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Essays on Well-Being in Japan

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Economics

by

Masanori Kuroki

June 2011

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ABSTRACT OF THE DISSERTATION

Essays on Well-Being in Japan

by

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Doctor of Philosophy, Graduate Program in Economics
University of California, Riverside, June 2011
Dr. David Fairris and Dr. Todd Sorensen, Co-Chairpersons

This dissertation is comprised of four papers on well-being in Japan and aims to examine three important measures of well-being: perceptions of job insecurity, self-reported happiness, and suicide. The first chapter is titled “The Deregulation of Temporary Agency Staffing Services and Worker Perceptions of Job Insecurity in Japan” and examines whether the expansion of temporary agencies contributes to a rise in perceptions of job insecurity among workers in Japan, where non-regular employment has increased in recent years. I exploit the temporary staffing deregulation of 2004 and identify the impact of the law change as the difference between the change in the perceptions of job insecurity of low-skill manufacturing workers (treatment group) and the change in the perceptions of job insecurity of other non-manufacturing low-skill workers (control group). I find that the temporary agency staffing deregulation significantly contributed to the rise in job insecurity among low-skill manufacturing workers. The second chapter is titled “Does Social Trust Increase Individual Happiness in Japan?” This paper tests the hypothesis that social trust is valuable intrinsically by using

individual happiness data from Japan and finds that social trust has positive and significant effects on individual happiness. Furthermore, additional tests suggest heterogeneous effects of social trust. The third chapter is titled “Suicide and Local Unemployment in Japan: Evidence from Municipal Level Suicide Rates and Age-Specific Suicide Rates” and investigates the link between suicide and unemployment in Japan, where suicide has drawn much attention from researchers, policymakers, and the general public. The results from fixed-effects models show that an increase in the unemployment rate significantly contributed to the male suicide rate during the period 1985-2007, and prime age working men aged 35-64 are the most vulnerable group. The fourth chapter is titled “The Effect of Local Labor Market Conditions at Entry on Male Suicides in Japan,” which tests if entering the labor market during a recession increases the male suicide rate in Japan and finds that the effect of a recession at labor market entry has persistent adverse effects on the subsequent suicide risk.

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Chapter 1: The Deregulation of Temporary Agency Staffing Services and Worker Perceptions of Job Insecurity in Japan

Abstract

In Japan, non-regular employment, such as part-time and temporary work, has increased as a proportion of the workforce in recent years. This paper examines whether the expansion of temporary employment has caused an increased perception of job insecurity among existing workers. I exploit the temporary staffing deregulation of 2004, which allowed temporary agency staffing for production line work in manufacturing, and use a difference-in-differences (DD) methodology to identify the impact of the legal change on changes in perceptions of job insecurity among low-skill manufacturing workers. I find that the temporary agency staffing deregulation contributed significantly to a rise in perceived job insecurity among low-skill manufacturing workers.

Introduction

In most developed economies, non-regular employment, such as part-time and temporary work, has increased as a proportion of the workforce in recent years. The trend seems to be stronger in countries such as France, Italy and Spain, where regular employees have strong job protection, which in turn encourages firms to hire more non-regular workers who can easily be terminated when the reduction of labor is necessary (Booth et al., 2002). Japan, which also has strong employment protection for regular workers, is no exception. Because of the stagnant economy and in response to competitive pressures to

lower labor costs, more Japanese firms have been increasingly using non-regular employees instead of using traditional employees as a means to lower labor costs and gain flexibility in hiring and dismissal.¹ One notable phenomenon in the recent Japanese non-regular labor market is the growth of temporary agency employment. Although temporary agency workers² only account for a small fraction of the Japanese labor force, their share more than doubled during the period 2002-2005, from 0.9 percent to 2.1 percent.³

One possible consequence of this expansion of temporary agencies is a rise in perceptions of job insecurity among existing workers. If the relative cost of agency workers is lower, a firm may choose to replace other types of non-regular employees with agency workers. Regular employees are not likely to be easily replaced by agency workers because of strong job protection, but if a firm can no longer afford job security for regular employees due to intensive competitive pressure brought about by the expansion of temporary agency staffing at other firms, it may choose to downsize and lay off regular employees in order to remain competitive and survive. Whether or not layoffs

¹ According to Houseman and Osawa (2003), “[non-regular workers] are perhaps most easily defined by what they are not: full-time dependent employment with a contract of indefinite duration, or what is generally considered the ‘standard’ work arrangement” (p. 3).

² In the literature by Japanese scholars, “dispatched worker” is traditionally used for the Japanese word “*haken*” instead of temporary agency worker, but I translate it as (temporary) agency worker to be comparable to the U.S. terminology.

³ *Labor Situation in Japan and Analysis: General Overview 2006/2007*: The Japan Institute for Labour Policy and Training (JILPT). Note it is difficult to estimate the precise number of agency workers in Japan because one survey (Japanese Labor Force Survey) by the Statistics Bureau defines agency workers as a person worked at least 1 hour during the previous week of the survey while the other survey (the Worker Dispatching Business Survey) by the Ministry of Health, Labour and Welfare defines them as a person who was registered and employed at least once in the previous year. However, both surveys shows the number of temporary agency workers has grown rapidly (Gottfried, 2008).

actually happen in the workplace, the fear of job loss may increase as long as employees are aware that cheaper substitutes are available or firms face considerable pressure to lower labor costs.

Identifying the impact of the expansion of temporary agencies on worker perceptions of job insecurity is difficult, however, because job insecurity and agency hiring may also be affected by macro shocks and secular trends. Therefore, I exploit the temporary staffing deregulation of 2004, which allowed temporary agency staffing for production line work in the manufacturing sector, and examine possible impacts of the growing use of temporary agency workers on perceptions of job insecurity of existing workers. No country other than Japan regulates temporary agency employment based on occupational distribution (Gottfried, 2003), and thus this deregulation provides a unique setting for a natural experiment, in which only production workers in the manufacturing sector were exposed to a potential large entry of agency workers. Japan is an interesting case for the study of regular workers' job insecurity because strong employment protection was often partly attributed to the country's economic success before the decade-long recession of 1990s.

Using a difference-in-differences (DD) methodology, which allows me to distinguish the effect of the deregulation on job insecurity from other factors affecting job insecurity, I identify the causal impact of the law change as the difference between the change in the perceptions of job insecurity of low-skill manufacturing workers (treatment group) and the change in the perceptions of job insecurity of other non-manufacturing low-skill workers (control group). I find that the deregulation significantly increased job

insecurity among low-skill manufacturing workers, especially regular workers, relative to the control group.

However, there remains a possibility that manufacturing workers as a whole were experiencing distinct external shocks unrelated to the deregulation. I address this issue by including high-skill workers and using a triple-differences (DDD) approach in order to account for manufacturing-specific shocks. The results from the difference-in-differences are robust to the inclusion of the additional control group in the triple difference method, which further supports the hypothesis. Additionally, I test for heterogeneity among workers in firms with different sized establishments and find that firm size matters for job insecurity when workers face potential competition in the workplace.

The paper is organized as follows. Section 2 provides some background on the Japanese labor market and the deregulations on temporary staffing. Section 3 describes the literature on subjective measures of job insecurity and the potential impact of the deregulation on job insecurity. Section 4 describes the data and the methodology I use to identify the impact of the deregulation. The empirical results are presented in Section 5, and the paper concludes in Section 6 by discussing the policy implications of these findings and suggesting directions for future research.

An Overview

Japanese Industrial Relations and Non-Regular Employment in Japan

The labor market in Japan is known to be less flexible and workers less mobile than in the US and even Europe. Japan was one of the countries with the highest employment

protection on the indicator “difficulty of dismissal” for regular employees (OECD,1999).⁴ Japanese companies, especially large corporations, use the long-term employment system, more commonly known as lifetime employment, which is defined as “an employment practice where companies hire a specific number of new graduates at fixed times every year, and under contracts without a fixed period of employment, employees continue to be employed at the same company or affiliated companies from the time that they are hired as new graduates to the time they retire, as long as there are no extraordinary circumstances such as a management crisis”.⁵ Despite some obvious drawbacks of lifetime employment, many firms are still strongly committed to not laying off any permanent employees.⁶ Research in 2003 found that 36.1 percent of firms surveyed said they would basically maintain lifetime employment, 40 percent said “partial adjustment is inevitable”, and 15.3 percent said “fundamental review is necessary”.⁷

Though lifetime employment is no longer a guarantee for many Japanese workers, layoffs still require justification (layoffs must be strictly necessary from a business standpoint to keep the firm in operation),⁸ and, prior to layoffs, firms must try other

⁴ *Employment Protection and Labour Market Performance*, OECD:
<http://www.oecd.org/dataoecd/9/46/2079974.pdf>

⁵ *Labor Situation in Japan and Analysis: General Overview 2004/2005: The Japan Institute for Labour Policy and Training (JILPT)*.

⁶ The reports *The Labor Situation in Japan 2002/2003* by JILPT states “traditional hiring guidelines, e.g. the long-term employment system, are still the norm at the majority of Japanese companies” and “the long-term employment system will most likely persist”.

⁷ *Labor Situation in Japan and Analysis: General Overview 2004/2005: The Japan Institute for Labour Policy and Training (JILPT)*.

⁸ The layoff of regular employees is regulated by the Employment Contracts Act and case laws (see Araki, 2002).

measures, such as voluntary early retirement and cutting work hours, wages, or bonuses.⁹ Non-regular workers are more vulnerable to contract termination. This duality in terms of protection has been criticized in the 2008 OECD report *Jobs for Youth: Japan*, which recommends that Japan increase “the employment protection and social security coverage for fixed-term, part-time and temporary agency workers, while easing the employment protection for workers on regular contracts.”

Non-regular employment can be roughly divided into temporary and part-time positions. Within the category of temporary worker, the distinction is made between direct-hire temporary workers, who are hired directly by the employer either for a temporary period of time or on a fixed-term contract, and temporary agency workers, who are employees of a temporary staffing agency that subcontracts out its employees to clients on a short-term basis. Temporary agency employment is regulated based on occupational distribution, but as described below, a series of deregulations, which aimed to make the Japanese labor market more flexible and responsive to business needs, has legalized temporary staffing in many formerly-prohibited occupations.

The rationale for employers to use non-regular workers is straightforward. Because of the protracted recession in the 1990s and future uncertainty as well as intensifying global competition, many firms are employing fewer regular workers and using more non-regular workers so that they can save labor costs. In *Survey of the Diversification of Employment Status 2003*, 55 percent of firms said they use part-time

⁹ In addition to the restrictive regulatory environment, “the implicit social contract that has developed over the years makes it difficult for companies to introduce sweeping changes to their industrial relations practices in rapid fashion without causing loss of morale and risking productivity declines among regular workers” (Houseman and Osawa, 2003, p. 194).

workers and 26.2 percent of firms said they use agency workers because they need to control wage costs. In addition to the cost-saving, firms find it easy to adjust non-regular workforce during a possible downturn, and they report easy acquisition and termination as reasons for using non-regular workers and more flexible staffing arrangement (Morishima, 2001). Indeed, this seems to be the main reason that non-regular employment has grown more rapidly in Japan than in the United States. Because of the Japanese industrial relations system, regular workers in Japan have greater job security than do regular workers in the United States, and therefore Japanese firms have a greater need for temporary agency workers to respond to seasonal or cyclical fluctuations in workload and protect regular workers from such demand fluctuations (Houseman and Osawa, 2003).

Temporary Agency Workers and the Temporary Staffing Services Law

Temporary agencies attempt to match temporary workers with clients by assigning those whose skills fit the job. Agency workers are defined as “workers under contract to a [temporary staffing agency], who are entrusted with specific duties by the companies to which they are assigned.”¹⁰ There are reasons to use agency workers rather than direct-hire temporary workers. Agency firms have economies of scale in screening and training workers and may be capable of speedier, often better, job matching than direct-hire. While some agency temporary jobs require specialized skills (e.g. product design and development), others are low-skill jobs (product assembly and clerical jobs). Many male

¹⁰ Labor Situation in Japan and Analysis: General Overview 2009/2010

agency workers perform professional or technical works (9.1 percent developing software and 11.1 percent designing machines in 2008). Clerical jobs account for the largest proportion of agency work for female agency workers (39.5 percent of female agency workers were assigned “general clerical work” in 2008). Overall, agency workers only account for a small fraction of the labor force (2 percent of the labor force, or 5.6 percent of non-regular workers in 2003).¹¹

While in the United States temporary staffing agencies are allowed to supply workers for all occupations and jobs, in Japan the occupations and jobs handled by agencies are limited. However, Japan has gone through significant changes in the regulation of temporary staffing in the last two decades. The temporary staffing business had been prohibited by the Employment Security Act of 1947 until temporary staffing was first legalized with the establishment of the Temporary Staffing Services Law in 1985. The initial deregulation lifted the ban on agency staffing for certain occupations. This was called “the positive list approach” because it specified which occupations temporary agency workers were allowed to work in. Then, motivated by the recession during the 1990s and lobbying efforts by temporary staffing industry firms, the government introduced a major revision of the Temporary Staffing Services Law in 1999, which allowed many formerly prohibited sectors to use agency staffing, but several occupations, including production line work in the manufacturing sector, were still not allowed. This was called “the negative list approach” because it specified which occupations temporary agency workers were not allowed to work in. Another revision of

¹¹ *The Labor Situation in Japan 2006/2007.*

the Temporary Staffing Services Law in March 2004 removed most of the remaining restrictions and legalized temporary staffing in production line work in manufacturing.¹²

Since agency staffing in production line work in the manufacturing sector has been legalized, more and more temporary agency workers started working in manufacturing.¹³ In a survey conducted in August 2004, 29.3 percent of male temporary agency workers and 4.9 percent of female temporary agency workers were in “services of manufacturing products”; the corresponding numbers were 42.4 percent and 9.9 percent in October 2008.¹⁴ In both survey years, manufacturing was the highest category for male temporary agency workers. Another statistics is provided in quarterly reports by *Japan Staffing Services Association (JASSA)*¹⁵ which conducts survey for its member companies representing a wide range of industries. Its report published in the 4th quarter of 2008 reveals that while the number of agency workers grew by 8 percent in 2005 and 2006 for all industries on average, in the manufacturing sector growth was 51 percent in 2005 and 63 percent in 2006. In summary, it appears that the 2004 deregulation had the intended effect on the manufacturing sector by effectively expanding the supply of temporary labor for production line work.

¹² Temporary staffing is still prohibited in construction, security, dockyards, and to some extent nursing and other medical fields.

¹³ However, it is widely believed that there were some legal loopholes that manufacturing firms had used before temporary staffing was legalized (Weathers, 2001; Gottfried, 2009).

¹⁴ *Statistical Report on Worker Dispatching Undertakings*, Ministry of Health, Labour, and Welfare

¹⁵ <http://www.jassa.jp/employer/statistics.html>

Perceptions of Job Insecurity

Job Insecurity and Economic Implications

Labor economists have traditionally used the duration of jobs and the job loss rate as proxies for job insecurity. Many economists are reluctant to use subjective perceptions of job insecurity because of justifiable concerns that workers' mood at the time of the survey can bias workers' reported perceptions of unemployment risk. Nevertheless, there has been a growing interest among economists in worker perceptions of job insecurity, and empirical evidence supports the claim that subjective job insecurity is significantly correlated with job market realities and not just a state of mind of overly pessimistic workers. Green et al. (2000) report the positive link between a worker's fear and regional unemployment rates, suggesting that individuals take into consideration local labor market conditions when assessing their chance of unemployment. Schmidt (1999) reports that the trends in job insecurity are largely consistent with the trends in involuntary job loss rates.¹⁶ Most importantly, Green et al. (2001), using panel data, find that workers' perception of the risk of unemployment is positively and significantly related to actual unemployment experience in the subsequent year, suggesting that their subjective assessments are to some degree reasonable predictions (see also Stephens, 2004; Dickerson and Green, 2006; Campbell et al., 2007).

Empirical studies have found that correlates of the perceptions of job insecurity are largely in line with expectation. Green et al. (2000) find that being on a temporary job or a part-time job contract raises the fear of job loss. Blanchflower and Oswald (1999)

¹⁶ However, job insecurity was unusually high relative to aggregate unemployment in the mid-1990s in the US and Britain (Schmidt, 1999; Green et al., 2000).

find that job insecurity is lower among older workers, supervisory workers, and workers in the public sector. Manski and Straub (2000) find that, in the United States, expectations of job loss tend to decrease with age and schooling and vary substantially by race (Blacks reporting greater job insecurity) but vary little by sex. Green et al. (2001) find that job insecurity is linked to past individual unemployment experience.

Economists are interested in job insecurity because insecurity about the future has been hypothesized to affect outcomes in the labor market. Workers may increase labor supply as a result of growing job insecurity if they, expecting future job loss, try to work as many hours as possible while they can (Bluestone and Rose, 1998). Workers may suffer slower wage growth if job insecurity reduces their bargaining power (Campbell et al., 2007).¹⁷ In 1995 the former Federal Reserve Chairman Alan Greenspan stated “[the fear of displacement] has doubtless played a significant role in the slowdown in growth of labor compensation as workers have in effect sought to preserve their jobs by accepting lesser increases in wages”.¹⁸

It has also been pointed out that job insecurity affects workers’ productivity. Facing a threat of job loss, workers may decide to work harder to increase their chances of keeping their current job. This is the prediction of the shirking theory which asserts that the threat of job loss increases work effort. However, interviews conducted by Bewley (1999) reveal that most business people believe that a threat of dismissal is bad

¹⁷ In the US, it has been suggested that the use of agency workers contributed to the slow wage growth during the 1990s (Katz and Krueger, 1999; Houseman et al., 2003). For a detailed comparison of non-regular employment in Japan and the United States, see Houseman and Osawa (2003).

¹⁸ Greenspan's remarks appear on the website of the Economic Club of Chicago at <http://www.econclubchi.org/History/Excerpts\AlanGreenspan1.pdf>

for morale.¹⁹ Providing job security may also enhance a firm's productivity by making workers more committed and highly-involved. Given that job insecurity is negatively correlated with job satisfaction (e.g. Blanchflower and Oswald, 1999), job insecurity may decrease productivity of workers whose motivation to work hard for their current employer has decreased. The fear of job loss also has been hypothesized to encourage workers to invest less in firm-specific human capital.

Finally, the consequences of job insecurity could extend beyond the labor market to savings and consumption behavior if households have little confidence to spend due to job insecurity of wage earners; as Hamermesh (2001) points out, "more satisfied workers who are secure in their jobs have a reduced motive to undertake precautionary savings" (p. 3). These economic implications are based on growing anxiety, not actual job loss. As the microeconomic consequences of job insecurity potentially extend beyond the individual to the macro economy by aggregation, workers' perceptions of job insecurity can reduce output, productivity, and consumption and restrains wage growth at the macroeconomic level.

Job insecurity may also have indirect economic implications. Even though workers are likely to differ in their preferences for job security and may accept higher job insecurity in exchange for higher wage (i.e. a compensating wage differential), one consistent and robust finding in the psychology literature is the adverse mental and physical health effects of job insecurity on workers and families (see the review in Green

¹⁹ Adverse effects of job insecurity on morale was pointed out many years ago by Eisenberg and Lazarsfeld (1938): "Just having a job itself is not as important as having a feeling of economic security. Those who are economically insecure, employed or unemployed, have a low morale."(p. 361).

et al., 2000, and Bertaux and Queneau, 2002). Even after controlling for time-invariant unobservable personal traits, job insecurity significantly lowers both life satisfaction and mental health (Green, 2009). Since the psychological and physical well-being of workers are likely to be adversely affected by job insecurity, some economists are critical of the claim that the fear of job loss incentivizes workers to work hard and leads to higher performance; rather, they argue, the promotion of job security is good for an organization as a reasonable level of job security and a decent quality of working life motivate workers (Bertaux and Queneau, 2002).

Potential Effects of the Deregulation on Job Insecurity

If deregulation allows temporary agency staffing in manufacturing, how is manufacturing workers' job insecurity affected? For existing non-regular workers such as part-time workers and direct-hire temporary workers, who are typically used as a buffer enabling the reduction of labor input while keeping regular workers, a potential larger labor supply of agency workers means that firms may substitute agency workers for those existing non-regular workers if the relative cost of agency workers is lower. *Ceteris paribus*, job insecurity of non-regular workers, who have little job protection in the first place, is likely to increase.

For existing regular workers, whether or not job insecurity increases as a result of the expansion of temporary agencies is more contentious. On one hand, because labor laws make it difficult to terminate regular employees and replace with non-regular workers, the recent expansion of non-regular employment may have little effect on job

insecurity of regular workers. Job security of regular employees may even improve in the workplace with more non-regular workers who are the first to be laid off in a recession. On the other hand, introducing more non-regular workers may increase job insecurity of regular workers of firms that do not utilize less costly non-regular workers if these firms become less competitive because of permanent workers' higher relative costs and inflexibility. To remain competitive and stay in business, these firms with only regular workers may be forced to downsize by laying off some of its regular employees (and may choose to hire non-regular workers if they need more workers later). Indeed, there has been concern that the rise of temporary agencies might encourage the replacement of regular workers with agency workers (Mizushima, 2004). Still another possibility is that firms use temporary contracts as a probation device and recruit permanent workers from the rank of the temporary workers if they display high ability.²⁰ Once non-regular workers become regular workers, the existing regular workers may perceive them as a potential threat to their job security.

²⁰ Houseman and Osawa (2003) find that temporary jobs are less likely to be stepping stones to future regular jobs in Japan. According to one temporary agency, this temp-to-perm practice is not very common among employees (Gottfried, 2008). Not surprisingly, many temporary agency workers say they would rather be regular, permanent workers. According to Ministry of Health, Labour and Welfare's *Survey of the Diversification of Employment Status, 2003*, while many non-regular workers choose to be so because they are willing to trade compensation and job security for work schedule, 21.6 percent of part-time workers and 40 percent of agency workers chose to be non-regular workers because they could not find a permanent position. See Cohanty (1998) for the similar pattern of US workers.

Data and Identification Strategy

Measures of Job Insecurity

The data used in this study are taken from *the Japanese General Social Surveys* (JGSS).²¹ This survey is a repeated cross-section that was administered from 2000 to 2006, except for 2004, and contains a wide range of demographic, work, and attitudinal questions. In this survey, individuals who are currently in employment or self-employment are asked a question about job security expectations: “Thinking about the next twelve months, how likely do you think it is that you will lose your job or be laid off?” The question measures workers’ insecurity in terms of their unemployment expectation for the subsequent year, and individuals respond on a four-point scale, ranging from “very likely” to “not at all likely.”

I define job insecurity as a binary variable by collapsing the fourfold categories to form a dichotomous variable: 0 for not too likely or not at all likely and 1 for fairly likely or very likely. Figure 1 shows the trends in the fraction of the JGSS respondents who believed that that they were likely to lose their jobs in the next 12 months, along with the national unemployment rate. In this short period of time, the workers’ perception of job insecurity and the unemployment rate show a strikingly similar trend. Both the measure of job insecurity and the unemployment rate peak around 2001-2002 and then decrease, as the economic recovery started in 2003. Because this overall trend makes it difficult to uncover the impact of the law change, I use a difference-in-differences strategy.

²¹ *The Japanese General Social Surveys* are designed and carried out by the JGSS Research Center at Osaka University of Commerce (Joint Usage / Research Center for Japanese General Social Surveys accredited by Minister of Education, Culture, Sports, Science and Technology), in collaboration with the Institute of Social Science at the University of Tokyo.

Treatment and Control Groups

I attempt to identify the effect of the temporary staffing deregulation on job insecurity of low-skill, non-clerical production workers in the manufacturing sector (the treatment group). This group will contain regular workers and non-regular workers (temporary and part-time workers) who do not have college or university degrees, who do not supervise, and who do not have managerial positions. If low-skill manufacturing workers consider that the chance of losing their jobs in the near future increased due to the deregulation of temporary agency staffing, one would expect to see an increase in perceived job insecurity among these workers. As a control group, I use non-manufacturing low-skill workers, who presumably were not affected by the deregulation. I exclude executives, the self-employed, workers in public sector, and workers over 65 years of age. Agency workers are also excluded from the analysis because it was illegal to use temporary agency workers in production line work in manufacturing before 2004 as discussed above, and thus including temporary agency workers, whose job insecurity is high by definition, for the post-2004 period, can be misleading.

Table 1 compares the treatment group and the control group in terms of observable characteristics. The treatment and the control groups are similar in terms of the job insecurity measure; the prevalence of job insecurity is slightly higher in manufacturing workers (0.21 vs. 0.17), though the difference is marginally statistically significant. Compared to low-skill non-manufacturing workers, low-skill manufacturing workers are more likely to be regular workers (0.63 vs. 0.54), union members (0.23 vs. 0.14), and have longer tenure (10.5 vs. 7.9). Non-manufacturing workers are more likely

to be female (0.53 vs. 0.63), have high school diploma (0.69 vs. 0.78), work in small workplaces (0.16 vs. 0.22), and live in a large city (0.08 vs. 0.18). Even though these means are statistically different between the treatment and the control groups, to the extent I control for these factors, any bias due to differences in observable characteristics will be reduced.

Finally, I include in the analysis workers' belief about their ability to find another job with similar compensation should they search for new employment with the question: "About how easy would it be for you to find a job with another employer with approximately the same income and fringe benefits you now have? Would you say very easy, somewhat easy, or not easy at all?" I define "difficult to find a job" as a binary variable which takes a value of 1 for not easy at all, 0 otherwise. This variable will serve as a proxy for workers' personal assessment of tightness in the labor market and mitigate the effect of workers' unobservable disposition (e.g. pessimism). Low-skill manufacturing workers are more likely to feel it is difficult to find a job with similar compensations (0.59 vs. 0.53).

The validity of the results depends on a control group that nets out the impact of all other factors on the job security trend and controls for contemporaneous shocks to job insecurity. One crude way of checking if the control group is a valid counterfactual is to check for a parallel trend. If the secular trends are the same before the deregulation in 2004, then it is more likely that the counterfactual trends would have been the same after 2004 if there had not been the deregulation. Figure 2 shows job insecurity for the treatment and control groups over time. Job insecurity of the treatment group is similar to

that of the control group before 2004 while job insecurity is clearly higher for low-skill manufacturing workers after 2004. Thus, Figure 2 not only provides visual evidence of a treatment effect on the treated but also a common underlying trend, which suggests that the assumption of the parallel trend appears reasonable.

Basic Difference-in-Differences Estimates

I use a difference-in-differences (DD) methodology, which allows me to distinguish the effect of the deregulation on job insecurity from other factors related to job insecurity and identify the impact of the legal change as the difference between the change in the perceptions of job insecurity of low-skill manufacturing workers (treatment group) and the change in the perceptions of job insecurity of other non-manufacturing low-skill workers (control group). Let t denote period (before or after 2004). A simple DD estimate for the effect of the law revision on worker i 's perceptions of job insecurity JI is:

$$DD = \{E[JI_{it}|i = manufacturing, t = after] - E[JI_{it}|i = manufacturing, t = before]\} - \{E[JI_{it}|i = non-manufacturing, t = after] - E[JI_{it}|i = non-manufacturing, t = before]\}$$

Table 2 reports the raw difference-in-differences estimates of the effect of the deregulation of 2004. Each cell contains the mean for the group labeled, along with standard deviations and number of observations. The hypothesis is that the deregulation contributed to a *relative* increase in the perception of job insecurity among low-skill manufacturing workers. There was a 14 percentage point decrease in job insecurity for the control group compared with a 6 percentage point decrease for the low-skill

manufacturing workers. Thus, the relative increase for the treatment group was an 8 percentage point increase, supporting the hypothesis. Since the treatment group and the control groups differ in a number of observable characteristics, which are likely to be biasing the raw estimates, I attempt to reduce the bias by estimating the job insecurity equation with controls.

Regression Results

Difference-in-Differences for Low-Skilled Workers

My objective is to identify the average effect of the deregulation on job insecurity of low-skill manufacturing workers. I estimate the following equation for job insecurity JI :

$$JI_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 MFG_i + \beta_3 Post2004_t + \beta_4 (MFG \times Post2004)_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable is a dummy variable for the job insecurity measure discussed above. MFG_i is a dummy equal to one for low-skill manufacturing workers and controls for the time-invariant characteristics of low-skill manufacturing workers. $Post2004_t$ is a dummy equal to one for year 2005 and 2006 and controls for any secular trend in job insecurity. X_{it} represents a set of demographic and other control variables. These control variables are intended to control for workers' selection into the treatment group. I include prefecture dummies, industry dummies, and separate year dummies. In order to make the

interpretation of the DD estimate easier, OLS estimations, rather than probit or logit estimations, are presented.²²

The first column in Table 3 shows the results for all low-skill workers. The interaction $MFG \times Post2004$ is positive and significant at the one percent level, indicating that the deregulation increased job insecurity among low-skill manufacturing workers. The relative increase in job insecurity for the treatment group is a 9.5 percentage point increase. The size of the coefficient is similar to the raw difference-in-differences estimate presented in Table 2. The post dummy is large in magnitude and strongly significant, consistent with the figures above and the raw difference-in-differences estimate in Table 2. The coefficient of the non-regular worker dummy is significantly positive, suggesting that being a non-regular worker is significantly associated with greater perceptions of job insecurity as expected.

Despite the wide range of controls included in the regression above, there still remains the possibility that the deregulation led to nonrandom selection of workers. Workers who are pessimistic and insecure by nature may decide not to seek employment in production line work in the manufacturing sector if they think that the chance of job loss is higher due to the deregulation, while confident and optimistic workers may not perceive the potential entry of agency workers as a threat to job security. This sorting among workers increases the share of optimistic workers in manufacturing and may

²² This is because interaction effects are more complicated in nonlinear models, such as logit and probit models, than in OLS. Interpreting the coefficients and the statistical significance of interaction terms in nonlinear models could be misleading, and the marginal effect from the “dprobit” command in STATA is not necessarily related to the DD estimate. In linear probability models, the interpretation of the coefficient of the interaction between two variables is straightforward, and the statistical significance of the interaction effect can be tested with a single t-test on the coefficient. See Ai and Norton (2003) for details.

underestimate the effect of the deregulation on job insecurity of production workers. Another possibility of nonrandom selection of workers comes from the firm side. If the types of workers that employers demand are different between before and after the deregulation, newly hired workers will be on average different from existing workers. For example, employers in the manufacturing sector may be increasingly hiring those who they think are better able to deal with the repetitive and monotonous job for which workers perform single routine tasks. If those workers are more insecure by nature, then the effect of the deregulation on job insecurity of production workers will be overestimated.

In either case, comparing the perceived job insecurity before and after the deregulation will be problematic, and controlling for observable characteristics may not control for this nonrandom selection. To address this issue, I exclude workers who changed their occupation or entered the labor market after 2004, that is, workers whose job tenure is less than one year in 2005 and less than two years in 2006. Column (2) in Table 3 shows the results when the model excludes workers hired after 2004. The DD coefficient is still significant at the 5 percent level, and the relative increase in job insecurity for the treatment group is a 7.8 percentage point increase.

Differential Effects for Regular and Non-regular Workers

Next, I examine differential effects for the different labor market groups rather than assuming the common effect. I use the split sample approach and partition the sample into regular and non-regular workers. There are two reasons to believe that job insecurity

of regular workers and that of non-regular workers are affected differently. First, regular workers and non-regular workers differ greatly in the degree of employment protection as discussed above. *Ceteris paribus*, the adverse effect of the deregulation on job insecurity should be larger for non-regular workers, who enjoy much less job security, than for regular workers. Second, there is a possibility that the demand for non-regular workers increased relative to the demand for regular workers during this period. As Gottfried (2008) states, “more regular jobs are converted into nonstandard positions and new jobs increasingly are created as nonstandard work arrangements” (p. 181). If more and more temporary jobs are created as a substitute for permanent jobs, then job security of non-regular workers may rise, thereby mitigating the adverse effect of the deregulation.

Column (3) in Table 3 shows the results when the sample is restricted to regular workers. The interaction $MFG \times Post2004$ is positive and significant at the 10 percent level, and when the model excludes workers hired after 2004 in Column (4), the DD estimate remains significant, at the 5 percent level. It seems that, despite strong employment protection, regular workers’ perception of job insecurity increased in response to the law revision.

Column (5) in Table 3 shows the results for non-regular low-skill workers. The interaction $MFG \times Post2004$ is positive but insignificant. When the model excludes workers hired after 2004 in Column (6), the DD estimate is imprecisely estimated. Overall, the results from the difference-in-differences suggest that job insecurity of low-skill manufacturing workers, especially regular workers, increased after the deregulation of temporary agency employment.

Most personal characteristics do not have statistically significant effects on job insecurity. Somewhat surprisingly, despite job tenure typically being considered as a proxy for firm-specific human capital and thus greater security, longer tenure is not statistically associated with job security.²³ “Difficult to find a job” is uniformly significant and positive, suggesting that those who think they will have a difficulty with finding a job with similar compensations and benefits are more likely to have the fear of job loss. Being a union member is associated with lower job insecurity for regular workers but not for non-regular workers.²⁴ Having a high school diploma is associated with lower job insecurity only for non-regular workers. Perhaps strong job protection given to regular workers diminishes the positive effect of education on job security. The R-squared is fairly low, meaning that there remains a great deal of variation in job insecurity that is unexplained and due to unobservable factors such as worker’s disposition (e.g. pessimism) and private information that workers may have.

Triple Differences Approach

The evidence presented above suggests that the deregulation increased job insecurity among low-skill manufacturing workers, especially regular workers. The DD approach is problematic, however, if there were manufacturing-specific shocks after 2004, i.e. the DD estimates are biased if manufacturing workers were subject to other forces that affected

²³ I also tried a quadratic specification for tenure to explore the possibility of a U-shaped pattern but dropped it because the result was not statistically significant. The U-shaped pattern may appear if old workers' skills are judged to be obsolete (Green et al., 2000).

²⁴ Theoretically, the effect of unions on job security is ambiguous. While unions may protect workers from layoffs, they tend to raise wages and may be concentrated among shrinking industries (Green et al., 2000).

their perceptions of job insecurity. Then, the comparison of manufacturing and non-manufacturing workers does not provide a convincing test of the hypothesis, and the DD estimates do not identify the impact of the deregulation on job insecurity. On one hand, for example, intensifying global competition and unfavorable exchange rates are more likely to raise fear of job loss among manufacturing workers than among non-manufacturing workers, and in this case the effect of the deregulation will be biased upward due to confounding effects of the negative shock increasing job insecurity only for manufacturing workers. On the other hand, if there was a favorable shock to manufacturing workers, the effect of the deregulation will be biased downward in the DD model. Hence, the secular trends in job security among manufacturing workers need to be accounted for to correct the DD estimates.

In order to evaluate the robustness of the DD estimate, I employ a triple differences (difference-in-differences-in-differences, or DDD) approach by using high-skill workers, who have college or university degrees and/or supervisory posts, an additional control group. Because the policy change introduced more flexible workers at the lower level of firms, job insecurity of low-skill manufacturing workers should be affected more than that of high-skill manufacturing workers, and one should expect to see no (relative) increase in job insecurity of high-skill workers. If there was a distinct shock to manufacturing workers over this period, the effects of these shocks should show up in the perceptions of job security among all manufacturing workers, both low- and high-skill. Thus, the DDD approach controls for the possibility of contemporaneous shock to manufacturing workers in estimating the impact of the deregulation. My triple-

differences approach uses four different groups, and the DDD estimate for the effect of the deregulation on worker i 's perceptions of job insecurity JI is:

$$DDD = \{\Delta E[JI_i | i = \text{low-skill manufacturing}] - \Delta E[JI_i | i = \text{low-skill non-manufacturing}]\} \\ - \{\Delta E[JI_i | i = \text{high-skill manufacturing}] - \Delta E[JI_i | i = \text{high-skill non-manufacturing}]\}$$

Table 4 reports the raw DD for high-skill workers and DDD estimates of the effect of the deregulation of 2004. There was a 6 percentage point decrease in job insecurity for the high-skill non-manufacturing workers compared with a 17 percentage point decrease for the high-skill manufacturing workers.²⁵ Thus, the relative *decrease* in job insecurity for the high-skill manufacturing workers was 11 percentage points, suggesting that the secular trends for high-skill workers were favorable for manufacturing workers. The raw DDD estimate, which is the raw difference-in-differences estimate for low-skill workers (from Table 2) minus the raw difference-in-differences estimate for high-skill workers, indicates a 19 percentage point increase for low-skill manufacturing workers. This suggests that, if the secular trends in job security among manufacturing workers are accounted for, the relative increase in job insecurity of low-skill manufacturing workers is greater than the DD estimates in the previous section. The regression equation for the DDD has the following form:

²⁵ That none of the high-skill manufacturing workers reporting job insecurity after 2004 may raise some concern about their sample size being too small to represent a valid comparison group, since they comprise only 37 observations in a sample of over 5000. I attempted to increase their sample size by including managerial workers in the high-skill worker group, though this raises another concern that managerial workers may not be suitable to be included in the control group for low-skilled workers. Rather ironically, including managerial workers in the control group reduced the magnitudes of DDD estimates, with little change in the statistical significance. The results are available from the author on request.

$$\begin{aligned}
JI_{it} = & \beta_0 + \beta_1 X_{it} + \beta_2 MFG_i + \beta_3 LowSkill_i + \beta_4 Post2004_t & (2) \\
& + \beta_5 (MFG \times Post2004)_{it} + \beta_6 (LowSkill \times Post2004)_{it} \\
& + \beta_7 (MFG \times LowSkill)_i + \beta_8 (MFG \times LowSkill \times Post2004)_{it} + \varepsilon_{it}
\end{aligned}$$

The second level interactions control for changes over time for manufacturing workers $MFG \times Post2004$ and low-skill workers $LowSkill \times Post2004$, and time-invariant characteristics of low-skill production workers in the manufacturing sector $MFG \times LowSkill$. The third level interaction, which is the DDD estimate, captures all variation in job insecurity of low-skill workers (relative to high-skill workers) in manufacturing (relative to non-manufacturing) after (relative to before) the deregulation. The DDD estimate is immune to shocks to low-skill workers as well as shocks to manufacturing workers, and this triple-differences model may generate a more convincing results than the DD model by exploiting three sources of variation instead of two. Of course the DDD estimator is valid only if there was no contemporaneous shock that affected only the treatment group, low-skill manufacturing workers.

The results are shown in Table 5. In order not to overload the table, I do not explicitly report the coefficients on personal characteristics.²⁶ The coefficient on the third-level interaction is positive and statistically significant at the one percent level, and the size of the coefficients is very similar to the raw DDD estimate presented in Table 4. The DDD estimate remains significant at the one percent level when workers hired after 2004 are excluded. When the sample is restricted to regular workers, the DDD estimates are statistically significant and larger in magnitude. In contrast, the DDD estimates are

²⁶ Also, they are in line with the difference-in-differences estimates above. The detailed results can be obtained from the author on request.

not statistically significant for non-regular workers, suggesting that the statistically significant DDD estimates in columns (1) and (2) are mainly driven by regular workers. The DDD results paint a picture that is largely consistent with the results from the DD model: regular low-skill manufacturing workers' job insecurity significantly increased after the deregulation, but job insecurity of non-regular manufacturing workers did not.

Heterogeneity and Firm Sizes

In this section, I further explore the effect of the deregulation by interacting the DD and the DDD terms with the establishment size to test for heterogeneity. There are two reasons to expect differential effects among workers in firms with different sized establishments. First, large corporations are likely to provide regular employees with lifetime employment, a practice small or medium size firms may not provide. If larger firms are more strongly committed to not laying off any regular workers, regular employees will feel more secure in larger firms. Second, the firm survey shows small firms are less likely to use agency workers while the majority of large firms uses workers from temporary agencies. Evidence from the employer survey in 2004 shows that 79.1 percent of firms with more than 500 employees use agency workers compared to 27.8 percent of firms with 30-99 employees.²⁷ This implies that within-firm exposure to agency workers is more likely to happen in larger firms as a need for at least one flexible

²⁷ *Statistical Report on Worker Dispatching Undertakings*, Ministry of Health, Labour, and Welfare.

worker is more likely to arise in larger firms. In this case, non-regular workers are more likely to feel insecure in large firms than in small ones.²⁸

Table 6 and 7 present the coefficients of interest from job insecurity DD regressions and triple-differences regressions, respectively. The sample size is smaller because I exclude workers who did not report their firm size. In terms of statistical significance, the results are not very different between Table 6 and 7. The interaction terms are significant for workers of medium size firms, though job insecurity of non-regular workers of medium size firms are not affected. In contrast, non-regular workers of large size firms experienced an increase in job insecurity as a result of the deregulation. The author speculates that job insecurity of low-skill regular workers in large firms is not affected because larger firms are more likely to be strongly committed not to lay off regular employees than medium size firms, while the job insecurity of low-skill non-regular workers in large firms is adversely affected because large firms are more likely to use agency workers, thereby low-skill non-regular manufacturing workers in large workplace are more likely to have the fear of being replaced.

Conclusion

In Japan, it is now widely perceived that job security is becoming a thing of the past for many workers. One factor associated with job insecurity is a growing trend toward non-regular employment, as firms are increasingly relying on flexible staffing arrangement,

²⁸ Houseman (2001) points out another factor: “Larger employers, which generally have more sophisticated human resources departments than small employers, may be better positioned to avail themselves of opportunities presented by the rapidly growing and dynamic temporary help industry. Alternatively, or in addition, temporary agencies may target large employers for business” (p. 165).

including temporary agency workers. Since agency staffing in production line work was legalized in 2004, production sites have been increasingly using agency workers. Using the deregulation as a natural experiment, this study tested the hypothesis that the expansion of non-regular employment contributed to workers' job insecurity. I found that job insecurity of low-skill manufacturing workers significantly increased following the deregulation of temporary staffing services in 2004. The positive and significant results from the difference-in-differences approach are robust to the inclusion of the additional control group in the triple difference approach, which further provides evidence supporting the hypothesis that low-skill manufacturing workers' job insecurity increased as a result of the deregulation. The evidence from this study provides insights into the role temporary staffing agencies potentially play in perceived job insecurity.

One notable finding in this paper is that job insecurity of regular low-skill manufacturing workers was particularly affected by the deregulation, while job insecurity of non-regular workers was not generally affected. Considering that the layoff of regular employees is difficult while that of non-regular workers is not, the finding is somewhat counter-intuitive. One possible explanation is that, if a firm faces more intensive competitive pressure as a result of the deregulation, the firm may choose to downsize and lay off its regular workers, assuming there is no other recourse. Alternatively, a firm may go bankrupt if it chooses not to lay off its regular workers, which may be the case for small firms. In either case, regular workers lose jobs. Whether fearing downsizing layoffs or bankruptcy, as long as regular workers expect to lose their job, the finding is not contradictory to strong job protection for regular employees in Japan. Indeed, many

regular workers have been laid off in the name of restructuring since the 1990s, and one online survey reveals that many regular workers report the fear of job loss.²⁹

The widespread non-regular employment may lead to unintended consequences. The main concern for firms should be a change in worker productivity caused by job insecurity. It has been pointed out that the fear of job loss may lower workers' morale (Bewley, 1999). The resulting decline in morale may take a toll on productivity, and the benefit of the labor market deregulation, which offers firms advantages of lower labor costs and flexibility in hiring and dismissal, might be partially or more than offset by the adverse effect on employee morale and productivity caused by increased fear of being replaced among existing workers.

Finally, the results indicate that policies that encourage firms to hire more non-regular employees may not be welfare enhancing. Although well-being calculation is beyond the scope of this paper, the fear of becoming unemployed in the future has been found to be detrimental to workers' mental and physical well-being in the psychology literature. Job security should be arguably a major goal for policy makers if the government's aim is to improve workers' well-being, and the advantages of flexible workforce must be weighted against well-being loss generated by greater job insecurity among not only non-regular workers but also among regular workers, as this study finds that the expansion of non-regular employment translates into less job security even for regular workers.

²⁹ The survey, which was conducted in 2009 by the website PresidentReuters (<http://president.jp.reuters.com>), asked 1,045 regular workers about their fear of job loss, and more than 10 percent of the respondents answered that they were afraid of the possibility of job loss.

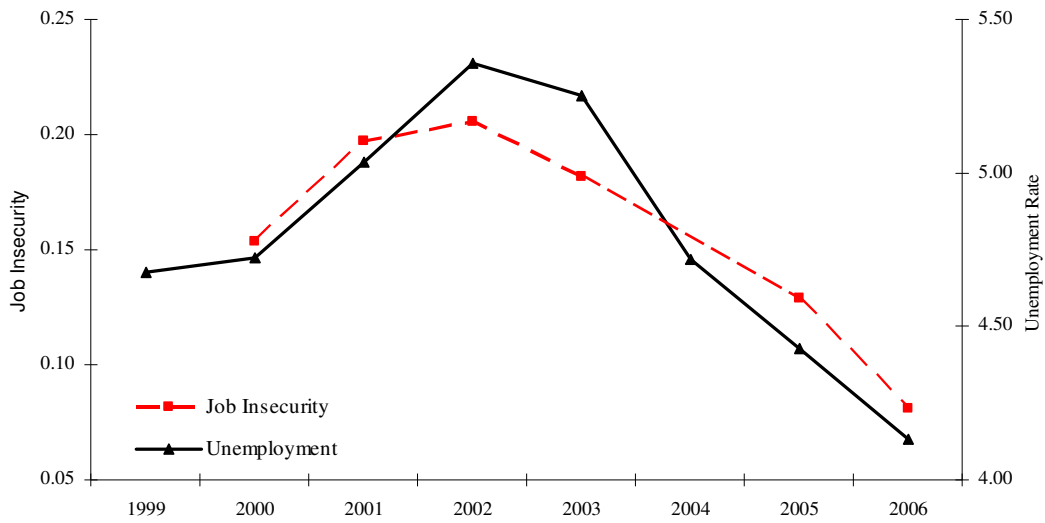
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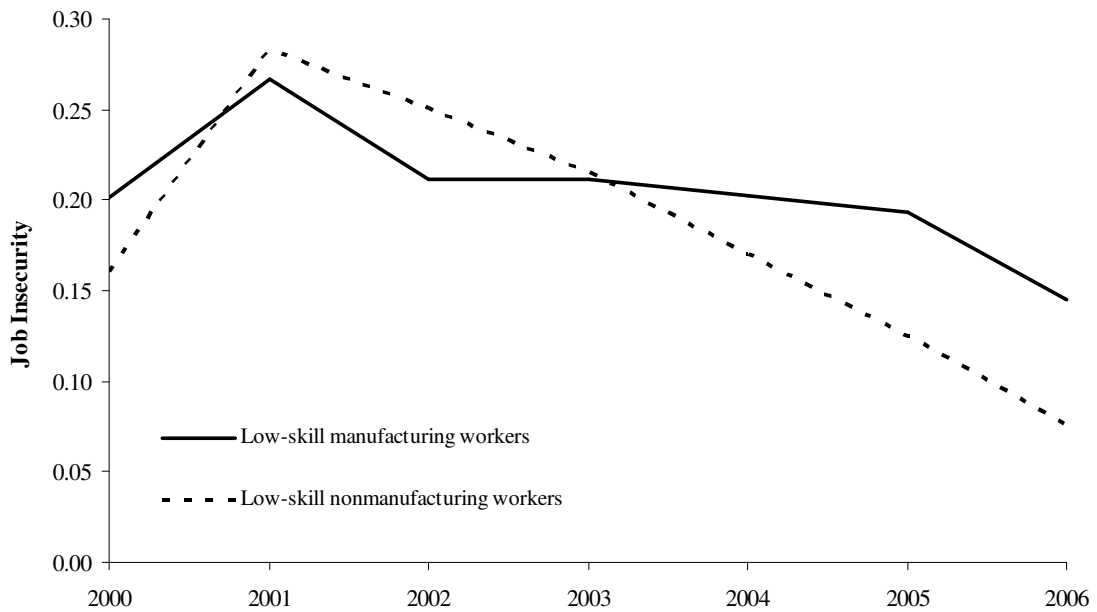
Figures and Tables

Figure 1. National unemployment and percent of workers who believed that they were likely to lose their jobs in the next 12 months



*Note: There are no job insecurity data for 2004.

Figure 2: Job Insecurity of Low-skill Manufacturing and Non-manufacturing Workers



*Note: There are no job insecurity data for 2004.

Table 1. Summary Statistics (2000-2006)

	Low-skill Manufacturing Workers (Treatment Group)	Low-skill Non-Manufacturing Workers (Control Group)	Difference in Means
Job Insecurity: Likely to Lose Job	0.21 (0.40)	0.17 (0.38)	0.03 *
Regular Worker (without managerial position)	0.63 (0.48)	0.54 (0.50)	0.09 ***
Non-Regular Worker (part-time or temporary)	0.37 (0.48)	0.46 (0.50)	-0.09 ***
Wage: Less than 0.7 million	0.07 (0.26)	0.14 (0.35)	-0.07 ***
Wage: 0.7 million-1.5 million	0.32 (0.47)	0.28 (0.45)	0.04 *
Wage: 1.5 million-2.5 million	0.13 (0.34)	0.15 (0.35)	-0.02
Wage: 2.5 million-3.5 million	0.15 (0.36)	0.14 (0.35)	0.01
Wage: 3.5 million-4.5 million	0.10 (0.30)	0.08 (0.28)	0.02
Wage: > 4.5 million	0.12 (0.33)	0.08 (0.27)	0.04 ***
Wage: Unknown	0.09 (0.29)	0.11 (0.32)	-0.02
Union	0.23 (0.42)	0.14 (0.34)	0.10 ***
Tenure	10.49 (9.66)	7.86 (8.85)	2.62 ***
Workhours	39.1 (10.90)	36.4 (15.32)	2.74 ***
Small size firm (<30)	0.16 (0.37)	0.22 (0.41)	-0.06 ***
Medium size firm (30-500)	0.28 (0.45)	0.24 (0.43)	0.04 *
Large size firm (>500)	0.22 (0.41)	0.15 (0.36)	0.07 ***
Firm size unknown	0.34 (0.47)	0.39 (0.49)	-0.05 **
Female	0.53 (0.50)	0.63 (0.48)	-0.10 ***
Age	44.1 (12.20)	43.7 (12.73)	0.42
Married	0.69 (0.46)	0.69 (0.46)	0.00
Divorced or Widowed	0.09 (0.28)	0.08 (0.28)	0.00
High School	0.69 (0.46)	0.78 (0.42)	-0.09 ***
Large City	0.08 (0.27)	0.18 (0.38)	-0.10 ***
City	0.51 (0.50)	0.49 (0.50)	0.02
Town or Village	0.41 (0.49)	0.33 (0.47)	0.08 ***
Difficult to Find a Job	0.59 (0.49)	0.53 (0.50)	0.06 ***
Number of observations	556	2,212	

Standard deviations are in parentheses. Means are unweighted. Asterisks indicate tests of the hypothesis that the means differ between the treatment group and the control groups. * indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$. All the variables are binary except for age and tenure. The sample years do not include 2004, as the survey didn't take place.

Table 2. Job Insecurity Difference-in-Differences Estimates

Treatment Workers: Low-skill Workers	Before 2004	After 2004	Time difference for occupation
Low-skill Manufacturing Workers (Treatment Group)	0.22	0.16	-0.06
	(0.42)	(0.37)	
Number of observations = 556	[383]	[173]	
Low-skill Non-Manufacturing Workers (Control Group)	0.23	0.09	-0.14
	(0.42)	(0.29)	
Number of observations = 2,212	[1,456]	[756]	
Occupation difference at a point in time:	-0.01	0.07	
	Difference-in-Differences:		0.08

Each cell contains the mean for that group, along with standard deviations in () and number of observations in [].

Table 3. Difference-in-Differences Regressions Results

	Low-skill Workers		Regular Low-skill Workers		Non-Regular Low-skill Workers	
	(1)	(2)	(3)	(4)	(5)	(6)
Manufacturing*Post2004	0.095 *** (0.036)	0.078 ** (0.033)	0.097 * (0.050)	0.093 ** (0.047)	0.109 (0.076)	0.041 (0.062)
Manufacturing	0.006 (0.023)	0.002 (0.023)	0.017 (0.048)	0.015 (0.049)	0.012 (0.045)	0.010 (0.046)
Post2004	-0.178 *** (0.024)	-0.119 *** (0.024)	-0.196 *** (0.036)	-0.127 *** (0.032)	-0.129 *** (0.048)	-0.136 *** (0.048)
Non-regular Worker	0.071 *** (0.026)	0.068 ** (0.029)	-	-	-	-
Wage: Less than 0.7 million	(Reference Group)					
Wage: 0.7 million-1.5 million	0.010 (0.027)	0.008 (0.027)	0.058 (0.067)	0.053 (0.075)	-0.020 (0.026)	-0.020 (0.027)
Wage: 1.5 million-2.5 million	0.000 (0.033)	-0.009 (0.033)	-0.001 (0.055)	-0.014 (0.062)	-0.022 (0.069)	-0.038 (0.072)
Wage: 2.5 million-3.5 million	-0.003 (0.031)	-0.007 (0.029)	0.011 (0.050)	0.001 (0.057)	-0.083 (0.101)	-0.078 (0.100)
Wage: 3.5 million-4.5 million	0.026 (0.048)	0.024 (0.048)	0.032 (0.066)	0.027 (0.074)	-0.046 (0.165)	-0.052 (0.166)
Wage: >4.5 million	-0.022 (0.040)	-0.025 (0.040)	-0.038 (0.059)	-0.048 (0.066)	0.021 (0.157)	0.023 (0.170)
Wage: Unknown	0.020 (0.033)	0.021 (0.036)	0.013 (0.051)	0.008 (0.061)	0.005 (0.064)	0.018 (0.072)
Tenure	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)	0.000 (0.002)
Union	-0.037 * (0.021)	-0.035 * (0.021)	-0.058 ** (0.026)	-0.058 ** (0.025)	0.073 (0.078)	0.079 (0.079)
Workhours	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.002 ** (0.001)	0.002 * (0.001)
Small size firm (<30)	(Reference Group)					
Medium size firm (30-500)	-0.007 (0.021)	-0.004 (0.022)	-0.011 (0.032)	-0.005 (0.033)	0.002 (0.035)	0.013 (0.035)
Large size firm (>500)	-0.020 (0.030)	-0.018 (0.031)	0.018 (0.044)	0.028 (0.046)	-0.064 (0.045)	-0.065 (0.047)
Firm size unknown	-0.030 (0.023)	-0.026 (0.023)	-0.046 (0.035)	-0.038 (0.035)	-0.026 (0.038)	-0.020 (0.037)
Female	-0.026 (0.027)	-0.033 (0.026)	-0.008 (0.029)	-0.014 (0.030)	-0.058 (0.056)	-0.076 (0.056)
Age	-0.001 (0.008)	0.000 (0.008)	0.010 (0.007)	0.011 (0.008)	-0.012 (0.015)	-0.010 (0.016)
Age squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
High school	-0.052 ** (0.022)	-0.047 ** (0.023)	-0.033 (0.024)	-0.016 (0.024)	-0.057 (0.036)	-0.065 * (0.035)
Married	-0.011 (0.022)	-0.005 (0.022)	0.012 (0.023)	0.020 (0.023)	-0.026 (0.056)	-0.033 (0.058)
Divorced or Widowed	0.001 (0.037)	0.015 (0.038)	0.035 (0.046)	0.047 (0.049)	-0.050 (0.055)	-0.044 (0.060)
Large city	0.031 (0.035)	0.022 (0.036)	0.060 (0.050)	0.047 (0.048)	-0.012 (0.049)	-0.011 (0.049)
City	0.007 (0.021)	0.011 (0.020)	0.001 (0.027)	0.007 (0.026)	0.014 (0.029)	0.022 (0.030)
Difficult to find a job	0.066 *** (0.015)	0.064 *** (0.013)	0.061 *** (0.019)	0.061 *** (0.018)	0.057 ** (0.025)	0.050 * (0.026)
Workers hired after 2004 excluded	No	Yes	No	Yes	No	Yes
R-squared	0.088	0.089	0.105	0.110	0.142	0.150
Number of observations	2,768	2,646	1,538	1,482	1,230	1,164

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the regional industry level are shown in parentheses. Prefecture, year and industry dummies are included. In all estimations, JGSS-provided sampling weight is used.

Table 4. Job Insecurity Difference-in-Differences and DDD Estimates

	Before 2004	After 2004	Time difference for occupation
High-skill Workers			
High-skill Manufacturing Workers	0.17 (0.37)	0.00 (0.00)	-0.17
Number of observations = 197	[159]	[38]	
High-skill Non-Manufacturing Workers	0.18 (0.38)	0.12 (0.32)	-0.06
Number of observations = 2,097	[1572]	[525]	
Occupation difference at a point in time:	-0.01	-0.12	
Difference-in-Differences for High-skill Workers:			-0.11
Difference-in-Differences for Low-skill Workers (from Table 2):			0.08
DDD:			0.19

Each cell contains the mean for that group, along with standard deviations in () and number of observations in []. DDD is the raw difference-in-differences estimate for low-skill workers (from Table 2) minus the raw difference-in-differences estimate for high-skill workers.

Table 5. Triple-Differences Regressions Results

	All Workers		Regular Workers		Non-Regular Workers	
	(1)	(2)	(3)	(4)	(5)	(6)
Manufacturing*Low-skill*Post2004 (β_8)	0.209 *** (0.039)	0.190 *** (0.039)	0.243 *** (0.048)	0.244 *** (0.051)	0.064 (0.089)	-0.056 (0.085)
Manufacturing*Post2004 (β_5)	-0.116 *** (0.031)	-0.117 *** (0.033)	-0.148 *** (0.035)	-0.155 *** (0.036)	0.017 (0.072)	0.068 (0.076)
Low-skill*Post2004 (β_6)	-0.063 *** (0.024)	-0.068 *** (0.026)	-0.091 *** (0.028)	-0.103 *** (0.030)	0.044 (0.042)	0.057 (0.047)
Manufacturing*Low-skill (β_7)	0.005 (0.026)	0.006 (0.026)	-0.018 (0.029)	-0.017 (0.029)	0.098 ** (0.045)	0.101 ** (0.046)
Manufacturing (β_2)	0.009 (0.026)	0.003 (0.027)	0.036 (0.026)	0.031 (0.026)	-0.085 ** (0.034)	-0.088 ** (0.037)
Low-skill (β_3)	0.037 * (0.019)	0.035 * (0.020)	0.039 * (0.020)	0.036 * (0.021)	0.028 (0.037)	0.029 (0.038)
Post2004 (β_4)	-0.063 *** (0.021)	-0.063 *** (0.021)	-0.040 (0.026)	-0.033 (0.024)	-0.188 *** (0.036)	-0.213 *** (0.043)
Non-regular Worker	0.075 *** (0.020)	0.071 *** (0.022)	-	-	-	-
Workers hired after 2004 excluded	No	Yes	No	Yes	No	Yes
R-squared	0.058	0.060	0.065	0.070	0.106	0.109
Number of observations	5,041	4,827	3,136	3,017	1,905	1,810

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the regional industry level are shown in parentheses. Prefecture, year and industry dummies are included. Control variables are characteristics used in Table 3, plus managerial position. In all estimations, JGSS-provided sampling weights is used.

Table 6. Difference-in-Differences Regressions Results: Firm size interactions

	Low-skill Workers		Regular		Non-Regular	
	Low-skill Workers		Low-skill Workers		Low-skill Workers	
	(1)	(2)	(3)	(4)	(5)	(6)
Manufacturing*Post2004*Small firm	0.068 (0.060)	0.035 (0.039)	0.093 (0.075)	0.079 (0.065)	0.005 (0.110)	-0.101 (0.095)
Manufacturing*Post2004*Medium firm	0.135 *** (0.051)	0.120 ** (0.051)	0.175 ** (0.075)	0.172 ** (0.068)	-0.022 (0.116)	-0.106 (0.094)
Manufacturing*Post2004*Large firm	0.045 (0.051)	0.021 (0.032)	-0.024 (0.048)	-0.021 (0.047)	0.265 ** (0.117)	0.133 (0.105)
Workers hired after 2004 excluded	No	Yes	No	Yes	No	Yes
R-squared	0.103	0.109	0.122	0.132	0.233	0.263
Number of observations	1,718	1,612	1,063	1,010	655	602

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the regional industry level are shown in parentheses. Prefecture, year and industry dummies are included. Control variables are characteristics used in Table 3. In all estimations, JGSS-provided sampling weight is used.

Table 7. Triple-Differences Regressions Results: Firm size interactions

	All Workers		Regular Workers		Non-Regular Workers	
	All Workers		Regular Workers		Non-Regular Workers	
	(1)	(2)	(3)	(4)	(5)	(6)
DDD*Small firm	0.048 (0.056)	0.003 (0.029)	0.046 (0.064)	0.013 (0.042)	0.086 (0.086)	0.001 (0.085)
DDD*Medium firm	0.126 *** (0.040)	0.105 *** (0.039)	0.132 ** (0.055)	0.118 ** (0.048)	0.085 (0.108)	0.017 (0.093)
DDD*Large firm	0.028 (0.050)	0.008 (0.028)	-0.043 (0.042)	-0.034 (0.041)	0.340 *** (0.125)	0.217 * (0.122)
Workers hired after 2004 excluded	No	Yes	No	Yes	No	Yes
R-squared	0.067	0.071	0.068	0.075	0.180	0.195
Number of observations	3,148	2,964	2,133	2,024	1,015	940

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the regional industry level are shown in parentheses. Prefecture, year and industry dummies are included. Control variables are characteristics used in Table 5. In all estimations, JGSS-provided sampling weight is used.

Chapter 2: Does Social Trust Increase Individual Happiness in Japan?

Abstract

Economists are mainly interested in trust as being growth enhancing, but whether trust is well-being enhancing is underexplored. This paper examines whether trust is valuable intrinsically by using individual happiness data from Japan. I attempt to mitigate the problem of nonrandom selection of residents by restricting the sample to nonmovers. I also address reverse causality by instrumenting trust with residential stability as trust should be higher for a more stable community. I find that trust has positive and significant effects on individual happiness. The instrumental variables approach suggests that social trust has a causal effect on individual happiness.

Introduction

Social trust, the belief that others around you can be trusted and the core component of social capital, is considered to lead to faster financial development and economic growth by reducing transaction costs and facilitating investment, and economists have attempted to identify the effect of trust on economic outcomes (Knack and Keefer, 1997; La Porta et al., 1997; Beugelsdijk et al., 2004). Both economic theory and experiments suggest that trust affects cooperative behavior and lead to better outcomes.¹ Even though there are criticisms of the validity of these findings on effects of social trust or social capital,² the

¹ See La Porta et al. (1997) for an overview of the existing theory of trust.

² For a critical discussion of the concept of social capital, see Durlauf (1999, 2002).

concept of social capital has received considerable publicity, and there is a widespread interest in social trust and other indicators of social capital among social scientists and policymakers.

Among measures of social capital, trust is of particular importance for economists. Economists are mainly interested in trust as being growth enhancing, but whether trust is well-being enhancing is underexplored. Does social trust have beneficial effects on one's well-being by making aspects of life more enjoyable? If so, social trust is good not only because it leads to more successful economic outcomes but also because it is valuable intrinsically. Uslaner (1999) argues that social trust plays an important role in creating a vibrant community, as trust promotes civic participation. Trust also may encourage altruistic behavior if it promotes the expectation that altruistic actions will be reciprocated by others in future. The goal of this paper is to investigate whether social trust increases well-being by using subjective happiness data.

Several recent studies have examined the effect of social trust on well-being. Cross-country studies have produced mixed results. Bjørnskov (2003, 2006) and Helliwell (2006) find that social trust is significantly and positively associated with national subjective well-being, while Ram (2009) finds the effect of social trust generally insignificant. Helliwell (2003), using the large international sample of individual-level well-being data, finds that national social trust increases individual life satisfaction. However, because well-being and social trust across countries are affected by the omitted variable problems due to differences in institutional and cultural factors, of particular interest is the multilevel studies which exploit within-country variation in trust to identify

its effects on individual well-being. Helliwell and Putnam (2005) demonstrate that social trust is significantly associated with micro level subjective well-being for the United States but not for Canada.

Social trust is a property of groups and is typically measured by aggregating individual responses to a question about interpersonal trust, but one issue is that trust measured at a certain geographically defined area would be noisy for racially mixed areas. Alesina and La Ferrara (2002) find that, in the United States, minority groups, blacks in particular, trust others less, and social trust tends to be lower (higher) in racially and ethnically fragmented (homogeneous) states. Thus, linking well-being of, for example, blacks living in a black community in a state whose population is mostly white with state level social trust may be problematic, because the trust measure represents that of the white population. In order to alleviate worries about the measurement problem in earlier micro-level studies, I use Japan, a country that, because of its ethnically homogenous population, provides a good case study. In Japan, as of 2008, approximately 1.7 percent of the population was foreign origin. Thus, the measurement problem associated with racial diversity is minimized for the present study.

There are two methodological problems when considering the effect of social trust on well-being: (i) nonrandom distribution of movers (omitted individual characteristics affect both the decision to move and self-reported happiness) and (ii) reverse causality (happiness makes people trust more). To tackle these problems, I (i) restrict the sample to people who did not move to other prefectures and (ii) use an instrumental variables strategy. I use the change in the fraction of residents who were

living in the same prefecture five years before the census years as an instrument for trust. The logic is that residential stability should be correlated with the level of trust because migration reduces the number of interaction among residents and makes trust harder to develop, as people who have not known others for long enough are less likely to trust others. Therefore, in the aggregate, the average length of tenure in a community should increase social trust, and residential stability should be uncorrelated with well-being except through social trust and other variables that are included in the equation explaining well-being. Addressing the endogeneity problem represents important contributions to this line of research.

Japan consists of 47 prefectures, and this paper exploits prefecture-level variations in social trust to examine its effect on subjective well-being. This means that person specific or area specific fixed effects cannot be included, but cross sectional studies are more or less suitable for the analysis of social capital. It is inconceivable that social trust varies substantially over short period of time, and since fixed effects absorb all factors that do not change over time and prevent scrutiny of time invariant factors, identifying the effect of social trust would be difficult with fixed effects. For this reason, many studies on trust and social capital are cross-sectional.

As a proxy indicator of well-being, I use survey answers about “happiness” to examine the link between well-being and social capital.³ Happiness surveys have been

³ Life satisfaction is often used as a measure of well-being, and, not surprisingly, answers to happiness and life satisfaction questions are closely correlated (Graham, 2009), but Deaton (2008) argues that they are not necessarily synonyms.

studied intensively by research psychologists but often ignored by economists.⁴ Even though psychologists find that subjective happiness is correlated with (1) stress-induced physical responses such as heart rate and blood pressures, (2) duration of smiles, (3) subject recall of positive versus negative life events, and (4) assessment of the person's happiness by his or her friends, family members, and spouse (see Konow and Earley, 2008),⁵ many economists are wary of using subjective questions such as "How happy are you?" because of justifiable concerns. For example, the exact meaning of "happiness" may be different for each respondent. Scale comparability is another issue, as one person's "very happy" may be higher, lower, or equal to another person's "pretty happy". Also, Bertrand and Mullainathan (2001) report that ordering and wording of questions can affect answers respondents give.⁶ Even among economists who accept the usefulness of subjective questions, many disagree with the claim that happiness is more or less the same thing as utility, which is the dominant explicit or implicit hypothesis in the existing literature on happiness. For example, Kimball and Willis (2006) argue that happiness is not a proxy of utility but one of the arguments of the utility function.

⁴ As Blanchflower and Oswald (2004) put it, "[m]ost economists... are probably unaware that data of this sort are available, and have not thought of whether empirical measures approximating the theoretical construct 'utility' might be useful in their discipline" (p. 1360).

⁵ Furthermore, empirical studies find a negative association between suicide and subjective well-being at the national level (Helliwell, 2006) and the individual level (Koivumaa-Honkanen et al., 2001).

⁶ Specifically, "... respondents were asked two happiness questions: "How happy are you with life in general?" and "How often do you normally go out on a date?" When the dating question came first, the answers to both were highly correlated, but when it came second, they were basically uncorrelated. Apparently, the dating question induced people to focus on one aspect of their life, and aspect that had undue effects on their subsequent answer" (p. 67).

Despite these potential problems mentioned above, a growing recent literature in economics successfully uses subjective survey data.⁷ These studies include the examination of the relationship between subjective well-being and unemployment (Clark and Oswald, 1994; Winklemann and Winklemann, 1998), absolute and relative income (Clark and Oswald, 1996; Easterlin, 2001; Deaton, 2008), inflation (Di Tella et al., 2001), social inequality (Alesina et al., 2004), and political institution (Frey and Stutzer, 2000). The role of social capital has been relatively underexplored within the happiness economics literature (Dolan et al., 2008). Other research by economists on happiness in Japan includes Tsutsui et al. (2010), Yamane et al. (2008) and Oshio and Kobayashi (2010).

Controlling for observable individual characteristics and socioeconomic variables of areas, I find that higher levels of social trust are associated with higher levels of happiness. The instrumental variables approach suggests that causality appears to run from social trust to happiness. Furthermore, additional tests suggest heterogeneous effects of social trust, and trustworthy environments do not necessarily benefit everyone. Specifically, nontrusting individuals do not benefit from living in high-trust areas.

Data

Social Trust and Social Capital Data

Social trust is a major component of social capital, which political scientist Robert Putnam (2000) defines as “connections among individuals – social networks and the

⁷ See Frey and Stutzer (2001) and Dolan et al. (2008) for overviews of the economics of happiness.

norms of reciprocity and trustworthiness that arise from them” (p. 19). Even though social capital is somewhat an elusive concept and sometimes has different definitions across studies (Durlauf, 2002), Lochner et al. (1999) state “there is enough consensus to draw some important generalizations about the nature of social capital. The most important of these is that social capital is a collective dimension of society external to the individual” (p. 260). Social capital is thus a property of groups and a contextual feature of community, which refers to the existence and strength of social ties. The most common measures of social capital used in the literature are social trust and aggregate nonprofessional membership in organizations evaluated at some high level of aggregation such as state, regional, or country-level.

The social trust variable for each prefecture is constructed from the Japanese General Social Surveys (JGSS). This survey is a repeated cross-section that was administered from 2000 to 2006 (except for 2004) and contains a wide range of demographic, work, and attitudinal questions.⁸ In this survey, individuals are asked a question about their view on trust in people. The social trust variable is defined as the percentage of people responding “yes” to the question. In order to reduce omitted variable bias, I include other indicators of social capital, which might be correlated with social trust and happiness. In addition to aggregate membership commonly used in the literature, I include two more measures of social capital: blood donation and voter

⁸ The JGSS’s subject population consists of men and women aged between 20 and 89, and subjects are selected using a stratified 2-stage sampling method. Specifically, the stratification divides Japan into the six blocks; each block is then further subdivided into the three (four in 2006) groups of largest cities, other cities, and towns/villages according to the size of the cities and districts in each block. Survey locations were sampled from each stratum, and from each survey location 12-15 individuals aged between 20 and 89 were randomly selected.

participation.⁹ Appendix reports summary statistics for social trust as well as other measures of social capital used in the present paper.

Happiness and Personal Characteristics Data

I use the JGSS to test for the presence of social trust effects on happiness, and my empirical analysis of the determinants of individual subjective happiness is based on the response to the question “Degree of Happiness” which is given on an ordinal scale from 1 (very unhappy) to 5 (very happy).¹⁰ The JGSS consists of ~18,000 individuals, but the sample is reduced to 14,538 individuals after eliminating observations for missing values. Table 1 shows the distribution of reported happiness levels for the sample of 14,538 individuals. It appears that a significant proportion of those interviewed in the JGSS are happy. Almost 30 percent of the sample reported the highest level of happiness. More than 90 percent of the sample reported the happiness level of 3 or above. The lowest level of happiness is reported by only 1.3 percent of the sample.

Table 2 shows levels of happiness for different groups in the sample. There are eleven household income categories, but about one third of the respondents did not reveal their income levels. Self-reported health is measured on a five-point scale, with 1 representing very poor health and 5 being very good health. The data demonstrates that men are less happy than women on average. The level of happiness increases with income (except for one stratum), self-reported health, and education. Married people are

⁹ They are used as social capital measures by Guiso et al. (2004) and Buonanno et al. (2009) because they are likely to be driven by civic and altruistic norms, not by economic or legal incentives.

¹⁰ The variables were originally ordered from 1 signifying “very happy” to 5 signifying “very unhappy” but have been reordered so that a higher value corresponds to a higher level of happiness.

happier than divorced people, and divorced people are happier than people who have never been married. Children also seem to give happiness. The age category 40-59 reported the lowest level of happiness. Not surprisingly, the unemployed are considerably less happy than the employed and people who are out of the labor force. There is no sizable difference in mean happiness between homeowners and renters or between the three categories of municipality of residence. Trusting individuals are happier on average than those who said “No” or “Depends” to the question about social trust, and members of associations are happier than those who don’t belong to any associations. These correlations in the raw data reveal that people who increase the level of social capital in the area are happier on average.

Social Trust and Happiness

I estimate standard happiness equations with a full set of controls. The dependent variable is an ordered variable which takes value from 1 to 5, where 5 is the highest possible level of subjective happiness. Since happiness is measured on an ordinal scale and discontinuous, I run an ordered logit regression. My estimating equation is:

$$Happiness_i = X_i\gamma + SOCIAL_TRUST_{p(i)}\beta + Z_{p(i)}\delta + TRUST_i\lambda + \varepsilon_i$$

Let $p(i)$ denotes the prefecture of residence of person i . X_i is a set of person specific controls. $SOCIAL_TRUST_{p(i)}$ denotes social trust in prefecture $p(i)$. $Z_{p(i)}$ denotes a vector of prefecture-specific controls. All personal characteristics variables except age and the

number of children are entered as dummy variables. $TRUST_i$ is a dummy for individual's own assessment of trustworthiness of others. The rationale for controlling for the individuals' own trust level is that, if unobserved characteristics of the area in which the individual lives make people happy and more likely to trust, then controlling for his likelihood of trusting may mitigate the omitted variable problem caused by those unobservables correlated with happiness and social trust.

In estimating the equation above, the major problem is that social trust and happiness are endogenous. Residents are not randomly distributed due to migration across prefectures. On one hand, selection of people with unobservables that make them happy into areas with high level of social trust will overestimate the positive effect of social trust on happiness. Given that happiness is positively correlated with trust at the individual level, happy people may prefer to live in proximity to people who are similarly trustworthy. On the other hand, people who are happier by nature might be better able to deal with the low trust level in the area and choose to stay in the area, while unhappy individuals decide to leave the area. If happy individuals tend to stay in low-trust areas, or unhappy individuals tend to move to high-trust areas, or both, the positive effect of social trust on happiness will be underestimated. Thus, the direction of bias due to nonrandom selection of people into areas is not clear.

To reduce the possibility that the results are driven by omitted individual characteristics that affect both the decision to move and self-reported happiness, I exclude "movers" from the analysis. The JGSS contains the question for the residence of prefecture at the age 15 (which is likely to be exogenous to the respondents), and I

include only those who reside in the same prefecture as they did when they were 15. Even though movers include those who moved for reasons that had nothing to do with the level of social trust in the area, I will remove some “nonrandom” component of the sample and thus reduce the possibility that the results are driven by selection of people who are intrinsically happy (or unhappy) into low-trust areas. Also, excluding movers removes a group of people whose happiness are affected by the social trust of the childhood environment in the place where he grew up and does not currently live.

In addition to the nonrandom selection of people into areas described in the preceding paragraph, reverse causation may be present. Even though we may find a positive relationship between social trust and happiness, it may reflect the effect of happiness on social trust rather than the other way around. Do trustworthy environments make people happy, or happy people create high-trust environments? One’s positive outlook on life or positive world view could encourage her to trust others and thus contribute to the formation of social trust. Then, since individual trust is used to calculate social trust, happiness and social trust may be positively correlated even if social trust has no causal effect on happiness (and even if individual trust is controlled for). When reverse causality is present, it becomes necessary to use an instrumental variables approach. I instrument social trust with the change in the fraction of people who were living in the same prefecture five years before each census year, 1990 and 2000.¹¹ The choice of instrument is motivated by the theory of what determines trust. People are likely to trust others they have known for “long enough” through repeated interactions

¹¹ Data is obtained from *Portal Site of Official Statistics of Japan*, <www.e-stat.go.jp>.

and, *ceteris paribus*, social trust should be higher for a community that is more stable and less transient. Furthermore, the higher propensity of leaving the area means the lower possibility of expected future interaction, which makes retaliation (reputational or local sanctions) less viable. This makes “defecting” more attractive and “cooperating” a losing strategy in the area where mobility is high, and consequently, establishing trust is more difficult. Consistent with this hypothesis, Alesina and La Ferrara (2002) find that individuals’ inclination to trust increases with the stability of the community in which they live.

Ideally, the instrument does not exert any direct effect on individual happiness besides the indirect effect through trust once the other determinants of happiness are controlled, but there remains concern that the residential stability may be correlated with other local unobservable characteristics that influence happiness. Furthermore, the residential stability may not be truly exogenous to trust as there may be mutual causation between trust and the residential stability, though I argue that this is not very likely. Across-prefecture variation in migration should be driven largely by differences in economic conditions, not in social trust, and the period between the two census years, 1990 and 2000, in which the residential stability was measured, is the period of the decade-long recession.¹² The influence of economic conditions on migration is likely to be greater during recessions (and expansions), so the effect of trust on the residential stability should not be large. Even though there are certainly issues with this instrument,

¹² The period 1991-2000 is known as “The Lost Decade,” during which the Japanese economy remained stagnant after the asset price bubble’s collapse. The governmental survey shows that, among people who moved to other prefectures during the period 1997-2001, 16.2 percent moved due to “other reasons,” which excludes job, school, and family-related reasons.

the potential shortcomings of these instruments are not discussed in detail here because the IV approaches are not the main focus of this paper; rather, the IV estimates can be used to check the robustness of the results found using ordered logits.

Results

Results from Ordered Logit Regressions

Table 3 shows the results of the first set of ordered logits, the standard microeconomic happiness function with prefectural level control variables. Because prefecture social trust does not vary for individuals within a prefecture, and to account for random disturbances which are potentially correlated within the same prefecture, standard errors are clustered at the prefecture level. Prefecture level controls include income per household, unemployment rate, inflation, the Gini coefficient, crime rate, the fraction of college graduates, the fraction of young (<15) and old (>65) people, and population density. All prefecture level variables are pooled and averaged from yearly data obtained from *Portal Site of Official Statistics of Japan*. As a rough approximation for the effect of fixed geographic factors on happiness, regional dummies are included.¹³ Year dummies are included as well to control for any differences between the populations surveyed in different years.

The first column shows the result of ordered logits for the whole sample when one's own trust perception is excluded. The coefficient on social trust is highly

¹³ The regions of Japan, though not official administrative units, have been used as the regional division of Japan in a number of contexts. Here areas are divided into the following seven regions: Hokkaido/Tohoku, Kanto, Chubu, Kansai, Chugoku, Shikoku, and Kyushu/Okinawa.

significant and positive. In the second column, individual differences in trust assessments and memberships are taken into account. Individual membership is included because members may tend to trust those only inside networks and distrust those outside networks; then membership may proxy for unobservables correlated with trust and happiness. In the second column, however, the coefficient on social trust shows virtually no change; social trust remains significant. While estimated coefficients from an ordered logits are not readily interpretable, social trust is significant at the 1 percent level. Individuals appear to be happier in a high-trust society. In the third and fourth columns, when the sample is restricted to nonmovers, trust still remains significant at the 1 percent level. Again, controlling for the individual's own trust and membership does not change the results. As for other social capital measures, blood donation is always significantly positive while membership and voter turnout have little effect.¹⁴

Turning to the individual characteristics, most coefficients on the individual characteristics remain very stable across different specifications. The individual's own trust and memberships are significantly associated with happiness. Those who trust others and those who belong to organizations are happier. Men are less content than women, and the age coefficients suggest well-being is U-shaped in years, as often found in the happiness literature (Clark and Oswald, 1996; Blanchflower and Oswald, 2004),

¹⁴ This insignificant effect of aggregate membership is consistent with Helliwell and Putnam (2005), who find that the individual own participation, not community level participation, increases his happiness. This is also consistent with the national level study by Bjørnskov (2006), who demonstrates that only social trust matters to national well-being. It appears that, for individual happiness, trust and membership are not measuring the same underlying concept.

suggesting that happiness is lowest for people aged around 55 on average.¹⁵ The lowest two income categories have statistically indistinguishable effects on happiness, but money seems to buy greater happiness.

Among the statistically significant non-financial variables, not unexpectedly, healthy people are happier. Married people are happier than divorced people, and, divorced people are happier than those who have never been married. More educated individuals are happier, even after controlling for income, suggesting that education is playing a role independently of income.¹⁶ Consistent with the literature, being unemployed is associated with unhappiness in all specifications.

Of course, the coefficients on the personal characteristics are not meant to capture the causal effect. Even though it is likely that, for example, health is an important and independent determinant of happiness, the causation can run in both directions as it may be that happier people are more likely to be healthier. Similarly, it may be that happier people are more likely to be married, earn more, and be socially active. But I am not interested in precisely establishing causality here for empirical determinants of happiness from personal characteristics.¹⁷ In sum, the coefficients of most personal characteristics

¹⁵ For most OECD countries and the US, the minimum point is typically in the early 40s.

¹⁶ This is consistent with Blanchflower and Oswald (2004) but different from Clark and Oswald (1996) and Clark (2003), who find the higher level of education reduces happiness possibly because of education raises aspirations.

¹⁷ However, readers might be interested to know that a longitudinal study on well-being suggests that marriage and self-reported health effects are still significantly positive even after personal fixed effects are included (Winkelmann and Winkelmann, 1998). Also, it has been found that lottery and inheritance improve mental well-being in the following year in Britain (Gardener and Oswald, 2001), implying that, unsurprisingly, money has a causal effect on happiness. Frijters et al. (2004), by using German reunification as a natural experiment, also find life satisfaction increased with the increased income. Of

are consistent with expectation as well as the exiting literature and give us some confidence in the significance of using the happiness data from Japan.¹⁸

Results from 2SLS

The results above have shown a statistically significant correlation between happiness and social trust, but to gain some confidence on the causal nature of this association, social trust is instrumented with the residential stability. The instrument has the expected sign and performs very well in the first stage (the coefficient on residential stability is significant at the 1 %, and the F-value of the joint significance is significant at the 10 %).¹⁹

Table 4 presents the results when trust is instrumented with residential stability. For a comparison, the coefficients for social trust from noninstrumented ordinary least-squares are shown. Column (2) and (4) show that the coefficients on instrumented trust are statistically significant at the 5 percent level both for the whole sample and for nonmovers. In both cases, IV estimates are higher than those of OLS. Using the preferred estimate from column (4), if a person is exogenously moved from an “average-trust” prefecture to the prefecture with the highest trust level (8.6 percentage point increase in trust), his happiness will increase by 0.16 in a 5-point scale. An increase in one standard

course, some of the positive association between income and well-being is likely to be still due to reverse causation, as found in Graham et al. (2004).

¹⁸ Yamane et al. (2008) use a different Japanese dataset, in which respondents answer the happiness question on a ten-point scale. Their ordered probit regressions show similar patterns in terms of statistical significance of determinants of happiness. For example, they find that happiness increases with education, income and self-reported health, and females and the married are happier than their counterparts.

¹⁹ The covariates included in the first stage regression are other social capital measures and the prefecture socioeconomic variables included in the second stage. The result is available from the author on request.

deviation in social trust will increase his happiness by 0.06. In summary, the statistically positive relationship between social trust and happiness found using the ordered logits survives when social trust is instrumented, suggesting that social trust has a causal effect on individual happiness.

It is interesting to note that, for both OLS and 2SLS, the trust coefficients are larger when the sample is restricted to nonmovers. This is suggestive evidence that happy individuals are less likely to leave low-trust areas because happy individuals are better to deal with the low trust level in the area. If unhappy individuals tend to leave low-trust areas and move to high-trust areas, then the positive relationship between social trust and happiness should weaken, making the social trust coefficients smaller when movers are included in the analysis.

Heterogeneous Effects

I now turn to the question of whether living in an area with more trusting residents makes everyone happy, whether or not he or she is a trusting person, in other words, whether social trust has heterogeneous effects on well-being, which has been overlooked in the literature. Here rather than assuming the common effect found in the previous section, I use the split-sample approach; I partition the sample across one's own trust perception (trusting, nontrusting, and trust-neutral). To focus on heterogeneous effects, I only show the coefficients of social trust for these subgroups. Also, even though there are interesting differences in the coefficients on personal characteristics between subgroups, they are not

the focus of the present study and thus not shown here. The sample is restricted to nonmovers to alleviate the problem of nonrandom distribution of movers.

Table 5 shows the effect of social trust across different groups. Social trust is significantly positive for trusting and trust-neutral people in the ordered logits and OLS, while it is significant only for trust-neutral people in the 2SLS. Nontrusting individuals are not affected by social trust at all, and in the 2SLS, the coefficient of social trust, though statistically insignificant, even has a negative sign. This indicates that there are positive externalities on trust-neutral people who answered that whether they can trust others “depends” (because they benefit from social trust even though they are not trusting individuals themselves) but not on nontrusting people. The finding that nontrusting individuals do not benefit from living in high-trust areas is suggestive evidence that social trust is not uniformly beneficial, as implied by Subramanian et al. (2002), who find that a higher level of trust in a community has negative effects on the self-reported health of low-trust individuals.²⁰ Somewhat surprisingly, social trust may not benefit trusting individuals as the insignificant IV estimate for trusting individuals indicates. Because the social trust variable is significantly positive in the ordered logits and OLS but not in the 2SLS for trusting individuals, reverse causality may be present. However, given the statistically significant IV estimate for trust-neutral people, the author speculates that it is more likely that trusting individuals are inherently different from others (for example, they may be more adaptable to high- or low-trust environments), but it is beyond the scope of this paper to explore this issue.

²⁰ They infer that low-trust individuals may “feel ostracized, alienated, or put upon as a result of residing in communities in which others feel and act opposite” (p. 31).

In summary, the well-being enhancing effect of social trust is significantly positive for trust-neutral individuals in all specifications, while nontrusting individuals do not benefit from living in high-trust areas. This finding does not support Helliwell's (2006) claim that "[w]hatever their personality type, [people] value trust in their neighborhoods" (p. 43), as the results here indicate that trustworthy environments do not necessarily benefit everyone. These heterogeneous effects of social trust are intriguing, but appropriate caution must be exercised. We must keep in mind that people are not randomly choosing to trust and may change their perception of trustworthiness of others depending on their current economic or social situations. Understanding the reasons for this heterogeneity effect of social trust will be a task in the future research.

Conclusion

The present study tests the hypothesis that social trust is valuable intrinsically by examining the effects of social trust on self-reported happiness. Even after controlling for a number of variables that have been identified by the previous happiness studies as important correlates of subjective well-being, I find social trust has positive effects on happiness, indicating that social trust can enhance human welfare through direct, intrinsically valuable effects. In this paper I attempt to address the potential endogeneity by using the residential stability as the instrument for social trust. The instrumental variable strategy suggests that the relationship between trust and happiness is likely to be causal. I also examine whether social trust affects happiness differently among trusting, nontrusting, and trust-neutral individuals. I find that nontrusting individuals do not

benefit from living in high-trust areas while trust-neutral individuals benefit from social trust in their area of residence. The effect of social trust seems to depend on the beliefs that people hold about trustworthiness of others.

One important question is whether these results are generalizable. Do the results extend beyond one country? Yamagishi (1988) asserts that Japanese society provides a system of mutual monitoring that increases the level of trust behavior. If the formation of trust in Japan is greatly affected by this cultural factor, which may be correlated with happiness, then the results found in the present paper may not apply to other countries. More research based on micro data from other countries is necessary in order to conclude firmly that social trust is valuable intrinsically.

Appendix. Summary Statistics for Social Trust and Social Capital Measures

Variable Name	Definition	Source	Mean	Std Dev	Min	Max
Trust	% responding yes to "View on Trust on People"	The Japanese General Social Survey, 2000, 2001, 2002, 2003, 2005, 2006 pooled	16.4	2.9	10.5	25.0
Membership	% of belonging to political, religious, sports, or hobby organization(s)	The Japanese General Social Survey, 2000, 2001, 2002, 2003, 2005, and 2006 pooled	27.8	4.5	13.6	37.5
Blood Donation	% population who donated blood	Japanese Red Cross Society, 2003-2007 averaged	4.3	0.5	3.3	5.5
Voter Turnout	% of eligible voters who cast a ballot in an election	The Ministry of Internal Affairs and Communications, 2001, 2003, and 2005 averaged	65.0	3.9	58.7	74.6

Japanese Red Cross Society website. <http://www.jrc.or.jp/blood/index.html>

The Ministry of Internal Affairs and Communications. http://www.soumu.go.jp/senkyo/senkyo_s/data

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Tables

Table 1. Happiness in Japan: 2000,2001, 2002, 2003, 2005, and 2006

Happiness	Number of Individuals	Percentage
5 (highest)	4,279	29.4
4	4,739	32.6
3	4,560	31.4
2	774	5.3
1 (lowest)	186	1.3
	<hr/> 14,538	<hr/> 100.0

Table 2. Mean Reported Happiness

	Number of Individuals	Mean
Overall	14,538	3.84
Male	6,686	3.77
Female	7,852	3.89
Age:		
20-39	3,865	3.85
40-59	5,430	3.80
60 over	5,243	3.86
Self-Rated Health:		
5 (good)	3,473	4.25
4	3,526	3.95
3	4,588	3.68
2	2,263	3.50
1 (poor)	688	3.30
Income Level:		
0-1.5 million	873	3.49
1.5 million-2.5million	781	3.63
2.5 million-3.5 million	1,148	3.79
3.5 million-4.5 million	1,157	3.83
4.5 million-5.5 million	1,023	3.85
5.5 million-6.5 million	817	3.84
6.5 million-7.5 million	750	3.90
7.5 million-8.5 million	748	3.92
8.5 million-10million	854	3.99
Over 10 million	1,509	4.11
Unknown or Do not want to tell	4,878	3.81
Marital Status:		
Married	10,694	3.93
Divorced or Widow	1,694	3.67
Never Married	2,150	3.49
Number of Children:		
0	3,113	3.62
1	1,980	3.90
2	6,028	3.88
more than 2	3,417	3.92
Education:		
Graduate School	150	4.01
4-Year University	2,101	3.92
2-Year College	1,867	3.93
High School	5,712	3.80
Other Education	4,708	3.79
Work Status:		
Working	8,867	3.83
Unemployed	280	3.19
Retired	1,280	3.82
Not Working for other reasons	4,111	3.90
Type of Residence:		
Homeowner	8,408	3.85
Renter	6,130	3.82
Municipality of Residence:		
Large City	2,734	3.85
City	7,804	3.84
Town or Village	4,000	3.83
Organization Membership:		
Membership of Political Associations	553	4.05
Membership of Religious Groups	1,157	3.92
Membership of Sports Groups	2,100	3.98
Membership of Hobby Groups	2,218	4.01
None of the above	9,841	3.77
View on Trust in People:		
Yes	3,127	4.11
No	1,725	3.63
Depends	9,686	3.78

These data refers to the JGSS, a cross-section of 14,538 people, 2000-2003 and 2005-2006.

Table 3. Social Trust and the Determinants of Happiness: ordered logits

Dependent Variable: Happiness Explanatory Variables:	Full Sample		Nonmovers	
	(1)	(2)	(3)	(4)
Social Trust	0.025 *** (0.007)	0.020 *** (0.008)	0.030 *** (0.008)	0.025 *** (0.009)
Prefecture Social Capital Measure:				
Membership	0.007 (0.005)	0.005 (0.006)	0.008 (0.006)	0.008 (0.006)
Blood Donation	0.137 ** (0.056)	0.135 ** (0.056)	0.118 ** (0.054)	0.113 ** (0.056)
Voter Turnout	0.014 (0.011)	0.013 (0.011)	0.012 (0.013)	0.012 (0.013)
View on Trust in People: Yes	-	0.698 *** (0.065)	-	0.716 *** (0.075)
View on Trust in People: Depends	-	0.209 *** (0.052)	-	0.202 *** (0.059)
Organization Membership:				
Political Associations	-	0.301 *** (0.098)	-	0.308 ** (0.129)
Religious Groups	-	0.209 *** (0.067)	-	0.182 ** (0.072)
Sports Groups	-	0.093 *** (0.031)	-	0.114 *** (0.042)
Hobby Groups	-	0.184 *** (0.044)	-	0.216 *** (0.048)
Female	0.192 *** (0.041)	0.209 *** (0.042)	0.204 *** (0.046)	0.227 *** (0.047)
Age	-0.113 *** (0.007)	-0.116 *** (0.007)	-0.110 *** (0.007)	-0.112 *** (0.007)
Age Squared	0.0011 *** (0.0001)	0.0011 *** (0.0001)	0.0011 *** (0.0001)	0.0011 *** (0.0001)
Income Level: ^a				
1.5 million-2.5 million	0.120 (0.103)	0.095 (0.102)	0.095 (0.125)	0.055 (0.120)
2.5 million-3.5 million	0.351 *** (0.080)	0.339 *** (0.080)	0.358 *** (0.102)	0.334 *** (0.103)
3.5 million-4.5 million	0.397 *** (0.074)	0.374 *** (0.076)	0.439 *** (0.088)	0.407 *** (0.092)
4.5 million-5.5 million	0.391 *** (0.103)	0.357 *** (0.102)	0.415 *** (0.106)	0.366 *** (0.104)
5.5 million-6.5 million	0.460 *** (0.083)	0.417 *** (0.085)	0.439 *** (0.109)	0.382 *** (0.116)
6.5 million-7.5 million	0.533 *** (0.107)	0.508 *** (0.106)	0.480 *** (0.108)	0.444 *** (0.108)
7.5 million-8.5 million	0.625 *** (0.107)	0.578 *** (0.105)	0.624 *** (0.116)	0.566 *** (0.118)
8.5 million-10 million	0.729 *** (0.083)	0.677 *** (0.084)	0.816 *** (0.101)	0.753 *** (0.107)
Over 10 million	0.868 *** (0.079)	0.787 *** (0.080)	0.860 *** (0.094)	0.764 *** (0.097)
Unknown	0.438 *** (0.071)	0.422 *** (0.071)	0.425 *** (0.082)	0.398 *** (0.084)

(continued on next page)

Table 3. (continued)

Dependent Variable: Happiness Explanatory Variables:	Full Sample		Nonmovers	
	(1)	(2)	(3)	(4)
Self-Rated Health:				
5 (good)	2.016 *** (0.096)	1.944 *** (0.094)	2.043 *** (0.106)	1.969 *** (0.103)
4	1.290 *** (0.099)	1.233 *** (0.101)	1.305 *** (0.111)	1.249 *** (0.110)
3	0.731 *** (0.091)	0.708 *** (0.093)	0.752 *** (0.098)	0.736 *** (0.099)
2	0.381 *** (0.107)	0.362 *** (0.110)	0.408 *** (0.110)	0.391 *** (0.113)
Marital Status:^b				
Married	1.237 *** (0.075)	1.269 *** (0.074)	1.213 *** (0.074)	1.231 *** (0.074)
Divorced or Widowed	0.691 *** (0.090)	0.727 *** (0.091)	0.628 *** (0.084)	0.657 *** (0.086)
Number of Children	-0.006 (0.020)	-0.014 (0.020)	0.007 (0.020)	0.002 (0.019)
Education:^c				
Graduate School	0.505 *** (0.119)	0.395 *** (0.114)	0.677 *** (0.200)	0.549 *** (0.191)
4-Year University	0.252 *** (0.062)	0.163 ** (0.064)	0.345 *** (0.062)	0.256 *** (0.064)
2-Year College	0.259 *** (0.058)	0.178 *** (0.057)	0.333 *** (0.076)	0.247 *** (0.072)
High School	0.069 * (0.041)	0.023 (0.041)	0.082 * (0.049)	0.038 (0.049)
Work Status:^d				
Working	-0.112 ** (0.053)	-0.117 ** (0.052)	-0.083 (0.059)	-0.090 (0.057)
Unemployed	-0.838 *** (0.164)	-0.837 *** (0.168)	-0.808 *** (0.199)	-0.811 *** (0.203)
Retired	-0.097 (0.072)	-0.109 (0.074)	-0.043 (0.092)	-0.066 (0.092)
Homeowner	0.119 ** (0.050)	0.118 ** (0.052)	0.050 (0.073)	0.049 (0.075)
Municipality of Residence:^e				
Large City	-0.014 (0.026)	-0.020 (0.026)	-0.014 (0.047)	-0.017 (0.044)
Town or Village	-0.022 (0.029)	-0.030 (0.029)	-0.008 (0.031)	-0.016 (0.031)
Observations	14,538	14,538	10,810	10,810

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the prefecture level are shown in parentheses. Prefecture level variables included but not shown are log of average income per household, unemployment rate, inflation, Gini coefficient, crime rate, the fraction of college graduates, the fraction of young (<15) and old (>65) people, and population density. Regional and year dummies are also included but not shown here.

^a The omitted category is the lowest income category (0-1.5 million).

^b The omitted category is people who have never been married.

^c The omitted category is other education.

^d The omitted category is "not working for other reasons".

^e The omitted category is city.

Table 4. Social Trust and the Determinants of Happiness: OLS and 2SLS

Dependent Variable: Happiness	Full Sample		Nonmovers	
	OLS	2SLS	OLS	2SLS
Explanatory Variables:	(1)	(2)	(3)	(4)
Trust	0.010 *** (0.003)	0.015 ** (0.007)	0.012 *** (0.004)	0.019 ** (0.009)
Observations	14,538	14,538	10,810	10,810

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the prefecture level are shown in parentheses. All specifications include the same variables listed in column 2 and column 4 of Table 3, plus regional and year dummies as well as prefecture level controls.

Table 5. Heterogeneous Effects of Social Trust

Dependent Variable: Happiness	Ordered Logits	OLS	2SLS
	(1)	(2)	(3)
The effect of average trust on:			
Trusting Individuals (N = 2,263)	0.029 ** (0.013)	0.016 *** (0.005)	0.019 (0.012)
Trust-Neutral Individuals (N = 7,247)	0.023 ** (0.011)	0.012 ** (0.005)	0.025 ** (0.010)
Non-Trusting Individuals (N = 1,300)	0.013 (0.024)	0.004 (0.013)	-0.027 (0.023)

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the prefecture level are shown in parentheses. All specifications include the same variables listed in column 2 and column 4 of Table 3, plus regional and year dummies as well as prefecture level controls.

Chapter 3: Suicide and Unemployment in Japan: Evidence from Municipal Level Suicide Rates and Age-Specific Suicide Rates

Abstract

Most previous studies on the relationship between unemployment and suicide use either individual level data or large unit aggregate level data. The former typically fail to distinguish the observed association from the causal link, and the latter often produce inconsistent findings on the unemployment-suicide relationship, making it difficult to draw policy implications. The present study contributes to this line of research by using semi-aggregate level datasets in Japan. The results show that unemployment is significantly associated with male suicide rates, especially those of prime age working men, while the results are not straightforward for female suicide rates.

Introduction

Japan struggles with a suicide epidemic. More than 32,000 people committed suicide in 2008, which is the 11th year in a row the number has exceeded 30,000. Starting in 2009, the National Policy Agency started publishing monthly, instead of annual, suicide data for the first time because of the continuing suicide epidemic and public concern. It is widely believed that unemployment is one of the major culprits, as unemployment drastically increased in the 1990's. The purpose of this paper is to examine to what extent the suicide rate during the period 1983-2007 is explained by changing unemployment rates in Japan. Unlike most previous studies, I focus on semi-aggregate level suicide rates and age specific suicide rates.

Many researchers have investigated the link between unemployment and suicide, and individual-level studies often find that being unemployed is significantly associated with suicide (Marikainen, 1990; Lewis and Sloggett, 1998; Kposowa, 2001; Blakely et al., 2003). However, empirical studies based on individual level data are not without serious limitations because they typically include only sparse control variables. The lack of control variables means the observed association between unemployment and suicide may be due to omitted variable bias. For instance, preexisting depression may lead to low productivity and, consequently, job loss. Mental illness may also reduce the chance of landing a job and consequently increase one's propensity to be in unemployment if a depressed individual shows undesirable characteristics, such as lower self-confidence, at job interviews. In this case, prior mental health problem, depression, caused both unemployment and suicide, i.e. depression is a confounding factor, and OLS does not give a true causal estimate of the effect of unemployment.¹

Because adequate data for suicide behavior for individuals are rarely available, much of the existing literature by economists use large-unit aggregate data (such as nations and states) to infer individual behavior.² Recent works include Ruhm (2000), who uses state level panel data from the United States for the period 1972-1991 and finds suicide increases during recessions, and Neumayer (2003), who also finds higher

¹ Furthermore, researchers should be aware that unemployment is not homogeneous; they need to know how long the unemployed had been unemployed (because the impact of unemployment on the risk of suicide may depend on the duration of unemployment) or how many times the unemployed had lost their jobs (because there is a time interval between censuses). See Kposowa (2003) for discussion of these issues.

² One exception is that of Lin (2006), who uses the city-level data from Taiwan and finds the significantly positive effect of unemployment rate on suicide rates, but the data set has only 23 cities.

unemployment rates are associated with higher suicide rates across countries.³ Studies on suicide in Japan by economists also confirm the positive effect of unemployment on suicide. Yamamura (2007) uses the panel data of Japan at the prefecture (which is analogous to states in the United States) level and finds the signs of unemployment coefficients are significantly positive for both males and females. Watanabe et al. (2006), using prefecture level data, also find a significant positive effect of unemployment on men (but not on women). Koo and Cox (2008), using national time series data, find the relationship between the suicide and the unemployment is significantly positive for both Japanese males and females. However, other empirical studies based on large unit aggregate data have found different results. Neumayer (2004), using state level data from Germany, finds evidence that the suicide rate decreases during recessions. Andrés (2005), using cross county data for 15 European countries, finds unemployment is not significantly related to suicide rates for both genders and all age groups. Maag (2008) finds unemployment is not significantly related to the overall suicide rate as well as to the suicide rates of most age groups in OECD countries. In summary, previous studies based on large-unit aggregate data provide inconsistent findings on how unemployment is related to suicide.

Despite mixed findings and criticism, aggregate-level analyses should not be dismissed for policy-related purposes. The destructive effect of unemployment should not be limited to only individual level as it may operate at community level, and for this

³ Earlier papers by economists include the seminal work by Hamermesh and Soss (1974), who formulated an economic model of suicide in which the individual, who is a rational and optimizing agent, takes his own life when the total discounted lifetime utility remaining to him is sufficiently low.

reason, the ideal geographical unit level of analyses for policymakers is smaller, semi-aggregate level, such as cities, towns, or villages, that is, “suicide maps” are most useful when they represent small geographical units. Yet, previous studies based on aggregate data use large-unit aggregate data (such as cross country or state-level data), which ignore heterogeneities among smaller geographic units. Large-unit aggregate data not only may make analyses too simplified but also make it difficult to design appropriate policy. Neither did these previous studies examine age-specific suicide rates.⁴ It is likely that the unemployment rate has different impacts on the suicide rates of different age groups. For example, it has been found that the adverse effect of being unemployed on mental well-being is small for young people (Clark and Oswald, 1994).

My empirical work consists of two basic analyses. The first analysis is to run panel regressions using municipal level data and focus on small, community level geographical areas. The second analysis uses age-specific suicide data at the semi-aggregate geographical units. To the best of my knowledge, systematic empirical analyses of (1) the response of suicide rates to local unemployment rates with municipal level data in Japan and (2) different impacts of unemployment on age-specific suicide rates at the small geographical unit level have not been done. These two represent important contributions to this line of research.

The results of the municipal level analysis show that an increase in the unemployment rate significantly contributed to the male suicide rate during the period

⁴ To my knowledge, Andrés’s (2005) study based on 15 European countries has been the only one panel data analysis of the impact of unemployment on age-specific suicide rates, but his study contains only three age groups and small sample cross-country data (N = 236).

1985-2007. The analysis based on age-specific suicide rates shows that unemployment mainly affects prime age working men aged 35-64, with the largest effect on age group 55-64. However, the results are not straightforward for women, as the direction of the effect of unemployment are different across age groups. This paper is organized as follows. Section 2 describes the suicide epidemic in Japan. Section 3 describes the two datasets used in this study. Section 4 and 5 present empirical evidences from the municipal level panel and the age-specific panel, respectively. Section 6 concludes.

The suicide crisis and unemployment in Japan: An overview

Suicide in Japan has drawn much attention from researchers, policymakers, and the general public, and deservedly so. In 2007, suicide was ranked sixth as the cause of death in Japan (see Table A1 in Appendix). Suicide surpasses other causes as the leading cause of death for many age groups; it is the number one cause of death for men in their prime working ages (See Table A2 in Appendix). These facts are simply shocking, considering that Japan is one of the most developed countries.

Figure 1 and Figure 2 show suicide rates by age in 1985 in 2007. From an examination of Figure 1, it is immediately apparent that the suicide rate generally increases with age for men. There is a sharp decline in suicide rates for men aged 75-79, who presumably are not directly affected by labor market conditions, during the period. Men in their 30s as well as men aged 55-64 have much higher suicide rates in 2007 than in 1985. As for female suicide rates, it is notable that there is not much dispersion among

different age groups in 2007, while in 1985 the suicide rate clearly increased with age. Like men, women in their 70s have much lower suicide rates in 2007 than in 1985.

The unemployment rate traditionally had been low in Japan, but it began rising in the early 1990s, with the end of Japan's "bubble" economy. Many firms stopped offering generous employment protection and "lifetime" employment. In 2007, more than half of people who committed suicide were unemployed.⁵ Suicide rates started rising from the mid-1990s and experienced a sharp increase in the late 1990s. Figure 3 and Figure 4 display national male and female suicide rates and unemployment each year. Unemployment and suicide rates show a similar trend, suggesting that adverse changes in labor market opportunities cause more people to commit suicide. The link between suicide and unemployment seems to be much stronger for males than females, which indicates that it is necessary to look at gender-specific suicide rate.

Data

The Dependent Variables

I conduct two sets of analyses in this paper, and the suicide data come from *Center for Suicide Prevention, National Institute of Mental Health, National Center of Neurology and Psychiatry (NCNP)*.⁶ The first data consists of municipal level suicide rate data. Instead of annual data, *NCNP* divides the period 1983-2007 into five periods (1983-1987, 1988-1992, 1993-1997, 1998-2002, and 2003-2007) and provides the average suicide

⁵ National Police Agency

⁶ <http://ikiru.ncnp.go.jp/ikiru-hp/index.html> (the main page), <http://ikiru.ncnp.go.jp/ikiru-hp/genjo/toukei/pdf/11.pdf>

rates over these 5-year periods.⁷ The advantage of municipal level panel data is the large sample size, which increases the precision of estimators, and the suicide-unemployment relationship can be evaluated at a level far smaller than those of nation or state/prefecture. While there are 47 prefectures, there are 1,782 municipalities in Japan.⁸ In addition to municipalities, the dataset contains data for wards,⁹ which are districts in large Japanese cities but not defined as municipalities. With all combined, the total number of geographical area is 1,867, and over the five time periods, the number of observation is 9,335. However, because the suicide data and the explanatory variables come from different sources, in some cases, there are missing explanatory variables, and thus the sample is reduced to 9,014. Figure 7 and Figure 8 show the municipal level geographical distribution of suicide rates, or “suicide maps.” We can see that there is a good deal of variation in suicide rates even among neighboring municipalities within the same prefecture. The Tohoku region of the northern tip of the mainland in general has higher suicide rates. In 2007, three prefectures in the region (Akita, Iwate, and Aomori) ranked in the top five for male suicide rates, and two (Akita and Iwate) ranked in the top five for

⁷ Even though *NCNP* provides the average suicide rate for the period 1973-1982, this period is not used in this paper for two reasons. First, the municipal income per capita is not available for this period, and there is little justification for estimates without income because failure to include it may lead to omitted variable bias. Second, the first period is a 10-year average, while the next five periods are averages of 5 years, and interpolating and averaging unemployment rates over a much longer period ignores annual fluctuations even more and reduces within-state variation and explanatory power in the regressions, not to mention that it is not consistent with other periods.

⁸ There are four types of municipalities in Japan: cities, towns, villages and special wards in Tokyo. Prefectures are the country’s sub-national jurisdictions. Each prefecture is further subdivided into cities and districts, which are further subdivided into towns and villages.

⁹ Wards are local entities directly controlled by the municipal government and used to subdivide each city designated by government ordinance. They handle administrative functions such as health insurance and property taxation.

female suicide rates. These prefectures are remote regions with a harsh climate (cold and snowy), and their suicide rates are consistently among the highest every year.

The second suicide data set contains age-specific suicide data also from *NCNP*.¹⁰ The suicide rate is measured at neither prefecture nor municipal level; instead, each area, which is literally translated as a secondary-medical-care area, consists of multiple neighboring municipalities (sometimes just a single municipality, though rare) and defined as the area that can provide almost all hospital medical services. There are 354 secondary-medical-care areas in Japan as of March of 2008, and those areas can be considered as somewhere between municipalities and prefectures. The advantage of the age-specific suicide data is that heterogeneities among different age groups can be examined. The disadvantage is that, compared to the first data set, there are fewer geographical areas. The data provides the suicide rate for the seven 10-year age and sex groups: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75 and over for males and for females. Since there are five time periods and 354 areas (secondary-medical-care areas) for each of the seven age groups, a total number of observations equals to 12,390. Summary statistics for both municipal-level suicide rates and age-specific suicide rates are provided in Table 1.

The Independent Variables

To gauge the independent effect of unemployment on suicide, it is necessary to control for factors stressed by the suicide literature, and my control variables comprise a set of

¹⁰ <http://ikiru.ncnp.go.jp/ikiru-hp/genjo/toukei/pdf/10.pdf>

standard socioeconomic and demographic factors that are likely to be correlated with unemployment and suicide. Explanatory variables come from *Portal Site of Official Statistics of Japan*.¹¹ For annual explanatory variables, averages over each period were calculated so that explanatory variables will be consistent with the suicide data. Some variables such as municipal unemployment and municipal income per capita, however, were available only on every five year-basis. For those variables for which enumeration occurs only once in five years, they are linearly interpolated and averaged for the period 1983-1987, 1988-1992, and so on.¹²

The primary shortcoming of using the municipal level data is the limited collection of municipal level explanatory variables. Ideally explanatory variables should be measured at the municipal level, but for these variables that are not available at the municipal level, compromises must be made; since many variables are available at the prefecture level, critical control variables measured at the prefecture level are included as regressors. Also, if many people are mobile across municipalities, which is likely to be the case in Japan, the municipal unemployment rate may be more or less irrelevant for them. Therefore, gender-specific prefecture unemployment rates are also included in addition to municipal unemployment rate, that is, unemployment rates at the prefecture level, from each 47 prefectures, are also used to explain the changes in suicide rate in 1,867 municipalities. Using prefecture-level unemployment rates is relevant to the analysis if people consider unemployment level in the prefecture, rather than that of, say,

¹¹ <http://www.e-stat.go.jp>

¹² However, for the period 2003-2007, the average is calculated from (linearly interpolated) 2003, 2004, and 2005, since the last data available were those of 2005, and the next census year is 2010.

the city in which they reside, as an indicator of labor market conditions. For the analysis of age-specific suicide, explanatory variables at the prefecture level are always used because they are not available at this medical geographical unit into which multiple municipalities are pooled. For the remainder of the paper, I use the terms “local” and “municipal” interchangeably. Appendix reports summary statistics for all the explanatory variables used in the present paper (see Table A3).

Municipal Level Analysis

I begin by exploiting the municipal level variation in unemployment. Panel data can control for time-invariant area-specific effects and a potentially important source of omitted variable bias. Even though Japan is more homogenous in terms of population characteristics than the United States, it has been hypothesized that geographical cultural differences affect suicide rates. For example, people in the Tohoku regions of the northern tip of the mainland are said to be more serious and conservative than the rest of the Japanese population, while Okinawans, living on the islands in the south, are said to be more optimistic and have more easygoing lifestyle than the people in the mainland. The results would be biased if these time-invariant unobservable traits are correlated with both the unemployment rate and the propensity to commit suicide, but fixed effect estimation will be unbiased even if the labor market conditions are correlated with those unobservable characteristics, which are wiped out from the equation to be estimated. Furthermore, fixed effects ensure that the estimated suicide-unemployment relationship will not be affected by the fact that suicide rates are always higher in some areas due to

the effect of climate (e.g. the longer winters or the exposure to sunlight) which is often suggested to be a cause of depression and thus suicide. The fixed-effect estimates seem to be appropriate as there appears to be substantial independent macroeconomic fluctuations across municipalities over time. The correlation coefficient between the national unemployment rates and municipality unemployment rates is just .44. Also, previous aggregate-level suicide studies generally used fixed effects models. The empirical model used in the municipal analysis is:

$$Suicide_{mt} = \alpha_m + \beta_t + U_{mt} \gamma + U_{p(m)t} \delta + X_{mt} \varphi + X_{p(m)t} \eta + \varepsilon_{mt} \quad (1)$$

where $Suicide_{mt}$ is the suicide rate by gender per 100,000 population in the municipality m in the time period t , U_{mt} are municipal unemployment rates, and letting $p(m)$ denotes the prefecture in which municipality m is located, $U_{p(m)t}$ are prefecture unemployment rates. X_{mt} and $X_{p(m)t}$ are vectors of regressors capturing socioeconomic and demographic correlates of suicide rates at the municipal level and prefecture level, respectively, α_m is the municipality-specific fixed effect, β_t is the time-specific effect and ε_{mt} is the error term.

Despite the wide range of controls included in the regression above, there still remains the possibility that there are some unobservable area characteristics correlated with both suicide rates and unemployment rates. One concern is time-varying unobservable factors that affect both unemployment rates and suicide. Because municipality-time interactions cannot be included as there is only a single suicide rate for

each time period (i.e. each observation in the suicide data is defined on the municipality-time level), one very crude way of addressing this question is to include prefecture-time interactions instead of including prefecture level controls. Then the regression takes the following form:

$$Suicide_{mt} = \alpha_m + \beta_t + U_{mt} \gamma + X_{mt} \varphi + \theta_{p(m)t} + \varepsilon_{mt} \quad (2)$$

where $\theta_{p(m)t}$ indicates prefecture-time interactions. Because the $\theta_{p(m)t}$ term absorbs all of the variation in the prefecture-time level, the explanatory variables at the prefecture-time level in (1) are not included in (2). The $\theta_{p(m)t}$ term removes any confounding effect that affects residents within a prefecture in a particular time period. Time-varying prefecture-specific effects that affect both the unemployment rate and the suicide rate may include temporary industry-specific regional shocks. Though I am unable to control for any time-varying unobservable at the municipal level, the prefecture-time interactions will remove any time-varying confounding factor that operate at the prefecture level. This equation allows me to focus on only municipal level unemployment rate and see if the coefficients of the municipal unemployment rate are affected substantially by this approach.

Table 2 summarizes the results of a variety of specifications, all of which include municipality and time fixed-effects and control variables. For the dependent variables, both the level and the natural logarithm of suicide rates are used. Suicide rates in natural logs will be less skewed, and interpretation of the results will be easier. For simplicity, only the coefficients of the unemployment variables and income are shown, and the

coefficients of the other control variables are suppressed.¹³ The standard errors are clustered at the municipal level in order to control for within-municipality serial-correlation and cross-municipality heteroskedasticity.

Table 2a shows the results of regressions using the level suicide rate as the dependent variable. For males, the municipality unemployment rate is significantly positive in column (1) and remains significant when the prefecture unemployment rate is included in column (2). However, the local income becomes insignificant when the prefecture unemployment rate is included. Turning to the results for females, the local unemployment rate is never significant but the prefecture female unemployment rate is significant. The sign of the coefficient is negative, meaning higher prefecture level female unemployment rate will *decrease* female suicide rates.

Table 2b shows the results of regressions using the natural logarithm of the suicide rates. In terms of statistical significance, the results do not change much whether suicide rates are in levels or in natural logs, except that the income is now uniformly significant for males. Again, the local unemployment is significant only for males. Holding the prefecture unemployment constant, a one percentage point increase in the local unemployment is predicted to increase the male suicide rate by 2 percent. As for the prefecture unemployment rates, the sign is significantly positive for males and significantly negative again for females. If we use columns (2) and (5), a one percentage

¹³ Most control coefficients by and large conform to my expectations. Divorce rates are always significant predictor of suicide rates, as well as crime rates and juvenile delinquency rates. Suicide rates increase with older population (65 or older) and decrease with younger population (15 or younger). However, the percentage of one-person household is negatively associated with the suicide rates, even if we expect it to be a proxy for lonely individuals. Since the focus of this paper is the effects of local unemployment rates, the possible explanation for those variables are not explored in the present study.

point increase in the prefecture unemployment rate will increase the male suicide rate by 2.8 percent and decrease the female suicide rate by 4 percent. The coefficients for income per capita are quite uniformly negative and significant, indicating that improvements in the overall standard of living in the area decrease both male and female suicide rates.

Finally, in columns (3) and (6) in Table 2a and 2b, prefecture-time interaction terms are included. For males, the effect of local unemployment rate remains significant at the one percent level and virtually does not change in magnitude compared to column (2), indicating that there was little omitted prefecture level variable bias in column (2). For females, local unemployment remains insignificant. In summary, the male suicide is significantly affected by municipal unemployment rates, suggesting that the community-level unemployment rate is a significant determinant of male suicide rates. The female suicide rate, on the contrary, is not affected by the municipal unemployment rate but affected negatively by the prefecture unemployment. Having established that there is a significant association between unemployment and male suicide rates at the municipal level as expected (and unexpected negative association between the prefecture unemployment rate and the female suicide rate), I now proceed to the analysis of age specific suicide rates.

Age Specific Suicide Rate Analysis

I now turn to the question of whether unemployment has a more pronounced effect on the suicide rates of certain age groups. As stated earlier, data limitations prevents measuring the unemployment variables separately for each age group. To test the hypothesis of

differential effects across age groups, I interact age dummies with the prefecture unemployment and allow the effect of unemployment to vary across age groups. My estimating equations are:

$$Suicide_{ita} = \alpha_i + \gamma_t + \beta U_{p(i)t} + \sum \beta_a AGE_a + \delta X_{p(i)t} + \varepsilon_{ita} \quad (3)$$

$$Suicide_{ita} = \alpha_i + \gamma_t + \beta U_{p(i)t} + \sum \beta_a AGE_a + \sum \theta_a U_{p(i)t} AGE_a + \delta X_{p(i)t} + \varepsilon_{ita} \quad (4)$$

where $Suicide_{ita}$ is the suicide rate in the area i in the time period t for age group a , $U_{p(i)t}$ are gender-specific unemployment rates in the prefecture in which the area i is located, AGE_a is dummy variables for age group a , $X_{p(i)t}$ is a vector of socioeconomic and demographic variables, α_i is area fixed effects, γ_t is the time-specific effect and ε_{ita} is the error term. Equation (3) estimates the effect of unemployment independent of age (the common effect of unemployment), i.e. it restricts the effect of the unemployment rate to be constant for all age groups, while Equation (4) allows the effect of unemployment to vary across age groups.

The results are presented in Table 3. The standard errors are clustered at the prefecture level. There are seven age groups, and age group 15-24 is the reference group. In all specifications, age dummies are highly significant, positive, and almost always monotonic both for males and females, indicating that, holding other things constant, the suicide rate increases with age, and this is consistent with the summary statistics of age specific suicide rates. When the effect of the unemployment rate is restricted to be

constant for all age groups in odd-number columns, the unemployment coefficients are significant for males but not for females. Using the coefficient from column (3), a one percentage point increase in the prefecture level male unemployment rate is predicted to increase the male suicide rate by 2 percent, which is similar to the results in the previous section.

For males, when the coefficient is allowed to vary by age groups, the common effect of unemployment has a positive sign but only significant for the estimate in natural logs of suicide rates. Using the preferred specification (4), the interactive terms are significantly positive for the middle-aged (35-44, 45-54, and 55-64) and significantly negative for the elderly (65-74 and ≥ 75). There is no statistically significant difference between age group 15-24 and age group 25-34, meaning that both groups are affected by unemployment to the same extent, which is the common effect of unemployment.. The coefficient on the interactive term for age group 55-64 is larger than any other groups, suggesting that this group represents the most vulnerable age groups when the unemployment rate increases. For age group 65-74, the coefficient from the interactive term almost offsets the common effect of unemployment, and for age group ≥ 75 , the common effect of unemployment is more than offset by the interactive term. These results are largely consistent with prediction, with the suicide rate for prime age working population (men aged 35-64) affected more severely by unemployment than the retired and the young.

Turning to the results for females, the common effect of unemployment becomes significantly positive once interactive terms are included and larger than the that of males.

Almost all interaction terms are significantly negative, suggesting that the effect of unemployment is larger for the reference age group 15-24 than any other age groups. Using the preferred specification (8), the total effect (the common effect and the effect from the interactive term combined) of unemployment is negative for the elderly (65-74 and ≥ 75). The total effect is essentially to zero for women aged 45-54 and 55-64 as the coefficients on the common effect and the interactive term have the same magnitude. For the younger women aged 25-44, the coefficients from the interactive terms do not offset the adverse common effect, even though they mitigate it. It is noteworthy that the elderly, who are presumably out of labor force, the total effect of unemployment is negative, suggesting that an increase in unemployment will decrease the suicide rates. This indicates that the negative effect found in the previous section is mainly driven by the elderly. In summary, the results in this section demonstrate the importance of using age-specific suicide rates as the impact is not equal across age groups. While unemployment increases the suicide rate of prime age working men the most as expected, the link between unemployment and suicide is not straightforward for women. On one hand, unemployment increases the suicide rate of the young aged 15-44, and the younger they are, the bigger the adverse effect of unemployment. On the other hand, the unemployment decreases the suicide rate of the elderly, and the older they get, the bigger the *beneficial* effect of unemployment. Unemployment seems to have no effect on the female suicide rates of age group 45-54 and 55-64.

Concluding remarks

Most previous studies use either individual level data or large unit aggregate level. Studies based on individual level data typically fail to distinguish the observed association from the causal link between unemployment and suicide, and studies based on large unit aggregate data often produce mixed findings on the unemployment-suicide relationship. Rather than using individual level or large unit aggregate data, I focused on the semi-aggregate level suicide rate and exploit the differences in the timing of unemployment changes across smaller geographical areas to explain the timing of the changes in the suicide rate.

This paper provides further support to the harmful impact of unemployment on the male suicide. At the municipal level, the results consistently confirm that unemployment significantly contributes to male suicide rates. The analysis based on age-specific suicide rates show that unemployment mainly affects prime age working population (men aged 35-64), with the largest effect on age group 55-64. This may reflect the fact that it is often harder for older workers to find a job once they become unemployed. For example, older workers may only have skills that are too specific to the firm they had worked for many years and lack the skill portable across firms, such as computer proficiency. Detailed exploration of these findings is beyond my current focus.

As for females, the analysis at the municipal level produces the negative effect of prefecture level unemployment rate on the suicide rates while the local unemployment rate is not significant. The analysis based on age-specific suicide rates finds the negative effect of unemployment is concentrated among older females (aged ≥ 65) who are

presumably out of labor force. The negative effect of unemployment found for females might indicate, perhaps, that it is the relative status that matters. On one hand, high unemployment rates proxy for deteriorating economic conditions, which generate more stressful environment, but on the other hand, high local unemployment in the area may make her feel relatively better off through social comparisons.¹⁴ However, given that Yamamura (2007) finds a positive and significant effect of unemployment on the Japanese female suicide rate using prefecture level data, we should be cautious about offering definitive interpretations concerning the nature of the unemployment-suicide link for females. Thus I consider this evidence for the relative status hypothesis to be more suggestive than definitive. The mixed findings for the female suicide rate in Japan indicate that it is difficult to explain the female suicide rates with unemployment rates, and men and women are likely to react to unemployment differently because women's attachment to labor force is inherently different from that of males. To reconcile these mixed results and better understand the mechanism that links unemployment to female suicide decision, more research, especially on the relationship between the relative status of the unemployed and their psychological wellbeing, is necessary.

¹⁴ To my knowledge, Neumayer's (2004) study on German states is the only work which finds the negative effect of the unemployment rate on the suicide rate.

Appendix

Table A1. Cause of Death by Age in 2003, Male

Age Group	Male			Female		
	1	2	3	1	2	3
15-19	Accident	Suicide	Cancer	Suicide	Accident	Cancer
20-24	Suicide	Accident	Cancer	Suicide	Accident	Cancer
25-29	Suicide	Accident	Heart Disease	Suicide	Cancer	Accident
30-34	Suicide	Accident	Heart Disease	Suicide	Cancer	Accident
35-39	Suicide	Cancer	Heart Disease	Cancer	Suicide	Heart Disease
40-44	Suicide	Cancer	Heart Disease	Cancer	Suicide	Heart Disease
45-49	Cancer	Suicide	Heart Disease	Cancer	Suicide	Stroke
50-54	Cancer	Heart Disease	Suicide	Cancer	Stroke	Heart Disease
55-59	Cancer	Heart Disease	Suicide	Cancer	Stroke	Heart Disease

Source: Ministry of Health, Labour and Welfare

Table A2. Top Ten Cause of Death in Japan, 2007

Cause of Death	Number
1 Malignant neoplasms (Cancer)	336,468
2 Heart diseases	175,539
3 Cerebrovascular diseases (Stroke)	127,041
4 Pneumonia	110,159
5 Accidents	37,966
6 Suicide	30,827
7 Senility	30,734
8 Renal failure (kidney disease)	21,632
9 Diseases of liver	16,195
10 Diabetes mellitus	14,907

Source: Ministry of Health, Labour and Welfare

Table A3. Summary Statistics for Explanatory Variables

Variable	Mean	Std. Dev.	Min	Max
(a) Municipal Level Explanatory Variables used in the Municipal Level Analysis:				
Local Unemployment	3.77	1.93	0.02	21.5
Local Labor Force Participation	52.12	3.93	37.00	81.70
Local Income Per Capita (1,000 yen)	2966.8	596.9	1560.9	8828.1
Marriage Rate (per 1,000 population)	5.16	1.24	0.00	15.11
Divorce Rate (per 1,000 population)	1.45	0.61	0.00	4.52
Birth Rate (per 1,000 population)	9.25	2.22	2.15	20.83
% of population age 15 or younger	16.79	3.62	5.20	33.50
% of population age 65 or older	18.59	7.24	4.10	53.40
% of single person household	19.91	8.65	2.90	68.70
% of single elderly household	6.19	3.86	0.30	27.70
(b) Prefecture Level Explanatory Variables used in the Municipal Level Analysis:				
Male Unemployment	4.76	1.78	1.9	13.7
Female Unemployment	3.61	1.35	1.3	9.3
Male Labor Force Participation	76.67	3.59	67.80	83.40
Female Labor Force Participation	48.63	3.39	37.60	57.50
Male Monthly Wage (1,000 yen)	316.2	48.2	206.6	440.6
Female Monthly Wage (1,000 yen)	194.9	37.7	115.6	298.6
Persons receiving welfare (per 1,000 population)	9.74	6.38	1.85	35.92
Reported criminal offenses (per 1,000 population,)	14.48	5.01	6.40	29.38
Juvenile delinquent arrested for criminal offenses (per 1,000 persons of 14-19 years old,)	14.47	3.67	6.86	25.62
(c) Prefecture Level Explanatory Variables used in Age-Specific Suicide Analysis in addition to variables in (b):				
Monthly Household Income (1,000 yen)	492.1	96.9	263.6	750.9
Marriage Rate (per 1,000 population)	6.28	0.75	4.35	8.05
Divorce Rate (per 1,000 population)	1.69	0.44	0.73	2.76
Birth Rate (per 1,000 population)	10.54	2.14	6.84	19.19
% of population age 15 or younger	17.73	3.87	11.70	29.60
% of population age 65 or older	13.70	4.63	5.83	27.24
% of single person household	24.45	7.11	9.05	42.19
% of single elderly household	4.84	2.30	1.15	13.17

All variables in (a) are weighted by municipal populations, and all variables in (b) and (c) are weighted by prefecture populations.

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Figures and Tables

Figure 1. Male Suicide Rates in 1985 and 2007

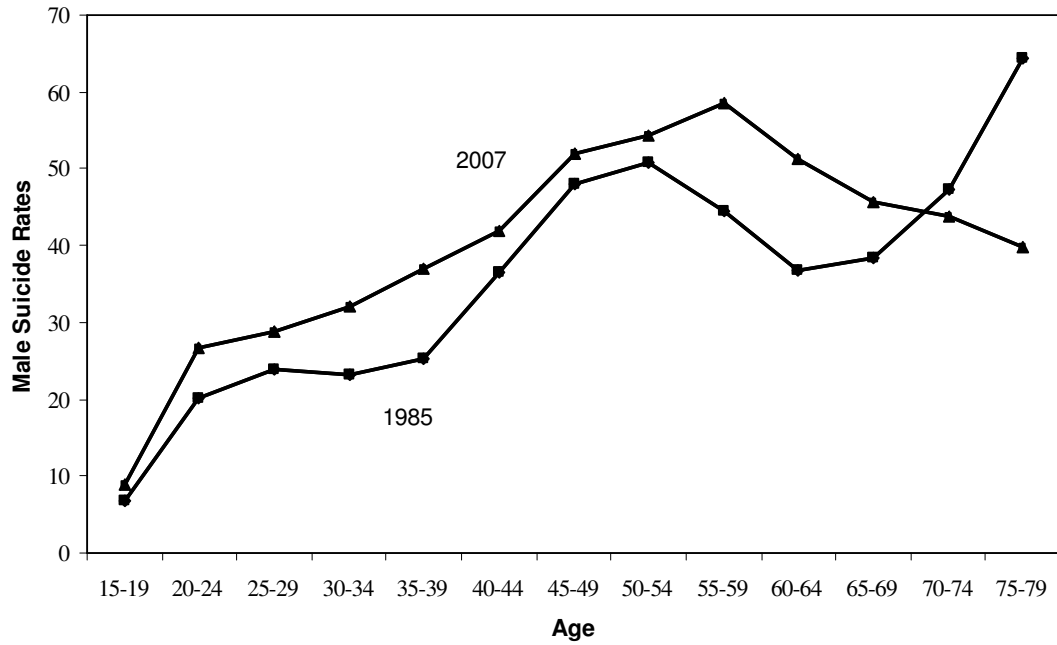
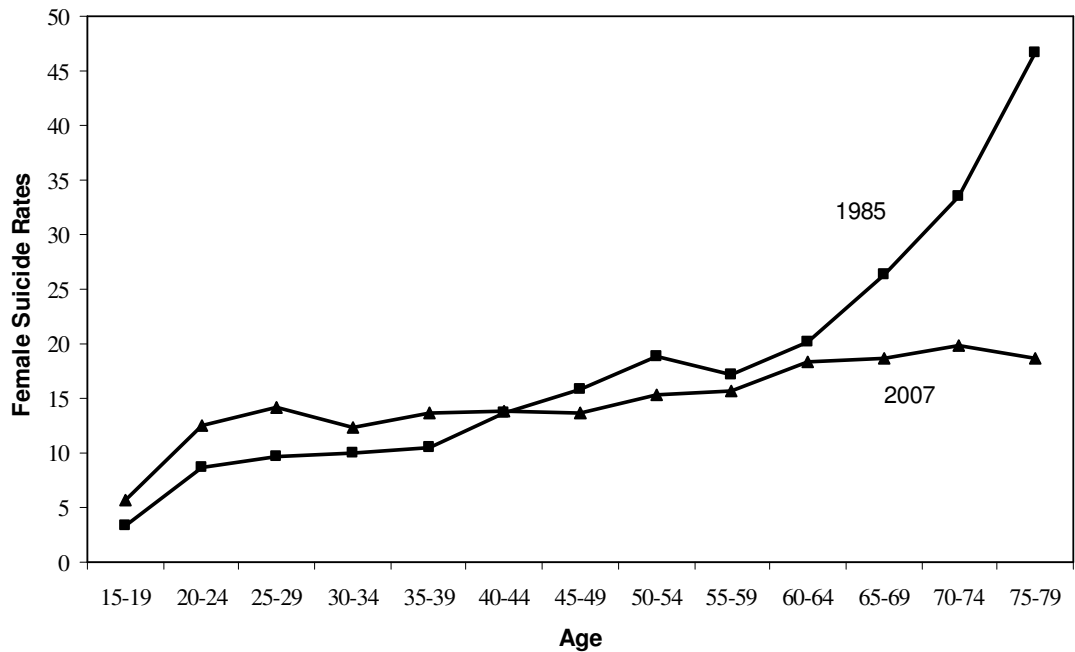


Figure 2. Female Suicide Rates in 1985 and 2007



Sources: *National Center of Neurology and Psychiatry*

Figure 3. Male Suicide Rate and Male Unemployment

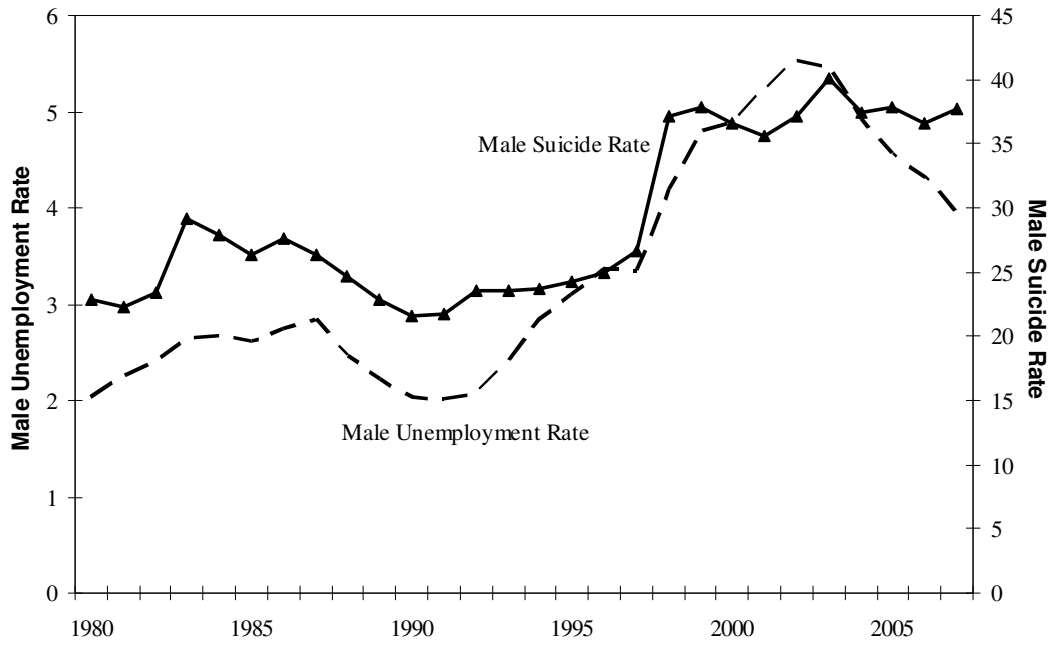
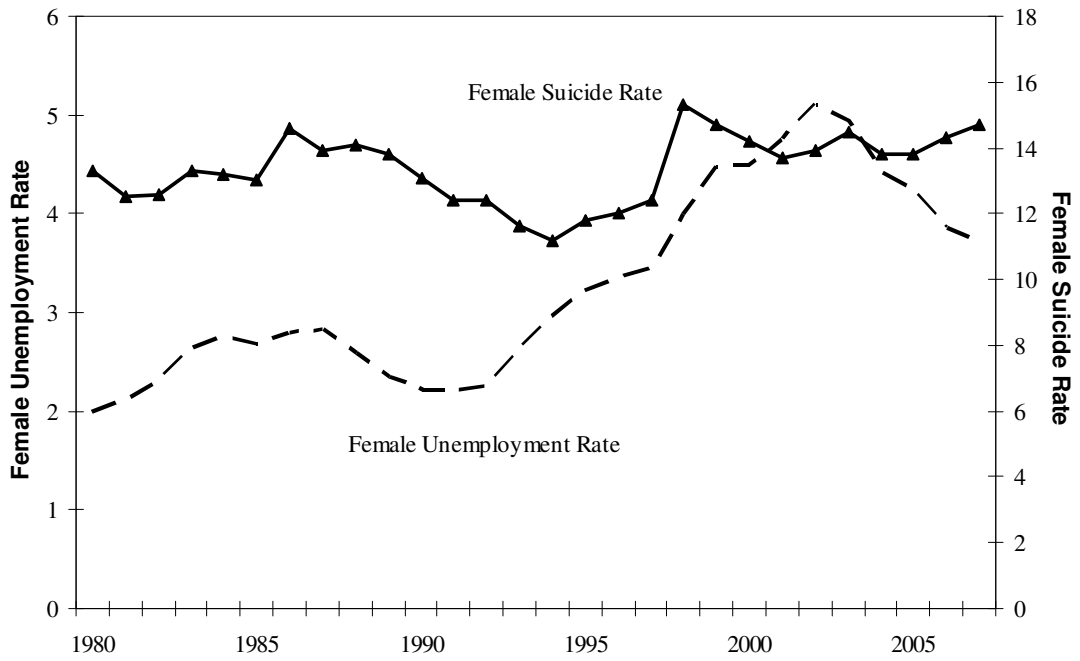


Figure 4. Female Suicide Rate and Female Unemployment



Sources: Unemployment Rate - *Portal Site of Official Statistics of Japan*
 Suicide - *National Police Agency*

Figure 5. Male Suicide Rate, 2003-2007

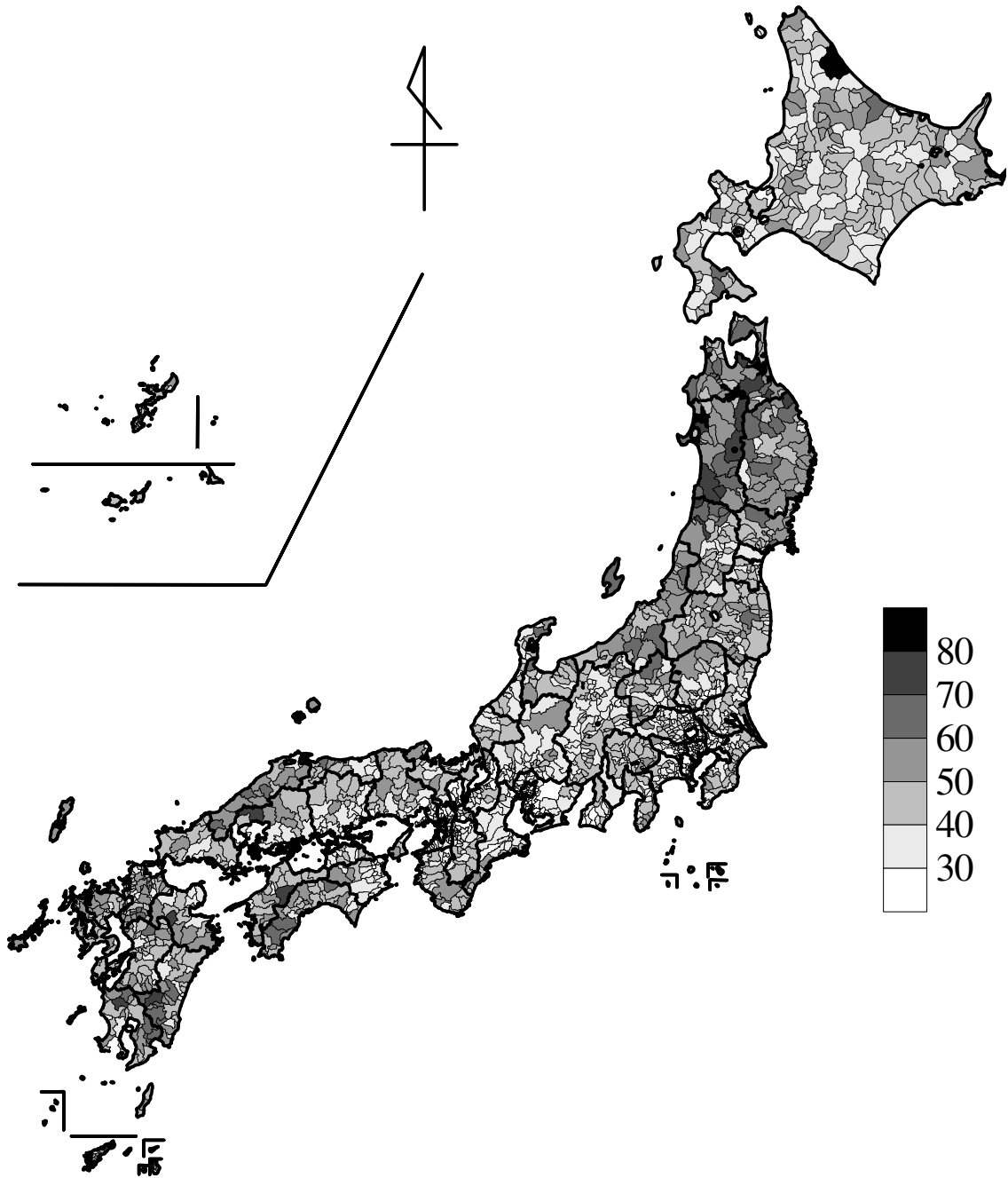


Figure 6. Female Suicide Rate, 2003-2007

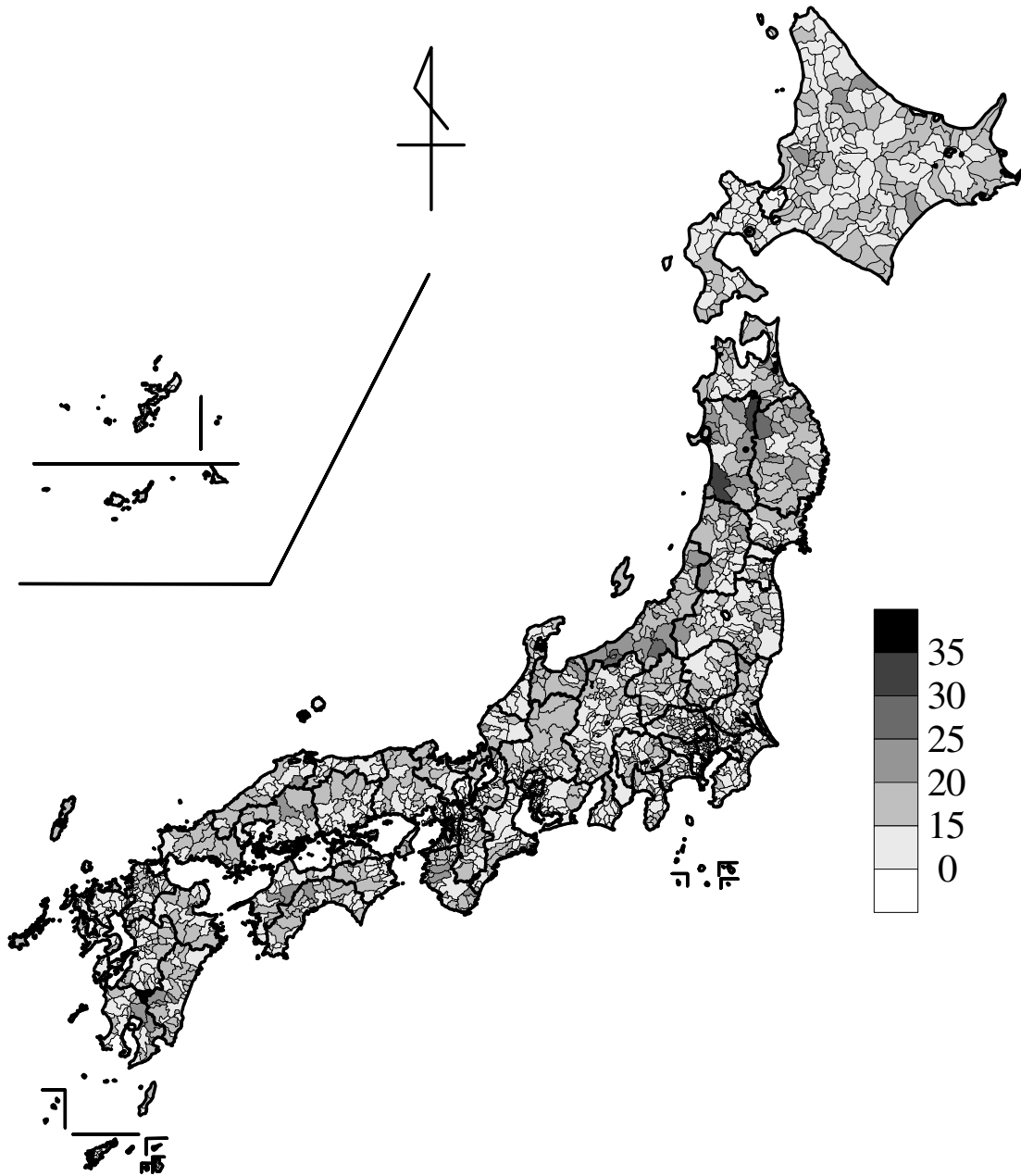


Table 1. Suicide Rates over Five Periods (1983-1987, 1988-1992, 1993-1997, 1998-2002, and 2003-2007)

Variable	Mean	Std. Dev.	Min	Max
Municipal Level Male Suicide Rate:	34.2	10.0	10.8	99.4
Municipal Level Female Suicide Rate:	15.0	3.7	5.0	39.0
Secondary-Medical-Care Area Level:				
Male Suicide Rate: 15-24	13.9	3.7	6.2	29.9
Male Suicide Rate: 25-34	25.5	6.6	8.8	50.0
Male Suicide Rate: 35-44	33.4	10.4	10.6	85.5
Male Suicide Rate: 45-54	49.4	14.6	18.2	108.5
Male Suicide Rate: 55-64	49.4	14.7	21.1	109.3
Male Suicide Rate: 65-74	41.0	10.1	15.2	85.5
Male Suicide Rate: 75 \geq	60.6	19.4	25.2	181.5
Female Suicide Rate: 15-24	6.5	1.8	2.8	16.6
Female Suicide Rate: 25-34	10.2	2.3	4.2	19.6
Female Suicide Rate: 35-44	10.5	2.3	4.4	19.5
Female Suicide Rate: 45-54	14.9	2.7	8.4	26.8
Female Suicide Rate: 55-64	18.0	3.3	9.8	37.0
Female Suicide Rate: 65-74	23.8	7.5	9.0	68.5
Female Suicide Rate: 75 \geq	40.5	20.3	9.2	180.2

The suicide rates equal the number of suicides per 100,000 population of the specified sex (and age) group. Municipal level suicide rates are weighted by municipal populations. Age-specific suicide rates are weighted by prefecture populations.

Table 2a. Panel-Data Estimates of the Relationship Between Unemployment Rates and Nominal Suicide Rates

Variable	Nominal Male Suicide Rate			Nominal Female Suicide Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Local Unemployment	1.620 ** (0.190)	0.924 ** (0.211)	0.847 ** (0.194)	-0.097 (0.103)	0.065 (0.110)	-0.052 (0.111)
Male Prefecture Unemployment	--	1.583 ** (0.288)	--	--	--	--
Female Prefecture Unemployment	--	--	--	--	-0.534 ** (0.203)	--
Log Local Income Per Capita	-6.87 * (2.711)	-4.84 (2.675)	-0.26 (2.958)	-9.79 ** (1.482)	-9.91 ** (1.464)	-10.51 ** (1.764)
Prefecture*Year Interactions	NO	NO	YES	NO	NO	YES

Table 2b. Panel-Data Estimates of the Relationship Between Unemployment Rates and Log Suicide Rates

Variable	Log Male Suicide Rate			Log Female Suicide Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Local Unemployment	0.032 ** (0.006)	0.020 ** (0.006)	0.019 ** (0.006)	-0.008 (0.008)	0.004 (0.008)	-0.005 (0.008)
Male Prefecture Unemployment	--	0.028 ** (0.009)	--	--	--	--
Female Prefecture Unemployment	--	--	--	--	-0.040 ** (0.016)	--
Log Local Income Per Capita	-0.67 ** (0.087)	-0.63 ** (0.086)	-0.41 ** (0.101)	-0.67 ** (0.105)	-0.68 ** (0.104)	-0.72 ** (0.123)
Prefecture*Year Interactions	NO	NO	YES	NO	NO	YES

The standard errors clustered at the municipality are in parentheses. A single asterisk (*) denotes statistical significance at the 5 percent level, and two asterisks denote 1 percent significance. All regressions are weighted least squares, with municipal populations used as weights. All regressions include municipality- and time-fixed effects and controls. Number of observation is reduced to 9,014 due to missing data on some explanatory variables.

Table 3. Panel-Data Estimates of the Relationship Between Unemployment Rates and Age-Specific Suicide Rates

Variable	Nominal Male		Log Male		Nominal Female		Log Female	
	Suicide Rate		Suicide Rate		Suicide Rate		Suicide Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment Rate	1.3 ** (0.36)	0.6 (0.37)	0.02 ** (0.008)	0.05 ** (0.010)	-0.5 (0.34)	2.0 ** (0.35)	-0.01 (0.014)	0.12 ** (0.015)
Age group: 15-24 (reference group)	--	--	--	--	--	--	--	--
Age group: 25-34	10.5 ** (0.18)	6.2 ** (0.49)	0.57 ** (0.007)	0.57 ** (0.021)	3.6 ** (0.07)	3.1 ** (0.21)	0.45 ** (0.008)	0.51 ** (0.024)
Age group: 35-44	17.5 ** (0.35)	6.6 ** (0.87)	0.81 ** (0.010)	0.71 ** (0.026)	3.9 ** (0.07)	4.9 ** (0.22)	0.48 ** (0.008)	0.69 ** (0.025)
Age group: 45-54	32.9 ** (0.51)	16.9 ** (1.26)	1.22 ** (0.010)	1.16 ** (0.024)	7.9 ** (0.10)	12.0 ** (0.29)	0.80 ** (0.010)	1.26 ** (0.028)
Age group: 55-64	33.6 ** (0.46)	13.5 ** (1.27)	1.23 ** (0.010)	1.09 ** (0.026)	11.0 ** (0.13)	15.6 ** (0.34)	1.00 ** (0.011)	1.46 ** (0.028)
Age group: 65-74	25.7 ** (0.38)	24.0 ** (0.96)	1.06 ** (0.010)	1.27 ** (0.031)	16.3 ** (0.25)	30.5 ** (0.76)	1.24 ** (0.015)	2.06 ** (0.038)
Age group: 75 and over	44.1 ** (0.74)	74.2 ** (2.21)	1.43 ** (0.013)	2.24 ** (0.050)	31.4 ** (0.76)	72.6 ** (2.30)	1.67 ** (0.023)	3.05 ** (0.056)
Unemployment interacted with								
Age group: 25-34	--	0.9 ** (0.11)	--	0.00 (0.004)	--	0.1 * (0.06)	--	-0.02 ** (0.006)
Age group: 35-44	--	2.3 ** (0.21)	--	0.02 ** (0.006)	--	-0.2 ** (0.06)	--	-0.06 ** (0.007)
Age group: 45-54	--	3.4 ** (0.29)	--	0.01 * (0.005)	--	-1.1 ** (0.08)	--	-0.12 ** (0.008)
Age group: 55-64	--	4.2 ** (0.29)	--	0.03 ** (0.006)	--	-1.2 ** (0.10)	--	-0.12 ** (0.008)
Age group: 65-74	--	0.4 (0.20)	--	-0.04 ** (0.007)	--	-3.8 ** (0.20)	--	-0.22 ** (0.012)
Age group: 75 and over	--	-6.4 ** (0.45)	--	-0.17 ** (0.012)	--	-10.9 ** (0.58)	--	-0.36 ** (0.017)

The standard errors clustered at the geographical area are in parentheses. A single asterisk (*) denotes statistical significance at the 5 percent level, and two asterisks denote 1 percent significance. All regressions are weighted least squares, with area populations used as weights. All regressions include area and year fixed effects and controls. Number of observation is 12,390.

Chapter 4: The Effect of Local Labor Market Conditions at Entry on Male Suicides in Japan

Abstract

Motivated by the empirical findings that entering the labor market during a recession reduces subsequent wages and employment prospects, this paper tests if entering the labor market during a recession increases the male suicide rate in Japan. Using age-specific suicide data, I find that entering the labor market during a recession has persistent adverse effects on the subsequent suicide risk for Japanese men.

Introduction

The effect of short-term economic fluctuations on the suicide rate has been studied extensively (see Brainerd, 2001; Andrés, 2005; and Kuroki, 2010, for example), but one area of research that has been overlooked in the literature is whether labor market conditions have long-term persistent effects on suicide risk. Rather than examining long-term effects by (arbitrarily) specifying the number of lags, I focus on the labor market conditions at entry and examine if there is a continuous influence of unfavorable labor market conditions at entry on subsequent suicide rates by using age-specific suicide data from Japan. The idea is motivated by empirical evidence (e.g. Genda et al., 2010) that entering the labor market during a recession reduces subsequent wages and employment prospects. If the initial labor market conditions have persistent effects on current income

as well as future income, then suicide rates should be affected by the labor market conditions at entry.

Japan is of particular interest because specific practices within the Japanese labor market create the labor market segregation which constrains the employment opportunities of many workers to non-regular employment, which is often associated with low wages, few benefits, and little job protection. Unlike in the United States where young workers often change jobs in order to find a better-matched career, in Japan the tightly coordinated relationship between education and employment facilitates the transition from school to work for most people, who obtain upon graduation regular jobs which are assumed to be on the lifetime employment track. However, if a high school or college student misses an opportunity to find a regular job upon graduation, he is likely to become a non-regular worker and remain so because access to the regular job market is limited to new graduates and existing regular workers (Kondo, 2007).

To my knowledge, the present study is the first to test the effect of initial labor market conditions on subsequent suicide rates. I focus on the male suicide rate because women's attachment to labor force is inherently different from that of males due to different societal expectations regarding employment status and their alternative role as wives and mothers. I find that unfavorable labor market conditions at entry increase the male suicide risk. I also find that the long-term effects are larger for older workers, possibly because the wage gap tends to be greater for older workers, and one's suicide decision depends on what he achieves in comparison with others in the same age group.

Institutional Background

Japanese firms' primary means of recruitment is the annual hiring of new graduates, and mid-career recruitment is mainly limited to relatively higher rank regular workers. Without being enrolled in a school, it is difficult to find regular employment. As Japanese economist Yuji Genda puts it, "workers get one chance to make it, and that's as a new graduate" (Ito and Fujioka, 2010). Because of this hiring practice and the underdeveloped job market for midcareer workers, some college students even delay graduation in order to qualify for student opening, and some universities allow students to stay for a fifth year for lower tuition. Even though the majority of new graduates obtain a regular job (79.8 percent for high school graduates and 90.9 percent for four-year college graduates in 1997, according to the Survey of Young Employees), the probability of becoming non-regular workers or unemployed upon graduation is also higher during a recession. The Japanese industrial relations system of strong job protection for regular employment also makes it harder for new graduates to find a regular job during a recession. Because dismissal of regular workers is severely restricted by labor law in Japan and thus is very costly, when firms need to cut back on labor costs, they put the vast majority of the adjustment onto non-regular workers and new graduates.

One is more likely to have prolonged unstable employment throughout his working life if he graduates during a recession. Those who start working at non-regular jobs experience a loss of opportunity to accumulate human capital, which further increases the probability of being trapped in non-regular employment. Furthermore, being a non-regular employee works as a bad signal which employers perceive as a lack of

employability. Kondo' study (2007) supports the negative effect of failure to land a regular job at the time of graduation on the probability of becoming regular workers in Japan.

Non-regular workers are subject to unequal treatment; as Gottfried (2008) puts it, “years of service and employment experience do not accumulate to place [non-regular] employees in line for in-house promotion, on-the-job training, or age-graded wage increases” (p. 182). Genda et al. (2010) find persistent negative effects of graduating during a recession on the probability of being employed and earnings among Japanese men, while the effects for American men are either temporary or modest. They find the effects are especially stronger for less-educated workers in Japan and attribute them to “chronic non-regular, unstable employment among those stranded out of the school-based hiring system” (p. 183). In addition to lower earnings and the higher probability of layoff, non-regular employment can bring stigmatization to male workers in Japan, where regular employment is the social norm.

Not surprisingly, many non-regular workers, who face uncertain economic futures, say they would rather be regular, permanent workers. According to *Survey of the Diversification of Employment Status, 2003* (Ministry of Health, Labour and Welfare), 21.6 percent of part-time workers and 40 percent of temporary agency workers chose to be non-regular workers because they could not find a permanent position. The fact that (i) many non-regular workers express a desire for regular jobs, (ii) access to the regular job market is limited to new graduates and existing regular workers, and (iii) firms cut back on labor costs by hiring fewer new graduates during a recession leads to my hypothesis

that the suicide rates for cohorts which entered the labor market during a recession are likely to be higher than those of cohorts which faced favorable labor market conditions at entry.

Data

The age-specific suicide data comes from *Center for Suicide Prevention, National Institute of Mental Health, National Center of Neurology and Psychiatry (NCNP)*. NCNP divides the period 1983-2007 into five periods (1983-1987, 1988-1992, 1993-1997, 1998-2002, and 2003-2007) and provides the average suicide rates over these 5-year periods. The suicide rate is measured at the “secondary-medical-care area” level. Each secondary-medical-care area consists of multiple neighboring municipalities and is defined as the area that can provide almost all hospital medical services. There are 354 secondary-medical-care areas in Japan. Since there are 47 prefectures and approximately 1,800 municipalities, the secondary-medical-care areas can be considered as somewhere between prefectures and municipalities. The data provides the suicide rate for the seven 10-year age groups. I use age groups 25-34, 35-44, 45-54. Age group 15-24 is excluded because current and initial labor market conditions are the same for this group. Age groups 55-64, 65-74, and 75 and over are excluded because there is no data on local labor market conditions at entry for these older age groups.

Explanatory variables come from *Portal Site of Official Statistics of Japan*. All explanatory variables are measured at the prefectural level. For annual explanatory variables, averages over each period were calculated so that explanatory variables will be

consistent with the suicide data. I use two measures of local labor market conditions: male unemployment rates as the proxy of economic conditions and the job opening-to-application ratio as a macro index of labor demand. I assign each age group a vector of past (at entry) and current local labor market conditions. Table 1 shows the labor market entry periods for each age groups, which are used to construct variables for local labor market conditions at entry. The number of observations is 1,770 (354 areas and 5 periods) for age group 25-34, 1,062 (354 areas and 3 periods) for age group 35-44, and 354 (354 areas and 1 period) for age group 45-54. Thus, a total number of observations equals to 3,186.

Results

I run three specifications: two separate regressions for the two measures of labor market conditions, and one regression which includes both measures. Control variables are log area income, divorce rates, female labor force participation, and crime rates. All specifications include dummies for area fixed effects, age group specific effect, and time-specific effect, which control for time-invariant area factors, age group characteristics, and nationwide time effects, respectively.

Table 2 shows the effect of past and current labor market conditions on the log of the male suicide rates. All the coefficients have expected signs; unemployment increases suicides while the job opening-to-application ratio decreases suicides. When the dependent variable is measured in levels, both the current unemployment rates and unemployment rates at entry have positive and statistically significant effect on male

suicides in specification (a). Both the current job opening ratio and the job opening ratio at entry have statistically significant negative effects in specification (b). However, only the job opening ratio variables remain statistically significant when both measures of local labor market conditions are included in specification (c).

When the dependent variable is measured in natural logs instead of levels, both labor market conditions at entry are highly significant. Using the coefficients from specification (f), a one percentage point increase in the prefectural male unemployment rate at entry contributes to 3.7 percent increase in the male suicide rate, and a one point increase in the job opening ratio at entry decreases the male suicide rate by 4.1 percent. Overall, a strong relationship exists between male suicide rates and local labor market conditions at entry. Male suicides are not only responsive to contemporaneous labor market conditions but also are affected by the labor market condition at entry.

Next, to test the hypothesis of differential effects across age groups, I interact age dummies with the local labor market conditions at entry and allow the effect to vary across age groups. Table 3 shows the results. The unemployment rates at entry have uniformly and significantly positive effects on male suicide rates across age groups, but the effects are stronger for age groups 35-44 and 45-54. The job opening ratio at entry does not have statistically significant effects on age group 25-34 but reduces the male suicide among age groups 35-44 and 45-54. Overall, the effects of labor market conditions at entry on male suicides are stronger for age groups 35-44 and 45-54, whether the male suicide is measured in levels or natural logs. One possible explanation is that the relative position and income are likely to be lower for non-regular workers in older age

groups. Economists have found that people are concerned about their position on the income and social ladder. Since non-regular workers are not covered by the seniority wage system in which employees' wages are closely tied to their age and tenure, the wage gap between regular workers and non-regular workers is bigger for older workers.

Conclusion

In Japan, the labor market is divided into two discontinuous segments: regular and non-regular employment. Those men who entered the labor market during a recession are more likely to be non-regular employees and face lower income and more uncertain economic futures than regular employees. The present study tests the hypothesis that unfavorable labor market conditions at entry increase the subsequent suicide risk for men and finds the statistically significant relationship. That not only contemporaneous labor market conditions but also initial labor market conditions are important determinants of the male suicide risk in Japan represents important contributions to this line of research.

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Tables

Table 1. Labor market entry periods for each age group

	1983-1987	1988-1992	1993-1997	1998-2002	2003-2007
Age group:					
25-34	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
35-44	-	-	1973-1977	1978-1982	1983-1987
45-54	-	-	-	-	1973-1977

Each entry into the table gives the period for which each age group entered the labor market. For example, for someone who was in the age group 25-34 during the period 1993-1997, it is assumed that his entry into the labor market was during the period 1983-1987.

Table 2. The effect of local labor market conditions on male suicide rates

	Nominal male suicide rate			Log male suicide rate		
	(a)	(b)	(c)	(d)	(e)	(f)
Unemployment Rates at entry	1.5 *** (0.58)	-	0.9 (0.61)	0.044 *** (0.012)	-	0.037 *** (0.013)
Current Unemployment Rates	1.8 * (1.03)	-	1.6 (1.02)	0.034 ** (0.014)	-	0.033 ** (0.017)
Job opening ratio at entry	-	-3.5 *** (0.83)	-3.4 *** (0.76)	-	-0.047 *** (0.018)	-0.041 *** (0.015)
Current job opening ratio	-	-3.9 ** (1.59)	-3.3 ** (1.67)	-	-0.047 (0.034)	-0.036 (0.034)

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the prefectural level are shown in parentheses. All regressions are weighted least squares, with prefecture populations used as weights. Area, year and age dummies are included. Control variables include log area income, divorce, female labor force participation, and crime rate. Number of observations is 3,186.

Table 3. The effect of local labor market conditions on male suicide rates: Differential effects across age groups

	Nominal male suicide rate			Log male suicide rate		
	(a)	(b)	(c)	(d)	(e)	(f)
Unemployment Rates at entry interacted with:						
Age Group 25-34	1.1 *	-	2.1 ***	0.035 ***	-	0.050 ***
	(0.56)		(0.65)	(0.011)		(0.012)
Age Group 35-44	2.9 ***	-	3.2 ***	0.067 ***	-	0.062 ***
	(0.51)		(0.58)	(0.010)		(0.013)
Age Group 45-54	4.3 ***	-	2.9 ***	0.069 ***	-	0.060 ***
	(1.65)		(1.00)	(0.024)		(0.020)
Current Unemployment Rates	1.2	-	0.2	0.029 **	-	0.020
	(1.13)		(0.79)	(0.014)		(0.016)
Job opening ratio at entry interacted with:						
Age Group 25-34	-	0.2	0.2	-	0.001	0.007
		(0.69)	(0.72)		(0.017)	(0.015)
Age Group 35-44	-	-5.0 ***	-3.7 ***	-	-0.095 ***	-0.077 ***
		(1.47)	(1.25)		(0.032)	(0.028)
Age Group 45-54	-	-8.4 ***	-8.2 ***	-	-0.080 **	-0.075 **
		(2.95)	(3.09)		(0.033)	(0.033)
Current job opening ratio	-	-3.5 **	-3.6 **	-	-0.058 *	-0.055 *
		(1.43)	(1.48)		(0.033)	(0.033)

* denotes significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level. Standard errors clustered at the prefectural level are shown in parentheses. All regressions are weighted least squares, with prefecture populations used as weights. Area, year and age dummies are included. Control variables include log area income, divorce, female labor force participation, and crime rate. Number of observations is 3,186.