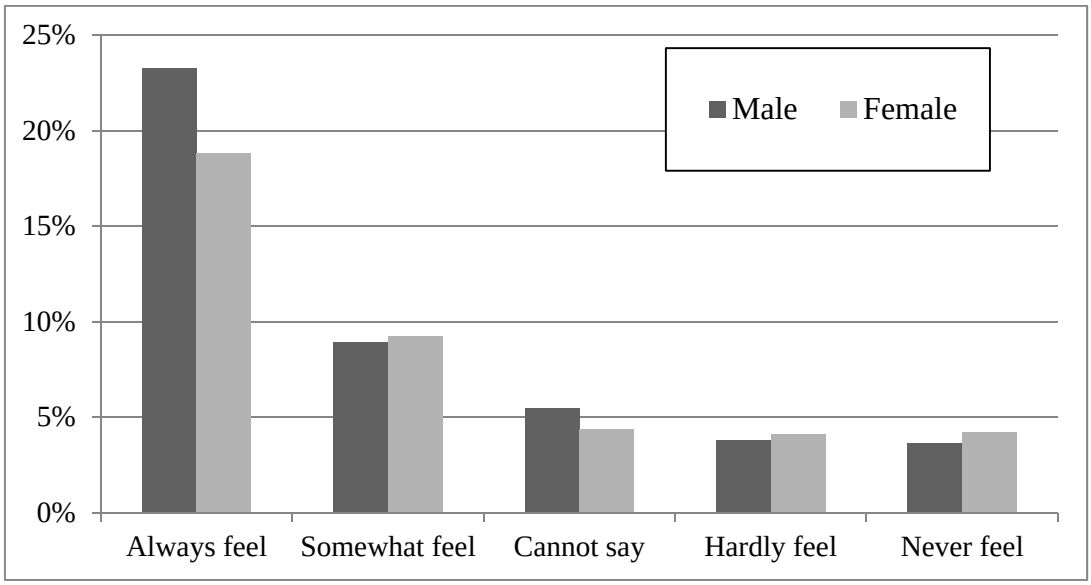
Source: Compiled by the authors based on "Work-life Balance Report Fiscal Year 2013" by the Cabinet Office

Figure 3. Industrial accident compensation status in the past 10 years for brain/heart diseases (cases of "karoshi," etc.)



Source: Compiled by the authors based on Ministry of Health, Labour and Welfare "Industrial Accident Status on Brain/Heart Diseases and Mental Disorders (2013)."

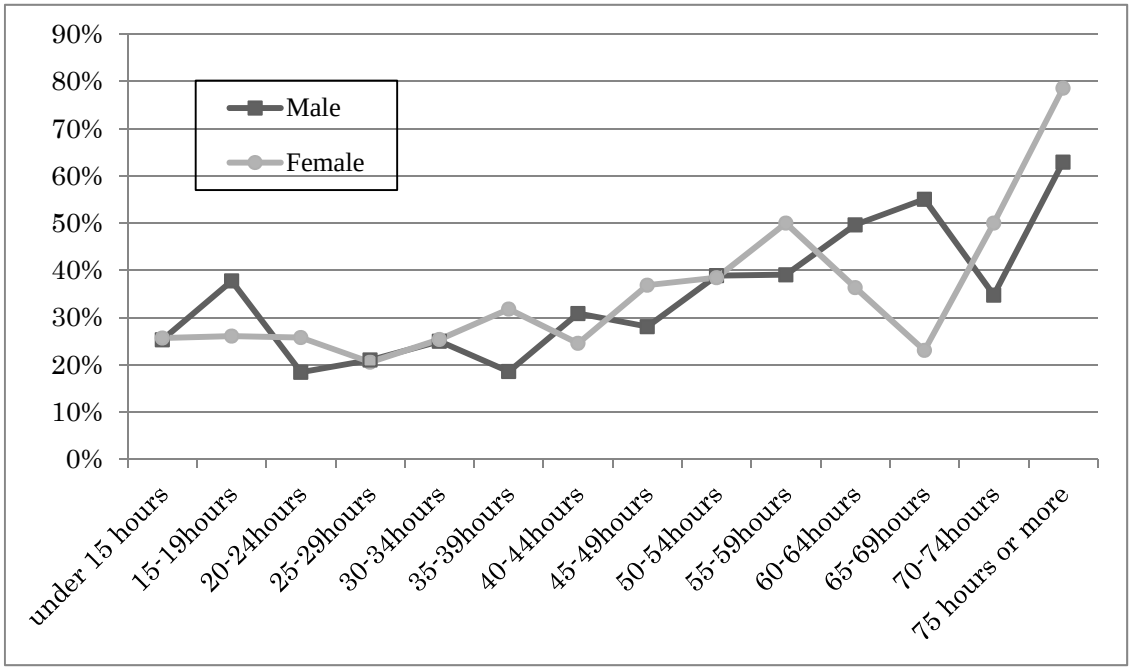
Figure 4. Correlation between anxiety toward karoshi and suicidal ideation



Source: Compiled by the authors based on the "Internet Survey on the Quality of Life (Fiscal Year 2011)" by the Cabinet Office.

Note: In this study, the analysis subjects were workers only; thus, those who responded that they "did not do any work" during the most recent week were excluded from the sample. Of the various responses regarding anxiety toward karoshi (e.g., "always feel"), the ratio is indicative of respondents who replied that they "tried to die," or "have seriously considered dying" within the past year. Those who were included in the time period "within a year" were those who responded in the above survey to the question of when suicidal ideation developed, namely "currently," "within 3 months," or "within 1 year." However, those who responded, "do not want to answer," regarding the time when suicidal ideation developed, were excluded from the sample.

Figure 5. Working hours and anxiety toward karoshi



Note: The ratio of those who responded "always feel" or "somewhat feel" regarding anxiety toward karoshi is indicated for each working hour period. The sample size: male (1,836 subjects) and female (1,710 subjects).

Table 1. Distribution by gender of "anxiety toward karoshi

Anxiety toward karoshi	Male		Female	
	N	%	N	%
5 (Always feel)	210	11.44	167	9.77
4	420	22.88	327	19.12
3	556	30.28	537	31.40
2	438	23.86	452	26.43
1 (Never feel)	212	11.55	227	13.27
Total	1,836	100	1,710	100

Table 2. Descriptive statistics

	Male		Female	
Variable	Mean	Std. dev.	Mean	Std. dev.
Anxiety toward karoshi	2.988	1.178	2.857	1.165
Under 15 hours	0.041	0.198	0.127	0.334
15-19 hours	0.025	0.155	0.094	0.292
20-24 hours	0.035	0.185	0.111	0.314
25-29 hours	0.021	0.142	0.080	0.271
30-34 hours	0.035	0.183	0.074	0.261
35-39 hours	0.070	0.256	0.103	0.304
40-44 hours	0.215	0.411	0.205	0.404
45-49 hours	0.167	0.373	0.082	0.275
50-54 hours	0.108	0.310	0.046	0.209
55-59 hours	0.095	0.293	0.033	0.178
60-64 hours	0.078	0.268	0.019	0.138
65-69 hours	0.038	0.190	0.008	0.087
70-74 hours	0.025	0.156	0.011	0.102
75 hours or more	0.048	0.215	0.008	0.090
WLB: “don’t think so”	0.210	0.408	0.142	0.349
WLB: “don’t think so, relatively speaking”	0.213	0.410	0.175	0.380
WLB: “neither”	0.367	0.482	0.350	0.477
WLB: “do think so, relatively speaking”	0.166	0.372	0.257	0.437
WLB: “definitely think so”	0.044	0.205	0.075	0.263
Age	44.98	13.60	42.95	13.44
Age squared/1000	2.208	1.199	2.025	1.143
Logarithmic annual income	5.885	0.747	4.974	0.830
Logarithmic equivalent household income	5.745	0.593	5.671	0.634
Junior high school graduate	0.069	0.253	0.053	0.223
High school graduate	0.438	0.496	0.447	0.497
College/technical college graduate	0.138	0.345	0.344	0.475
University graduate	0.325	0.469	0.146	0.353
Graduate school graduate	0.029	0.169	0.010	0.099
Regular employee/worker	0.607	0.488	0.326	0.469
Part-time worker	0.101	0.302	0.443	0.497
Dispatched worker	0.012	0.109	0.019	0.138
Contract worker	0.044	0.205	0.053	0.223
Fix-term worker	0.025	0.156	0.017	0.129
Corporate executive	0.071	0.257	0.029	0.169
Independent business owner	0.121	0.326	0.033	0.178
Helper of independent business	0.018	0.133	0.081	0.272
Married	0.736	0.441	0.646	0.478
Single	0.235	0.424	0.282	0.450
Divorced	0.023	0.150	0.053	0.225
Separated by death	0.006	0.077	0.019	0.136
Owned home	0.809	0.393	0.804	0.397
Living with biological parents	0.337	0.473	0.297	0.457
Under 3 years	0.084	0.278	0.036	0.187
3-5 years	0.051	0.220	0.040	0.197
6-12 years	0.108	0.311	0.104	0.305
13-18 years	0.123	0.328	0.135	0.342
19-23 years	0.114	0.318	0.113	0.317
24 years or older	0.212	0.409	0.226	0.419
No children	0.307	0.461	0.346	0.476
Hokkaido	0.038	0.192	0.042	0.201
Tohoku	0.089	0.285	0.084	0.278
Kanto	0.313	0.464	0.297	0.457
Hokuriku/Tousan	0.106	0.307	0.099	0.299
Tokai	0.131	0.337	0.125	0.331
Kinki	0.142	0.349	0.155	0.362
Chugoku/Shikoku	0.089	0.285	0.086	0.280
Kyushu/Okinawa	0.093	0.290	0.111	0.314

Note: Male (N = 1836), female (N = 1710).

Table 3. Estimated results: Male samples

Dependent variable: Anxiety toward karoshi	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
15-19 hours	0.268	0.218	0.216	0.203	0.193	0.193
20-24 hours	-0.249	-0.266	-0.276	-0.279	-0.287	-0.287
25-29 hours	0.001	-0.034	-0.058	-0.061	-0.084	-0.083
30-34 hours	-0.019	-0.057	-0.088	-0.098	-0.118	-0.117
35-39 hours	-0.193	-0.228	-0.279 *	-0.287 *	-0.290 *	-0.290 *
40-44 hours	0.222 *	0.146	0.081	0.074	0.066	0.066
45-49 hours	0.138	0.050	-0.014	-0.023	-0.032	-0.032
50-54 hours	0.376 ***	0.290 *	0.221	0.217	0.211	0.211
55-59 hours	0.424 ***	0.330 **	0.270 *	0.263	0.254	0.254
60-64 hours	0.503 ***	0.416 **	0.351 **	0.353 **	0.340 **	0.341 **
65-69 hours	0.552 ***	0.454 **	0.402 **	0.392 **	0.389 **	0.390 **
70-74 hours	0.561 ***	0.494 **	0.445 **	0.438 **	0.448 **	0.449 **
75 hours or more	0.951 ***	0.871 ***	0.815 ***	0.815 ***	0.813 ***	0.813 ***
Age		0.092 ***	0.089 ***	0.094 ***	0.098 ***	0.098 ***
Age squared/1000		-1.040 ***	-1.006 ***	-1.050 ***	-1.078 ***	-1.081 ***
Logarithmic annual income		-0.094 *	-0.126 **	-0.119 **	-0.130 **	-0.134 **
Logarithmic equivalent household income		-0.012	0.009	0.003	-0.006	—
Junior high school graduate		0.391 **	0.412 **	0.424 **	0.410 **	0.412 **
High school graduate		0.271 *	0.278 *	0.281 *	0.279 *	0.281 *
College/technical college graduate		0.219	0.230	0.232	0.227	0.229
University graduate		0.100	0.105	0.105	0.102	0.103
Regular employee/worker			0.027	0.026	0.022	0.022
Part-time worker			-0.158	-0.164	-0.170	-0.172
Dispatched worker			0.256	0.255	0.230	0.231
Contract worker			0.044	0.034	0.033	0.033
Fix-term worker			-0.052	-0.048	-0.052	-0.052
Corporate executive			-0.061	-0.061	-0.058	-0.059
Helper of independent business			-0.240	-0.250	-0.270	-0.272
Single				0.064	0.023	0.023
Divorced				-0.152	-0.141	-0.141
Separated by death				-0.066	-0.077	-0.078
Owned home					0.024	0.023
Living with biological parents					-0.060	-0.059
Under 3 years					-0.050	-0.047
3-5 years					-0.087	-0.085
6-12 years					-0.124	-0.121
13-18 years					-0.070	-0.069
19-23 years					-0.088	-0.088
24 years or older					-0.109	-0.108
Hokkaido					-0.093	-0.093
Tohoku					-0.009	-0.009
Hokuriku/Tousan					-0.017	-0.017
Tokai					0.107	0.107
Kinki					0.033	0.033
Chugoku/Shikoku					-0.018	-0.017
Kyushu/Okinawa					-0.097	-0.096
Log pseudo-likelihood	-2799.1	-2770.4	-2767.3	-2766.5	-2763.2	-2763.2
Pseudo R^2	0.020	0.030	0.031	0.032	0.033	0.033
Sample size	1854	1854	1854	1854	1854	1854

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Estimated results: Female samples

Dependent variable: Anxiety toward karoshi	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
15-19 hours	0.232 **	0.170	0.157	0.159	0.155	0.168
20-24 hours	0.183 *	0.113	0.088	0.100	0.101	0.108
25-29 hours	-0.009	-0.084	-0.105	-0.098	-0.087	-0.063
30-34 hours	0.213 *	0.137	0.128	0.127	0.156	0.182
35-39 hours	0.317 ***	0.258 **	0.261 **	0.263 **	0.269 **	0.297 **
40-44 hours	0.109	0.060	0.037	0.025	0.040	0.075
45-49 hours	0.353 ***	0.331 **	0.331 **	0.309 **	0.320 **	0.350 ***
50-54 hours	0.395 ***	0.426 ***	0.394 **	0.383 **	0.376 **	0.389 **
55-59 hours	0.441 ***	0.463 ***	0.486 ***	0.475 ***	0.466 ***	0.485 ***
60-64 hours	0.392 *	0.451 **	0.425 *	0.414 *	0.426 *	0.451 **
65-69 hours	0.150	0.157	0.118	0.040	0.050	0.105
70-74 hours	0.726 ***	0.749 ***	0.758 ***	0.751 ***	0.741 ***	0.791 ***
75 hours or more	1.190 ***	1.135 ***	1.173 ***	1.160 ***	1.168 ***	1.181 ***
Age		0.039 ***	0.035 ***	0.045 ***	0.029 *	0.030 *
Age squared/1000		-0.410 ***	-0.349 **	-0.449 **	-0.286	-0.287
Logarithmic annual income		0.051	0.037	0.014	0.023	-0.020
Logarithmic equivalent household income		-0.182 ***	-0.182 ***	-0.154 ***	-0.154 ***	—
Junior high school graduate		0.159	0.197	0.187	0.146	0.246
High school graduate		-0.047	-0.019	-0.035	-0.086	-0.027
College/technical college graduate		-0.060	-0.022	-0.033	-0.078	-0.032
University graduate		-0.355	-0.318	-0.338	-0.377	-0.355
Regular employee/worker			0.122	0.142	0.158	0.137
Part-time worker			0.067	0.073	0.080	0.061
Dispatched worker			0.137	0.132	0.177	0.177
Contract worker			-0.160	-0.168	-0.154	-0.166
Fix-term worker			0.061	0.072	0.113	0.069
Corporate executive			-0.227	-0.179	-0.157	-0.196
Helper of independent business			-0.166	-0.122	-0.100	-0.114
Single				0.121	0.226 *	0.278 **
Divorced				0.309 **	0.313 **	0.374 ***
Separated by death				0.300	0.298	0.380 **
Owned home					-0.065	-0.102
Living with biological parents					-0.125	-0.121
Under 3 years					-0.171	-0.109
3-5 years					0.104	0.152
6-12 years					0.146	0.181
13-18 years					0.073	0.097
19-23 years					0.318 **	0.320 **
24 years or older					0.052	0.053
Hokkaido					-0.045	-0.038
Tohoku					-0.098	-0.084
Hokuriku/Tousan					-0.080	-0.079
Tokai					-0.073	-0.078
Kinki					-0.024	-0.016
Chugoku/Shikoku					-0.086	-0.081
Kyushu/Okinawa					-0.035	-0.017
Log pseudo-likelihood	-2613.2	-2584.3	-2577.0	-2572.3	-2562.8	-2568.3
Pseudo R^2	0.009	0.020	0.022	0.024	0.028	0.026
Sample size	1727	1727	1727	1727	1727	1727

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Table 5 Estimated results: Female samples (Subsamples: With or without children)

Dependent variable: Anxiety toward karoshi	Without children	With children	
20-29 hours	0.109	-0.073	-0.069
30-39 hours	0.043	0.219 **	0.229 **
40-44 hours	-0.078	0.029	0.037
45-49 hours	0.129	0.342 **	0.344 **
50-59 hours	0.159	0.501 ***	0.486 ***
60 hours or more	0.374 *	0.638 ***	0.640 ***
Age	0.020	0.084 ***	0.047
Age squared/1000	-0.190	-0.848 ***	-0.475
Logarithmic annual income	0.104	-0.034	-0.026
Logarithmic equivalent household income	-0.151 *	-0.119 **	-0.124 **
Junior high school graduate	-0.365	0.938	0.816
High school graduate	-0.157	0.541	0.429
College/technical college graduate	-0.337	0.614	0.504
University graduate	-0.546 *	0.239	0.132
Regular employee/worker	-0.397	0.389 *	0.383 *
Part-time worker	-0.468 **	0.300	0.307
Dispatched worker	-0.217	0.264	0.316
Contract worker	-0.609 **	0.063	0.057
Fix-term worker	-0.228	0.207	0.226
Corporate executive	-0.754 **	0.115	0.110
Helper of independent business	-0.648 **	0.125	0.130
Single	0.129	0.998 **	0.978 **
Divorced	-0.406	0.360 ***	0.327 **
Separated by death	0.136	0.242	0.234
Owned home	0.036	-0.119	-0.121
Living with biological parents	-0.137	-0.031	-0.030
Hokkaido	0.004	-0.147	-0.122
Tohoku	-0.086	-0.028	-0.036
Hokuriku/Tousan	-0.060	-0.124	-0.121
Tokai	-0.105	-0.070	-0.073
Kinki	-0.127	0.005	0.018
Chugoku/Shikoku	0.091	-0.190	-0.182
Kyushu/Okinawa	0.105	-0.111	-0.114
Under 3 years			-0.170
3-5 years			0.038
6-12 years			0.068
13-18 years			0.003
19-23 years			0.257 **
Log pseudo-likelihood	-886.3	-1696.5	-1691.8
Pseudo R^2	0.022	0.030	0.033
Sample size	596	1144	1144

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Estimated results Male samples (Consideration of the improvement status of work-life balance in the workplace)

Dependent variable: Anxiety toward karoshi	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
15-19 hours	0.262	0.272	0.270	0.258	0.250	0.249
20-24 hours	-0.258	-0.282	-0.293	-0.298	-0.300	-0.300
25-29 hours	-0.120	-0.154	-0.179	-0.182	-0.206	-0.206
30-34 hours	-0.026	-0.063	-0.094	-0.103	-0.115	-0.118
35-39 hours	-0.220	-0.233	-0.281 *	-0.287 *	-0.287 *	-0.289 *
40-44 hours	0.226 *	0.161	0.098	0.092	0.088	0.087
45-49 hours	0.134	0.053	-0.009	-0.015	-0.021	-0.023
50-54 hours	0.361 **	0.259	0.193	0.189	0.187	0.187
55-59 hours	0.419 ***	0.317 **	0.260	0.255	0.250	0.248
60-64 hours	0.498 ***	0.399 **	0.339 **	0.343 **	0.335 **	0.333 **
65-69 hours	0.547 ***	0.438 **	0.392 **	0.385 **	0.385 **	0.383 **
70-74 hours	0.486 **	0.439 **	0.399 **	0.392 *	0.407 **	0.404 **
75 hours or more	0.948 ***	0.812 ***	0.764 ***	0.765 ***	0.765 ***	0.762 ***
WLB: "don't think so, relatively speaking"		-0.170 **	-0.166 **	-0.167 **	-0.169 **	-0.168 **
WLB: "neither"		-0.159 **	-0.154 **	-0.155 **	-0.154 **	-0.154 **
WLB: "do think so, relatively speaking"		-0.425 ***	-0.428 ***	-0.431 ***	-0.428 ***	-0.426 ***
WLB: "definitely think so"		-0.644 ***	-0.649 ***	-0.652 ***	-0.641 ***	-0.642 ***
Age		0.094 ***	0.092 ***	0.096 ***	0.099 ***	0.098 ***
Age squared/1000		-1.060 ***	-1.024 ***	-1.061 ***	-1.088 ***	-1.081 ***
Logarithmic annual income		-0.081	-0.111 *	-0.108 *	-0.121 **	-0.111 **
Logarithmic equivalent household income		0.009	0.028	0.025	0.019	—
Junior high school graduate		0.301 *	0.321 *	0.335 *	0.322 *	0.313 *
High school graduate		0.219	0.224	0.228	0.226	0.221
College/technical college graduate		0.186	0.197	0.200	0.197	0.191
University graduate		0.084	0.089	0.090	0.085	0.082
Regular employee/worker			0.056	0.056	0.051	0.051
Part-time worker			-0.109	-0.115	-0.122	-0.118
Dispatched worker			0.272	0.276	0.253	0.249
Contract worker			0.080	0.071	0.070	0.070
Fix-term worker			-0.048	-0.040	-0.041	-0.041
Corporate executive			-0.057	-0.057	-0.054	-0.053
Helper of independent business			-0.230	-0.240	-0.256	-0.250
Single				0.046	0.024	0.023
Divorced				-0.189	-0.175	-0.175
Separated by death				-0.129	-0.147	-0.143
Owned home					0.020	0.023
Living with biological parents					-0.055	-0.056
Under 3 years					-0.029	-0.037
3-5 years					-0.053	-0.059
6-12 years					-0.088	-0.095
13-18 years					-0.054	-0.058
19-23 years					-0.042	-0.045
24 years or older					-0.084	-0.084
Hokkaido					-0.117	-0.116
Tohoku					-0.009	-0.010
Hokuriku/Tousan					-0.036	-0.035
Tokai					0.104	0.104
Kinki					0.025	0.024
Chugoku/Shikoku					-0.025	-0.026
Kyushu/Okinawa					-0.096	-0.097
Log pseudo-likelihood	-2766.0	-2717.5	-2714.4	-2713.4	-2710.4	-2710.4
Pseudo R^2	0.021	0.038	0.039	0.039	0.040	0.040
Sample size	1836	1836	1836	1836	1836	1836

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Estimated results: Female samples: (Consideration of the improvement status of workplace work-life balance in the workplace)

Dependent variable: Anxiety toward karoshi	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
15-19 hours	0.205 *	0.139	0.131	0.133	0.132	0.143
20-24 hours	0.169 *	0.074	0.057	0.068	0.068	0.077
25-29 hours	-0.026	-0.119	-0.133	-0.127	-0.118	-0.093
30-34 hours	0.193	0.096	0.094	0.094	0.123	0.149
35-39 hours	0.297 ***	0.191	0.196	0.201 *	0.211 *	0.237 *
40-44 hours	0.096	0.007	-0.017	-0.024	-0.005	0.028
45-49 hours	0.333 ***	0.263 **	0.261 **	0.243 *	0.259 *	0.288 **
50-54 hours	0.375 ***	0.365 **	0.330 **	0.326 **	0.326 **	0.339 **
55-59 hours	0.422 **	0.387 **	0.403 **	0.397 **	0.390 **	0.407 **
60-64 hours	0.372 *	0.330	0.296	0.293	0.316	0.337
65-69 hours	0.130	-0.030	-0.072	-0.134	-0.116	-0.064
70-74 hours	0.705 ***	0.620 ***	0.626 ***	0.627 ***	0.623 ***	0.669 ***
75 hours or more	1.378 ***	1.313 ***	1.339 ***	1.332 ***	1.347 ***	1.361 ***
WLB: “don’t think so, relatively speaking”		-0.165 *	-0.162 *	-0.156	-0.149	-0.150
WLB: “neither”		-0.175 **	-0.168 *	-0.164 *	-0.170 **	-0.167 *
WLB: “do think so, relatively speaking”		-0.275 ***	-0.278 ***	-0.269 ***	-0.271 ***	-0.284 ***
WLB: “definitely think so”		-0.592 ***	-0.586 ***	-0.575 ***	-0.562 ***	-0.568 ***
Age		0.042 ***	0.039 ***	0.044 ***	0.027	0.028
Age squared/1000		-0.450 ***	-0.393 **	-0.450 **	-0.263	-0.266
Logarithmic annual income		0.068	0.050	0.030	0.037	-0.003
Logarithmic equivalent household income		-0.175 ***	-0.175 ***	-0.150 ***	-0.147 ***	—
Junior high school graduate		0.188	0.222	0.209	0.166	0.261
High school graduate		-0.017	0.009	-0.006	-0.053	0.003
College/technical college graduate		-0.043	-0.006	-0.016	-0.059	-0.015
University graduate		-0.313	-0.277	-0.293	-0.330	-0.308
Regular employee/worker			0.164	0.183	0.200	0.182
Part-time worker			0.085	0.090	0.099	0.084
Dispatched worker			0.144	0.145	0.194	0.196
Contract worker			-0.127	-0.131	-0.118	-0.126
Fix-term worker			0.083	0.095	0.128	0.088
Corporate executive			-0.204	-0.166	-0.147	-0.182
Helper of independent business			-0.106	-0.070	-0.049	-0.060
Single				0.070	0.221 *	0.270 **
Divorced				0.278 **	0.293 **	0.351 ***
Separated by death				0.296	0.293	0.371 *
Owned home					-0.057	-0.092
Living with biological parents					-0.131	-0.126
Under 3 years					-0.071	-0.008
3-5 years					0.174	0.223
6-12 years					0.185	0.218 *
13-18 years					0.120	0.143
19-23 years					0.337 **	0.339 **
24 years or older					0.076	0.077
Hokkaido					-0.025	-0.018
Tohoku					-0.120	-0.109
Hokuriku/Tousan					-0.080	-0.079
Tokai					-0.077	-0.084
Kinki					-0.021	-0.013
Chugoku/Shikoku					-0.089	-0.083
Kyushu/Okinawa					-0.017	0.000
Log pseudo-likelihood	-2587.4	-2544.4	-2537.6	-2533.9	-2525.0	-2529.9
Pseudo R^2	0.009	0.026	0.028	0.030	0.033	0.031
Sample size	1710	1710	1710	1710	1710	1710

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Supplement: Details of the questionnaire items for "Survey on the Quality of Life Fiscal Year 2012"

【Anxiety toward karoshi】

"To what extent do you feel anxiety with regard to the following?" – "Karoshi"

【Working hours】

"What were your working hours in the last one week?" (Response according to category)

【WLB (Work-life balance)】

"How do you feel about the following points regarding the quality of work?"

- "The environment in the workplace is conducive to the balancing of work and other duties for those who have childrearing and nursing care responsibilities."

【Individual annual income】

"What is your approximate annual income (including tax and social insurance premiums)?"
(Response according to category)

【Household annual income】

"What is the approximate annual income of your household (including tax and social insurance premiums?" (Response according to category)

【Educational background】

Please tell us about your educational background. If you are presently in school, please tell us the name of your school, and if you have dropped out of school, please tell us the name of the school from which you dropped out.

【Employment position】

"Please select the employment position applicable to you."

【Marital status】

"We would like to ask some questions about your family relationship. Are you married? Please reply regardless of whether you are registered or not."

【Owned home】

"To which does your home correspond?"

【Living with biological parents】

“On the average, how often do you directly see the following person(s)?”

－ “Your parents (living together)”

【Age of youngest child】

“Of your children, how old is your youngest?”

References

Cabinet Office (2013). “Work-Life Balance Report 2013”

http://wwwa.cao.go.jp/wlb/government/top/hyouka/report-13/zentai.html

Hamamura, A. (2015). “Problems on Labor Laws in Relation to Younger Researchers,” *The Japanese Journal of Labor Studies*, 660, 16-26.

Hamermesh, D. (2004). “Subjective Outcomes in Economics,” *Southern Economic Journal*, 71(1), 2-11.

Hara, H., & Sato, H. (2008). “Work-Life Conflict from the Gap of Reality and Hope of Working Hours – for the Realization of a Work-Life Balance,” *The Quarterly Journal of Economic Studies*, 79, 72-79.

Hashimoto, Y., & Miyagawa, S. (2008). “Why the Female Labor Force Participation Rate in Metropolitan Areas is Low: A reexamination of the current situation and of the issues,” RIETI Discussion Paper Series 08-J-043.

Higuchi, Y. (2010). “Working Hours Policy from an Economics Standpoint,” RIETI Discussion Paper Series 10-J-010.

Higuchi, Y., Matsuura, T., & Sato, K. (2007). “Impact of Regional Factors on Births and Wives’ Continuation in Employment – Analysis on Panel survey of consumers by the Institution for Research on Household Economics,” RIETI Discussion Paper Series 07-J-012.

Ishii, Y. (2001). “Historical Understanding of the Industrial Accident Approval of Karoshi,” *The Journal of Therapy* 83(8), 89-94.

Iwasaki, K. (2008). “Long Working Hours and Health Problems – Research Destination and Future Issues,” *The Japanese Journal of Labor Studies* 575, 39-48.

Kajikawa, A. (2008). “What Needs to Be Done to the Working Time Regulations in Japan – A Legal Analysis of the Cause of Long Working Hours,” *The Japanese Journal of Labor Studies* 575, 17-26.

Kato, T., Kawaguchi, D., & Owan, H. (2013). “Dynamics of the Gender Gap in the Workplace: An econometric case study of a large Japanese firm (Revised),” RIETI Discussion Paper Series 13-E-038.

Kawahito, H. (1998). “Suicide from Overwork,” (2nd edition, 2014), *Iwanami Shinsho.*

Kohara, M. (2000). “Long Working Hours and the Market/Household Labor – Do Husbands with Short Commuting Time Help with the Housework?” *The Japanese Journal of Labor Studies* 476, 35-45.

Kuwahara, S., Ueda, M., & Kawano, S. (2013). “The Results of the Survey on the Quality of Life (household survey: placement method),” ESRI Research Note No. 23.

Kuwahara, S., Tamura, T., Kamesaka A., & Murai, T. (2016). “Accessing Suicidal Ideation from Responses to Queries on Subjective Well-Being” Toshiaki Tachibanaki ed., *Advances in Happiness Research: A Comparative Perspective*, Chapter 16, Springer.

Liff, S. (1981). “Mental Health of Women Factory Workers,” *Journal of Occupational Behavior*, 2(2), 139－146.

Liu, Y., Tanaka, H., & The Fukuoka Heart Study Group. (2002). “Overtime Work, Insufficient Sleep, and Risk of Non-fatal Acute Myocardial Infarction in Japanese Men,” *Occupational and Environmental Medicine*, 59, 447-451.

Ma, X. (2009). “Do Long Working Hours Cause Mental Health Problems in Workers?” ‘Dynamism of Japan’s Household Behavior V – Qualitative Improvement of the Labor Market and Work Behavior,” Edited by Yoshio Higuchi, Miki Seko and Hiroshi Teruyama, *Keio University Press* Chapter 5, 105-145.

Martens, M.F.J., Nijhuis, F.J.N., Van Boxtel, M.P.J., & Knottnerus, J.A. (1999). “Flexible Work Schedules and Mental and Physical Health: A Study of a Working Population with Non-Traditional Work Hours,” *Journal of Occupational Behavior*, 20(1), 35－46.

Ministry of Health, Labour and Welfare (2001a). “Revisions on the Guidelines for Reducing Overtime Work” http://www.mhlw.go.jp/houdou/0110/h1024-3.html

Ministry of Health, Labour and Welfare (2001b). “Experts Review Meeting Report on the Certification Criteria of Brain and Heart Diseases” http://www.mhlw.go.jp/shingi/2009/10/dl/s1027-11c.pdf

Ministry of Health, Labour and Welfare (2004a). “1st Review Meeting on the Status of Overtime and Mental Health Measures Work (Minutes)” http://www.mhlw.go.jp/shingi/2004/04/txt/s0428-4.txt

Ministry of Health, Labour and Welfare (2004b). “2004 White Paper on Labor Economy – Health Risks Surrounding Modern Life Safety and Security Created Through Information and Cooperation” http://www.mhlw.go.jp/wp/hakusyo/kousei/04/

Ministry of Health, Labour and Welfare (2013). “Survey on the Awareness of Young People (Report)” http://www.mhlw.go.jp/stf/houdou/0000021856.html

Morioka, K. (2013). “What Accusation Does Karoshi Make? Modern Japan’s Companies and Labor,” *Iwanami Gendai Bunko*.

Obata, F., & Sasaki, M. (2008). “Working Hours” ‘Law and Economics of an Employment Society,’ Takashi Araki, Shinya Ouchi, Fumio Ohtake, Ryo Kambayashi, eds. *Yuhikaku*, Chapter 4, 79-109.

Ogura, K. (2008). “Long Working Hours in Japan – International Comparison and Research Subjects,” *The Japanese Journal of Labor Studies* 575, 4-16.

Ogura, K. & Fujimoto, T. (2007). “Long Working Hours and Work Style,” JILPT Discussion Paper Series 07-01.

Okamura, K. (2006). “Family Life after Mandatory Retirement,” *The Japanese Journal of Labor Studies* 550-67-82.

Owan, H. (2014). “Personnel Economics (2) Early Selection in Support for Women,” ‘Economics Class’ *Nikkei Newspaper* (August 13, 2014, morning edition).

Perrucci, R., MacDermid, S., King, E., Tang, C.Y., Brimeyer, T., Ramadoss, K., Kiser, S.J., & Swanberg, J. (2007). “The Significance of Shift Work: Current Status and Future Directions,” *Journal of Family and Economic Issues*, 28, 600－617.

Sasaki, M. (2008). “Does the Rise in the Extra Pay Rate Reduce Overtime Work?” *The Japanese Journal of Labor Studies*, 573, 12-15.

Sokejima, S., & Kagamimori, S. (1998). “Working Hours as a Risk Factor for Acute Myocardial Infarction in Japan: Case-control Study,” *British Medical Journal*, 317, 775-780.

Takeishi, E. (2011). “Work style and Utilization of Work-Life Balance Measures,” ‘Work-Life Balance and Family Makeup - Work style that Changes the Society with a Declining Birthrate,’ Yoshio Higuchi, Tetsuo Fukawa, eds. *Tokyo University Press*, Chapter 8, 173-194.

Toda, J., & Yasui, K. (2010). “Determining Factors of Mental Health” ‘Research Report on the Relationship Between Realization and Productivity of a Society Which Has a Work-Life Balance 2008’ *Economic and Social Research Institute (ESRI), Cabinet Office,* Chapter 6, 268-280.

Tsuru, K. (2010). “Working Hours Reform: A Bird’s Eye Perspective” ‘Working Hours Reform – How It Will Change Japan’s Workstyle,’ Kotaro Tsuru, Yoshio Higuchi, Yuichiro Mizumachi, eds. *Nippon Hyoron Sha*, Chapter 1, 1-24.

Tsuru, K., Higuchi, Y., & Mizumachi. Y., eds. (2010). “Working Hours Reform – How It Will Change Japan’s Workstyle,” *Nippon Hyoron Sha*.

Tsutsui, J. (2014). “Female Labor Participation and Sexual Division of Labor – A Consideration on the Persistent Male-Breadwinner Role,” *The Japanese Journal of Labor Studies*, 648, 70-83.

Uchiyama, S., Kurasawa, T., Sekizawa, T., & Nakazuka H. (1992). “Risk Factors of Cerebral Cardiac Accidents in Male Workers in Their 50s Who Are Receiving Antihypertensive Drug Treatment,” *Occupational Health* 34, 318-325.

Wada, I. (2002). “Work and Heart Disease – Risk Factors and Countermeasures for Karoshi,”

Occupational Health Review 14, 183-213.

Yamaguchi, K. (2009). “Work-Life Balance – Evidence and Policy Recommendations,” *Nikkei Publishing.*

Yamaguchi, K., & Higuchi, Y., eds. (2008). “Controversy – Japan’s Work-Life Balance,” *Nikkei Publishing*.

Yamamoto, I., & Kuroda, S. (2014). “Economic Analysis of Working Hours – Viewing the Workstyle of a Super Aging Society,” *Nikkei Publishing*.

Yasuda, H. (2008). “Changes in the Workplace Environment and Stress: Having Hope in Work,” *Journal of Social Science* 59 (2),121-147.

Yoshikoshi, K. (2007). “Work Capacity with “Zero Overtime,” *JMA Management Center*.

Yoshikuni, S. (2015). “Financial Version of “Encouragement for Education” – Japan’s Endeavors Predating the First Year of Literacy,” ‘*Kinyu Zaisei Business*’ November 12, 2015, No. 10535, *Jiji Press,* 14-18.