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GENERAL SURVEY

More Than Half the Unemployed Have No Income: Government Survey

On September 27, the *Survey on the Circumstances of Job-Searchers* was released by the Ministry of Public Management, Home Affairs, Posts and Telecommunications. The survey focuses on the difficulties unemployed people have in making ends meet financially. This survey found that more than half of all the unemployed had no income: among those who did have income, more than half depended on pension payments or unemployment benefits. At the same time, the survey revealed that in many cases jobless heads of households financed their living expenses from their unemployment benefits, pension payments or withdrawing from savings.

In Japan, the number of unemployed has continued to increase sharply since the mid-1990s. In particular, the increase in the number of long-term unemployed — those without a job for more than a year — is regarded as one of the most serious issues facing society.

The survey, designed to shed light on the plight of the unemployed, was first conducted in April and May 2002. The subjects were unemployed people in approximately

20,000 households; questions included their sources of income, whether or not they receive unemployment benefits, and what activities they have undertaken to improve their skills. Those who had no jobs but had stayed in the job market (the unemployed) were asked about the progress of their job-searching activities, while those who had given up looking for a job and left the labor market were asked about the prospects of resuming job-hunting and other questions.

According to the survey, of the 3.74 million unemployed, 1.9 million (51%) had no income in the month prior to when the survey was taken, followed by 760,000 people whose main income source was unemployment benefits, and 330,000 with income from pension payments. With the exception of those 55 years old and older, the majority of all other age groups received no income. This is particularly noticeable in the groups comprising those aged 25 to 34 and 15 to 24, at 600,000 and 540,000 people, respectively. On the other hand, the largest proportion, 300,000, of those aged 55 and older cited pension payments or benefits as their main income source. (See Statistical Aspect on page 3.)

Where households with unemployed heads are concerned, the largest proportion, 23.6 percent, financed their living expenses in the month prior to the survey with pension payments, followed by 22.2 percent who

relied on unemployment benefits, and 20.8 percent on savings or other assets. On the other hand, households which answered that they financed their living expenses with the wages or salaries of spouses or other family members accounted for only 15.3 percent.

The number of unemployed who were receiving or would soon be receiving unemployment benefits totaled a mere 1.03 million, whereas those who were not receiving any benefits numbered an overwhelming 2.54 million. Incidentally, the duration of eligibility for unemployment benefits varies depending on the kind of work contract one had at his/her last job (regular or otherwise); the reasons for leaving his/her last job (voluntary termination or otherwise); and age. Of the unemployed people who had previously worked as regular workers, 800,000 were receiving or would receive unemployment benefits, outnumbering the 660,000 who were not receiving benefits. On the other hand, in cases where an unemployed person was employed as a non-regular employee, such as a part-time or temporary worker, some 80 percent, or 600,000, were not receiving unemployment benefits.

WORKING CONDITIONS & THE LABOR MARKET

The Effects of Deflation on Wages and Pension Payments

In July and August, guidelines concerning legal minimum wage levels, pensions, and salaries of national public servants were revised in ways that signalled a serious impact from deflation.

On July 26, the Central Commission concerning Minimum Wage Levels, a consultative body of the Ministry of Health, Labour and Welfare comprising employer, labor union and public interest representatives, after considering criteria for minimum wage levels in each region, recommended to the minister that the current levels should remain unchanged. Since fiscal 1978 the council has been responsible for recommending revisions to the minimum wage in individual regions. In fiscal 2001, the council had recommended an increase of 0.68 percent, until that time the lowest increase. However, this was the first year that the council recommended freezing the minimum wage, based on the fact that some 60 percent of private business establishments maintained or lowered their present wage levels. Following this recommendation, individual prefectures will discuss and determine their new minimum wage levels.

Pension payment levels are determined by the Law concerning the Employees' Pension Plan, which stipulates a sliding scale whereby the level of pension payments fluctuates in accordance with the fluctuation of consumer prices the previous year. Since fiscal 2000, the government has frozen pension payments, based on the decrease in consumer spending, despite continuing deflation. This year, however, the decision reached on August 1 was to lift the freeze and reduce payments from fiscal 2003 based on persistent deflation and cuts in public servants' salaries described below. The amount by which payments will be reduced has not yet been decided; the Ministry of Finance insists that the drop in prices during the previous three years, when payments were not tied to

Statistical Aspect

Recent Labor Economy Indices

	August 2002	September 2002	Change from previous year (September)
Labor force	6,732 (10 thousand)	6,717 (10 thousand)	-36 (10 thousand)
Employed ⁽¹⁾	6,371	6,353	-43
Employees ⁽¹⁾	5,363	5,342	-2
Unemployed ⁽¹⁾	361	365	8
Unemployment rate ⁽¹⁾	5.4%	5.4%	0.1
Active opening rate ⁽¹⁾	0.54	0.55	-0.02
Total hours worked ⁽²⁾	148.7 (hours)	151.8 (hours)*	-0.6
Monthly cash earnings ⁽²⁾	300.5 (¥ thousand)	281.8 (¥ thousand)*	-1.0

Notes: ⁽¹⁾ Seasonally-adjusted figures.

⁽²⁾ Figures refer to establishments employing five or more people.

*Preliminary figures.

US\$1= ¥122 (November 1, 2002)

Source: Ministry of Public Management, Home Affairs, Posts and Telecommunications, *Rōdōryoku Chōsa* (Labour Force Survey); Ministry of Health, Labour and Welfare, *Shokugyō Antei Gyōmu Tōkei* (Report on Employment Service), *Maitsuki Kinrō Tōkei* (Monthly Labour Survey).

deflation, must be taken into account, whereas the Ministry of Health, Labour and Welfare insists that only the decrease during fiscal 2002 should be taken into consideration. In the Finance Ministry's scenario, a model recipient of the Employees' Pension Plan (¥238,000 [US\$1,950] for a married couple) will see a monthly drop of ¥5,500, while the decrease for National Pension Plan model recipients (¥134,000 [US\$1,098] for a married couple) will be ¥3,000 per month. According to the Ministry of Health, Labour and Welfare, the reductions will be ¥1,500 for the Employees' Pension Plan and ¥800 for the National Pension Plan. The two proposals are to be adjusted in due course.

Following a fall in wages in the private sector, on August 8 the National Personnel Authority submitted to the Cabinet and the Diet a recommendation to reduce the monthly salaries and bonus payments of 480,000 national public servants engaged in clerical work. In Japan, national public workers are forbidden to call for strike action; instead, their wages are annually revised in accordance with recommendations of the National Personnel Authority. It was the first time for the Authority to recommend a decrease in monthly salaries since this system began in 1948. Normally, the Authority compares the wages of employees in private firms with those of the national government as of April, calculates and examines the differentials, and releases recommendations for revisions in the summer. Recently, many private business establishments have not given raises in basic payments and regular pay hikes, or even reduced the wages of

employees, leaving the salaries of public servants higher than those of their counterparts in the private sector. In the last three years, the National Personnel Authority had reduced the bonus payments of public servants as a means of alleviating this wage differential. However, the wage gap between the two sectors widened to ¥7,770 per month this year, a substantial difference accounting for 2.03 percent, leading the council to recommend a decrease in monthly wages and the abolition of special lump-sum payments (i.e., bonus payments in March). The recommendations are to be completely reflected in actual wages, meaning that an average annual salary of a public servant will be ¥6.274 million, a decrease of about ¥150,000.

HUMAN RESOURCE MANAGEMENT

Number of Employees Suffering from Depression Increases

More than half of all firms agree that mental illness has been increasing in the workplace, and a majority, 72.3 percent, cited depression as the most common illness, according to results of a questionnaire concerning mental health released in August by the Mental Health Research Institute of the Japan Productivity Center for Socio-Economic Development. The survey, carried out in March, targeted people in charge of personnel management at 2,669 firms listed on one of the markets. Usable replies were received from 282 firms.

Statistical Aspect

Number of Unemployed by Monthly Income Source

(thousand people)

	Total	Wage/Salary	Pension payments	Unemployment benefits	Support from parents	No income	Other
Total	3,740	250	330	760	70	1,900	260
Age group							
15-24	770	60	-	60	30	540	50
25-34	990	40	10	210	30	600	70
35-44	510	50	0	60	0	300	50
45-54	650	60	20	220	0	270	30
55 and older	830	40	300	210	0	180	40
Position of the unemployed family member							
Head of household	1,080	100	240	280	0	310	100
Spouse of householder	570	30	30	160	0	300	30
Other family member	1,700	100	20	250	0	1,160	90
Single-person household	390	30	40	60	60	130	30

Asked about mental illness at the workplace, nearly half, 48.9 percent, of the firms surveyed answered that it had become more common. By company size, this represented 34.6 percent of firms with less than 1,000 employees, 55.1 percent of firms with 1,000 to 2,999 employees, and 61.5 percent of firms with 3,000 or more employees, showing that the large companies are more likely to face serious problems concerning the mental health of employees.

Concerning the nature of mental illness, 72.3 percent of the firms surveyed said that overwhelmingly the most common type of disease was depression. Among firms with 3,000 or more employees, the figure stood as high as 84.6 percent, leading the Institute to regard the mental depression prevailing in recent years as a syndrome characteristic of employees at large companies. Other psychological disorders, though much less frequent, include psychosomatic disorders (9.2%) and neuroses (8.5%). The number of firms which had employees on leave for more than a month due to mental illness was 58.5 percent, more than half the firms surveyed; among firms with 3,000 or more employees, the figure was nearly 90 percent (89.7%).

In line with this, an increasing number of firms have set up counselling bodies within the company. By size, 57.0 percent of firms with fewer than 1,000 employees, 76.4 percent of those with 1,000 to 2,999 employees, and 91.1 percent of those with 3,000 or more employees had such internal counselling bodies. Asked about specific measures to improve employees' mental health, a majority answered readjusting the volume of assignments (58.5%), and reducing long working hours and holiday work (54.6%). Despite this, 44.7 percent of the firms adopting such measures gave negative answers to a question concerning whether or not they had any fixed criteria, showing that nearly half had no clear standards for improving mental health.

The Institute investigates whether or not the individual worker can feel improvement in the productivity of his/her own work, the workplace, and the company as a whole, and uses this as a barometer of the employee's mental state. They suggest that while firms should pursue the health, safety, and peace of mind of individual employees on the one hand, they should also seek to improve company productivity and organizational efficiency.

Where long-lasting, hard assignments that could bring about cumulative exhaustion are concerned, in February the Ministry of Health, Labour and Welfare issued a written notice entitled "Comprehensive Measures for the Prevention of Health Disorders Due to Overwork." This notice states that when employees work more than 45 hours of overtime per month, the Labour Standards Inspection Offices should carry out supervisory guidance of the employers concerned, calling for the following mea-

asures:

- (1) The employers must provide industrial physicians with information on the workers in question, such as work environment, working hours, frequency and total hours of night work, past medical records, and so on. The employers in return will receive advice and recommendations from the physicians concerning health management at the workplace.
- (2) In cases where overtime exceeds 100 hours per month or where the monthly average overtime for two to six months exceeds 80 hours, the employers, in addition to the requirements detailed above, should have the workers receive health counselling from industrial physicians. The workers in question should also have medical checks focusing on the items the physician finds necessary, and take into account the results and the opinions of the physician in taking appropriate follow-up measures. (For more information on *karo-jisatsu* — suicide as a result of overwork — see the "Special Topic" column of the November 2000 issue of the *Japan Labor Bulletin*.)

PUBLIC POLICY

New Law Lays Responsibility on Government to Help Homeless Return to Society

On July 31, the first law concerning the homeless was enacted. The "Law for Special Measures concerning Support for Independence of the Homeless" clearly states that measures to help homeless people return to society and to prevent more people from becoming homeless are the "responsibility" of the national and local governments.

Article 1 of the law lays out the current situation: there are a number of people who want to work, but for whatever reason are homeless, leaving them unable to live physically and culturally healthy lives; and that discord between the homeless and local communities is increasing.

The government first took action on projects to help homeless people in 1999 (see the August 1999 issue of the *Japan Labor Bulletin*), but the situation has continued due to the prolonged recession. In many cases, they cannot receive any kind of social security because they cannot provide a home address, or because they are still of working age. At the same time, however, homeless people are rarely offered a place to reside or opportunities to work, having been left outside the scope of governmental supportive measures.

The law now coming into effect is noteworthy in the sense that it clearly mentions the liabilities of the national and local governments with respect to supporting homeless people return to society, and of precluding any further increase in their number. Specifically, the administrative bodies are required to draw up and effect compre-

hensive measures concerning the following three items:

- (1) The following measures should be taken for those who wish to become independent: try and secure stable jobs for them; secure employment opportunities by providing training to develop vocational abilities; and safeguard places for them to live, along with providing health care and medical treatment. This is to be combined with counselling and recommendations concerning lifestyles, in an effort to help the homeless rehabilitate themselves.
- (2) In cases where there are a large number of people in danger of having to live without a home, measures should be taken to secure employment opportunities, to conduct counselling and guidance on lifestyles, and to assist them in other ways so that they do not end up homeless.
- (3) Measures to be taken to resolve the problems of homeless people include offering temporary accommodation; providing necessary goods and other urgent assistance; caring for them under the Social Security Law; protecting their human rights by, for example, organizing campaigns to inform the public about their problems; and improving their living environment and safety in the local community.

The new law also states that the government should conduct nationwide surveys of the condition of homeless people, and that the ministers of Health, Labour and Welfare, and of Land, Infrastructure, and Transport should take the results into account in setting up basic policies to help homeless people become independent.

On the other hand, as many homeless now live in parks and other public facilities in urban areas, the law stipulates that measures to support the rehabilitation of the homeless should be coordinated with the need to ensure that such facilities are properly used in accordance with legal regulations.

Number of Unemployed Youth Rises

As many as 280,000 young people were without an occupation — neither going on to higher education nor having a job — after graduation from university, two-year colleges or high school in March. According to the Ministry of Education, Culture, Sports, Science and Technology, the figures were 119,000 university graduates, 25,000 two-year college graduates, and 138,000 high-school graduates. The percent of these graduates to graduates as a whole was the second highest ever, 21.7 percent, among university graduates, and a record high, 10.5 percent, among high school graduates.

The prolonged economic recession and poor business performance obliged firms to cut back on recruitment of new graduates, resulting in a reduction in the number of jobs for young people. A particularly serious situation has been developing among high-school graduates: the

employment rate among new high school graduates was a record low at the end of June, and the ratio of the number of job openings to the number of job-searching high school students due to graduate next March stood at 0.5 (as of the end of July 2002), the lowest ever.

In line with this, the Ministry of Health, Labour and Welfare has been reinforcing its supportive measures toward out-of-work high school graduates. (Concerning job-searching activities of high school graduates, see the April, May and June 2002 issues of the *Japan Labor Bulletin*.) A particular emphasis, among other measures, is being placed on a project aimed at finding young people regular employment by subsidizing employers (¥50,000 per job/month) who hire people under 30 years old on a fixed-term basis (basically three months). This measure enables employers to minimize the initial cost of hiring, and to sort out and select competent workers while judging the suitability and ability of workers hired on the basis of a fixed-term job contract. From the point of view of young people, this can serve as a good opportunity to experience an actual work environment. The project has been in operation since last December, and the government earmarked ¥9.3 billion to cover 50,000 people, though, as of the end of July, applicants totalled only 15,902, of whom a mere 6,096 completed their fixed-term contracts. Despite this, of those who completed their contracts, quite a high proportion, 73 percent, succeeded in switching their contracts to a regular one. The ministry aims to improve the performance of this fledgling project, calling for allocation to cover 55,000 people in the next fiscal year.

A recovery of the economy will surely improve the job market for new graduates and other young job seekers, but, at the same time, in recent years the number of young people referred to as “parasite singles,” who allow themselves to rely utterly on their parents for their livelihoods, has been increasing. (Concerning “parasite singles,” see the “Special Topic” column in the March 2000 issue of the *Japan Labor Bulletin*.) What is more, it has been found that the younger generation tends to give up jobs at an early stage; 70 percent of junior high school graduates, 50 percent of high school graduates, and 30 percent of university graduates leave their first jobs within three years. An increase in the number of young workers who fail to concentrate on their job careers and repeat random job switching may well reduce the number of workers fitted to take charge of the future progress of Japanese firms’ technologies, as well as producing negative effects on the economy as a whole. The ministry now plans efforts to encourage school children to form their own views on various vocations and on the meaning of work, through, for example, the adoption of programs in which junior high and high school students visit workplaces and experience work themselves.

Special Topic

The Internal Labor Market and Industrial Accidents in Japan*

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1. Introduction

In everyday life, people are faced with various dangerous, unexpected events that sometimes result in death, such as becoming ill or injured. It is impossible to escape from such risks, including disasters at the workplace, known as industrial accidents. An industrial accident is defined more accurately as sickness or injury caused by work, or that which occurs while commuting to or from work⁽¹⁾. Since most adults spend almost eight hours a day working, it is to be expected that there is a large number of industrial accidents. Industrial accidents involve not just the employee who is injured, but the entire family, as the accident may either temporarily or permanently disable the worker. Therefore, to improve the welfare of a country and to promote industrial prosperity, it becomes vital to establish a system of compensation for workers who suffer from industrial accidents and to suppress the occurrence of such accidents.

With the development of modern “hazardous” industries such as mining, railroad and manufacturing, developed countries instituted industrial accident compensation systems one after another. Safety and health laws were also established in order to prevent industrial accidents. In Japan, the Workers’ Accident Compensation Insurance Law was enacted in 1947, which provides for compensation to workers who have suffered from industrial accidents. In 1972, the section of the Labour Standards Law relating to safety and health was separated out to become its own law, known as the Safety and Health Law⁽²⁾. Currently, both systems are in place, and are comparable to the most developed systems in the world.

Parallel to the development of these systems, research related to industrial accidents has rapidly gained in importance. This is particularly true regarding workmen’s compensation insurance and effective safety and health methods. However, at least in Japan, it appears that there have been few reports dealing with an economic analysis of industrial accidents. In this paper, the author would like to examine some problems related to industrial accidents which have not been dealt with extensively up until now. First, the author will examine the determinants of industrial accident probability. When devising future

accident prevention measures, it is important to understand the determinants of industrial accident occurrence rates. Second, the author examines the impact that these occurrence rates and safety and health activities undertaken by firms have on the average tenure of a worker. There are numerous research reports that delve into the Japanese separation rate (or tenure) equation, but only a few have explicitly taken into account the effect that industrial accidents and safety and health activity have on this equation. This paper attempts to fill this gap. The data used in this paper is only aggregate. Therefore, while a significant first step, the conclusions should be viewed as provisional.



A basic hypothesis in this paper is that frequency and severity of industrial accidents are related to the degree of “internalization” of the labor market. A firm that requires a high level of firm-specific skills has an incentive to lengthen the average tenure of its employees. The longer an employee works at the same firm, the more likely that worker will be able to avoid dangerous situations, since longer average tenure is associated with better handling of particular machinery. On the other hand, because longer tenure is directly related to higher productivity in a firm requiring a high level of specific skills, such a firm will try to extend the average tenure of workers by lowering the frequency and severity of industrial accidents. This interdependence between industrial accidents and tenure is one of the important points addressed in this paper. Furthermore, the impact that an aging labor force has on industrial accident occurrence is also discussed in this paper.

This paper is organized as follows. In the next section, a long-term transition of industrial accidents is observed and factors determining the frequency of industrial accidents are discussed. In Section 3, a more detailed examination is carried out using data classified by industry and firm size. Section 4 contains a summation.

2. Industrial Accident Trends

Let us first examine the recent situation. According to data from the Labour Standards Bureau of the Ministry of Labour⁽³⁾, which is in charge of collecting all industrial accident data, in 1999 the number of people requiring four days or more off work stemming from injuries was 137,316; of that figure 1,992 people died. The number of those killed or injured exceeded the figures for the previous year, although the numbers for both years were low. The construction industry suffered the most number of deaths (794), followed by manufacturing (344), and land freight transportation (270). The large number of deaths in construction and manufacturing stems from their blue-collar nature. On the other hand, traffic accidents were the major cause for death in the land freight traffic business.

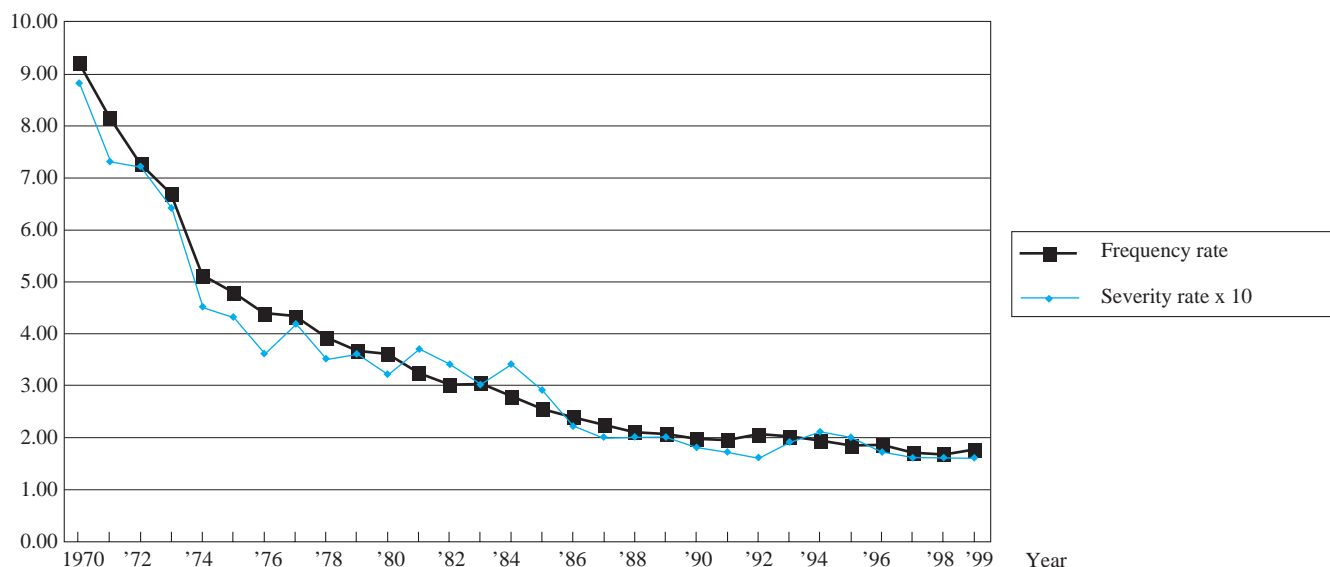
In 1998, there were 8,574 cases of illnesses acquired on the job: a 0.2 percent increase over the previous year, although that was the sixth consecutive year of fewer than 10,000 cases. The industry that recorded the most number of illnesses was manufacturing (2,457 cases), followed by construction (1,364 cases), and transport/traffic (1,100 cases). As for the reason, 70 percent originated as injuries suffered during the course of work. Among these, lumbago constituted the largest share (81.6%), followed by pneumoconiosis and associated complications (14.0%). Diseases which have seen a considerable increase recently are mental disorders and suicide due to psychological burdens related to work. In 1999, the Ministry of Labour issued guidelines concerning mental disorders stemming from work-related psychological burdens, which facilitated the process of

applying for workers' compensation. In the same year, 155 applications were filed, 3.7 times⁽⁴⁾ the previous year (42 cases).

Let us consider the factors determining industrial accident occurrence by examining the accident occurrence rate over a long period. Data on industrial accidents, their frequency (frequency rate) and severity (severity rate) for the 30 years from 1970 to 1999 can be found in the *Survey on Industrial Accidents* published by the Ministry of Labour. The frequency rate is defined as the number of people killed and injured from industrial accidents for every one million actual hours worked (death and absence of one day or more). On the other hand, the severity rate is defined as the number of work days lost due to industrial accidents per 1,000 actual hours worked⁽⁵⁾. This survey includes those businesses that employ 10 or more regular workers, however it only covers long-term trends for enterprises that employ 30 or more regular workers. This is the data we use below.

Figure 1 shows changes in the industrial accident occurrence rate. Noticeable is the decrease from 1970 to 1999 both in terms of frequency and severity. In 1970, the frequency rate was 9.2 and the severity rate was 0.88. However, in 1999 the rates were 1.74 and 0.16 respectively, about one-fifth the figure for 1970. No doubt this downward trend was brought about by higher consciousness on the part of both employers and employees and also safer equipment. Moreover, as the economy shifted to the service industries, thereby reducing the number of people who worked in industries with a high industrial accident occurrence rate, the overall industrial accident occurrence rate decreased. Furthermore, there is the pos-

Figure 1. Industrial Accident Rates



Source: Ministry of Labour, *Survey on Industrial Accidents*.

sibility that shorter work weeks have meant that workers were less tired and more alert on the job.

The figure also shows another interesting tendency: industrial accidents decreased remarkably until the latter half of the 1980s, however, since then they have not decreased very much. Since it is impossible to have an occurrence rate of 0 or less, it seems natural that the rate of decrease would become smaller with time. However, one must take into consideration the aging factor, which has had a positive impact on the industrial accident occurrence rate. As people get older, it becomes more difficult to avoid dangerous events. Thus, as the labor force ages, there is a higher industrial accident occurrence rate. Moreover, stationing older workers in sectors with a high accident occurrence rate will also contribute to higher rates.

To confirm these points, a simple regression analysis was done. The dependent variable is the logarithm of the frequency and severity rate from 1970 to 1999. The independent variables are as follows. First, the share of white-collar workers (special job or technical worker, managerial worker, clerical worker) is used. We can predict that the accident occurrence rate will decrease with this group. Second, the share of those 55 years old or older in the workforce is used as an index of the aging of the overall workforce. It is expected that this will increase the occurrence rate. These variables were calculated from the *Labour Force Survey* (by the Management and Coordination Agency). Third, the total actual working hours (index: 1995=100) published in the *Monthly Labour Survey* by the Ministry of Labour is used to represent the tiredness factor. Thus, this variable is also expected to increase the industrial accident occurrence rate. Fourth, constant term and a trend variable are also used as independent variables. The method of estimation is maximum likelihood assuming first-order autocorrelation of the error term.

The estimated results are in Table 1. The equations fit the data well and the signs of the independent variables are as expected. However, there is variation concerning

significance. The effects of the share of older workers and the trend term are significantly noticeable in both the frequency and severity rates, but the share of white-collar workers is significant only for the frequency rate (for the severity rate, it is significant at the 15% level). The significance of total working hours is low in both cases.

The share of elderly has the highest explanatory power among the independent variables, which raises an interesting hypothesis: The slowdown in the decrease in the industrial accident occurrence rate from late 1980s can mainly be accounted for by the aging of the workforce. A simple simulation exercise was done to verify this. Some predicted values are calculated using the estimated equation for the frequency rate. When the share of elderly is fixed at the 1988 value, the predicted frequency rate in 1999 becomes 0.49, while the actual figure is 1.74. It can be inferred from this large difference that the aging of the workforce had a big impact on the frequency rate.

The Japanese workforce is now rapidly aging. Furthermore, it is predicted that many older people will stay in the workforce due to the raising of the age at which one can receive pensions. The result obtained here suggests the possibility that without more effective safety and health activities, the industrial accident occurrence rate will rise in the future.

3. Further Empirical Investigation

3.1. A Theoretical Consideration

It seems worthwhile to theoretically look at the relationship between the average length of tenure and industrial accidents before proceeding with more detailed empirical investigation. In Ohta (2001a), the author constructed a simple theoretical model of a firm, in which the optimal level for industrial accidents was chosen by the firm⁽⁶⁾.

In the model it is assumed that a firm can control the frequency of industrial accidents. However, reducing the accident rate will place a financial burden on the firm.

Table 1. Estimated Results for Industrial Accident Rates (Time-series Analysis)

	Constant	White-collar share	Elderly share	Working hours index	Trend		Std. Error	D.W.
Frequency rate	1.61 (1.46)	-11.4*** (-4.33)	25.2*** (8.98)	0.0092 (1.51)	-0.0807*** (-5.52)	0.252 (1.30)	0.0524	1.91
Severity rate	-1.53 (-0.557)	-9.62 (-1.53)	20.2*** (2.72)	0.0157 (1.00)	-0.0683* (-1.86)	0.446*** (2.56)	0.115	1.95

Notes:

1. is the term for autocorrelation. See the text for sources and definitions of the variables, yearly from 1970 to 1999.

2.*** indicates significance at the one percent level, and * at the 10 percent level. T-values are in parentheses.

Now the firm faces a trade-off: When the firm reduces the number of industrial accidents, the welfare level of the employees increases, and the turnover will be lower. This will enhance investment in firm-specific skills by workers, which in turn raises the productivity level of the firm. On the other hand, reducing industrial accidents entails various costs. Installing safer machinery in the workshop, reducing the pace of work, more active safety and health activities are some examples. In this case, there can be an optimal level of industrial accidents for the firm. To achieve an accident level below optimal is too costly; above the optimal level induces too much of a labor turnover. This argument leads to an interesting hypothesis: The frequency of industrial accidents in a firm requiring a high level of firm-specific skills tends to be low because the firm finds it more profitable to reduce

the number of industrial accidents and to raise the retention rate of its employees.

It is also clear from this argument that the average length of tenure (or separation rate) and the industrial accident occurrence rate are simultaneously determined variables. Workers in a firm with many accidents will try to leave this firm, which makes the average tenure at the firm short. On the other hand, a firm that highly evaluates firm-specific skills tends to have a longer average tenure, and attempts to reduce its turnover rate by overcoming industrial accidents. Thus, when estimating an industrial accident equation with average tenure as an independent variable, it is reasonable to treat it as an endogenous variable. This also applies when estimating the average length of tenure with the frequency of industrial accidents as an independent variable.

Table 2. Estimated Industrial Accident Rates Classified by Industry and Firm Size

Independent variables	(1)	(2)	(3)	(4)	(5)
	Prediction	Estimated Results			
		Frequency rate		Severity rate	
Total working hours	+	0.0357 (1.13)	0.0400 (1.32)	0.00004 (0.0053)	0.00342 (0.444)
Value added per worker	+	11.2*** (5.74)	9.54*** (5.48)	0.893** (2.52)	0.711** (2.31)
Share of high school graduates	+	-1.70 (-1.38)	-0.812 (-0.616)	0.257 (1.16)	0.181 (0.673)
Share of female workers	-	-3.97*** (-4.40)	-4.68*** (-5.72)	-0.571*** (-3.46)	-0.501** (-3.79)
Share of elderly	+	23.0*** (5.60)	19.2*** (3.90)	2.11** (2.91)	1.34 (1.46)
Average wage	-	-3.97*** (-5.36)	-3.32*** (-4.26)	-0.434*** (-4.13)	-0.355** (-2.76)
Average tenure	-	-0.648*** (-5.70)	-0.590*** (-5.30)	-0.0363* (-1.70)	-0.035 (-1.50)
Industry dummies		No	Yes	No	Yes
Firm-size dummies		Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes
Standard Error		1.13	1.11	0.238	0.238
Adjusted R-squared		0.756	0.766	0.312	0.317

Sources and Definitions:

1. Total working hours: actual number of scheduled hours worked in a month plus the actual number of overtime hours worked.
2. Value added per worker: value added per worker divided by WPI (1995=100).
3. Share of elderly: share of male high school graduates 55 years old or older.
4. Average wage: average wage of male senior high school graduates aged 30 to 34 with 10 to 14 years of tenure.
5. Average tenure: average tenure of male senior high school graduates aged 40 to 44.
6. The variables except for value added per worker are from the *Basic Survey on Wage Structure*, Ministry of Labour.
7. Value added per worker is from the *Industry Statistics Table*, Ministry of International Trade and Industry.

Notes:

1. The weighted instrumental variable method was used. Heteroscedasticity consistent estimates.
2. T-values are in parentheses. The number of observations was 384.
3. *** indicates significance at the one percent level, ** at the five percent level, and * at the 10 percent level.

3.2. Estimating Industrial Accident Equations

In this section, factors determining industrial accident occurrence rates are examined in greater detail⁽⁷⁾. This study used frequency and severity rates classified by industry and firm size, which were collected from the *Industrial Accident Trend Survey*. This included 18 manufacturing industries divided into five categories depending on the number of employees, i.e., 30 to 99, 100 to 299, 300 to 999, 1,000 to 4,999, and 5,000 or more. In addition, data from 1993 to 1997 were used.

The following were used as independent variables: total actual working hours, real value added per worker, the share of high school graduates, the share of female employees, the share of older workers, the average wage of employees with relatively long tenure, average tenure, three industry dummies⁽⁸⁾, four firm-size dummies, four-year dummies, and constant term. How working hours and the share of elderly affect industrial accidents has already been discussed in the previous section.

Real value added per worker is introduced to capture the work strength per unit time. A positive effect on

industrial accident rates is expected for this variable. The share of high school graduates is used to represent the share of blue-collar workers, the latter of which cannot be calculated from published data for medium group industry classification. In this case, a positive effect is again expected. If there are many women workers in a particular industry, indicating that the workload in that industry is not very heavy, one can expect few industrial accidents, and therefore a negative effect. The average wage of workers with relatively long tenure is used to measure the merits of long-term employment relationships⁽⁹⁾. In this case, a negative sign is also expected. In industries where workers tend to stay for long periods of time, there is a tendency for fewer industrial accidents, mainly because workers are more familiar with their machines and have become skillful at handling them. Thus, a negative effect is expected in this case also. The forecast results are indicated in the first column of Table 2.

The dependent variables were the frequency rate and the severity rate classified by year, industry and firm size.

Table 3. Estimated Results of Average Length of Tenure

Safety and health variables	Safety and health	Frequency rate	Growth rate of newly opened vacancies	Firm-size dummies	Std. Error	Adj. R ²
		-0.147* (-1.69)	0.0090 (0.728)	yes	0.629	0.908
Presence of safety managers	3.24** (1.98)	-0.142* (-1.68)	0.0163 (1.28)	yes	0.602	0.916
Presence of full-time safety managers	9.27*** (5.28)	-0.326*** (-2.95)	0.0073 (0.664)	yes	0.531	0.935
Presence of safety managers plus regular office inspection	4.16** (2.52)	-0.312** (-2.18)	0.0197 (1.51)	yes	0.592	0.919
Presence of health managers	3.38** (2.15)	-0.150* (-1.69)	0.0199 (1.45)	yes	0.607	0.914
Presence of full-time health managers	9.68*** (5.49)	-0.225*** (-2.73)	0.0031 (0.277)	yes	0.508	0.940
Presence of health managers plus regular office inspection	3.89** (2.50)	-0.211** (-2.03)	0.0144 (1.17)	yes	0.590	0.919
Safety and health education	1.69* (1.77)	-0.150* (-1.71)	0.0060 (0.485)	yes	0.603	0.915
Safety and health activities	4.16* (1.95)	-0.137* (-1.66)	0.0022 (0.174)	yes	0.611	0.912

Notes:

1. The source for the growth rate of newly opened vacancies is the *Report on Employment Service*, Ministry of Labour.
2. The dependent variable is the average length of tenure for male workers aged 30 to 34. Weighted instrumental variable estimation (endogenous variable: frequency rate).
3. The number of observations was 77. *** indicates significance at the one percent level, ** at the five percent level, * at the 10 percent level.
4. T-values are in parentheses.

Instrumental variable technique is used to treat average tenure as an endogenous variable. The instruments are the exogenous independent variables, average length of tenure, and the growth rate of the number of newly opened vacancies. All the regressions are weighted and corrected for heteroscedasticity. The sample size is 384.

Columns 2 and 3 of Table 2 list the estimated results. Let's first look at the results of the frequency rate. The estimated coefficients have the same signs as those predicted above, except for high school graduates. Among the correctly predicted coefficients, only total working hours is insignificant. Therefore, it appears safe to say that the estimated frequency rate is correct: A higher value added per worker and the share of elderly workers increase the frequency rate, but more women workers, average wage, and average tenure decrease it.

Columns 4 and 5 show the estimated results for the severity rate. The determination coefficients were about half of that for the frequency rate, though the effects of the estimated coefficients coincide perfectly with the prediction. When industry dummies are excluded from the independent variables (Column 4), only total working hours and the share of high school graduates are insignificant. When industry dummies are added, the share of elderly workers and average tenure become insignificant at the 10 percent level.

3.3. Estimating Average Tenure Equations

This section considers the determination of average tenure of workers. The primary factor affecting average tenure is wage level (or wage growth). The separation rate decreases because it becomes more profitable for workers to stay with their company when they receive high wages. Other variables representing job satisfaction affect the average tenure of workers, including industrial accidents which will be examined here. The hypothesis is that a higher frequency (severity) of industrial accidents will induce workers to leave their jobs, and the average tenure becomes shorter. In addition, the average tenure in a firm with more ardent safety and health activities can be longer, with other conditions remaining constant. First, poor health becomes a factor decreasing a worker's satisfaction level. Second, workers might believe that firms with ardent safety and health activities can lower the number of industrial accidents in the long run, even if the effects are not immediately seen. In any case, average tenure will be longer in firms with a higher level of safety and health activities.

The dependent variable is the average tenure of 30 to 34-year old male high school graduates classified by industry (medium group manufacturing) and firm size. Data was adopted from the *Basic Survey on Wage Structure*. Three kinds of independent variables were pre-

pared, apart from firm-size dummies and constant terms. First, the rate of industrial accidents classified by industry and firm size was introduced. The frequency rate was adopted here⁽¹⁰⁾. Second, the new job vacancy growth rate was used to measure the demand fluctuation in the labor market. Third, the author introduced some variables representing safety and health activities undertaken by firms. The data source is the *Basic Survey of Safety and Health* (Ministry of Labour) conducted in 1995. The variables used here relate to: 1) the presence of a safety manager, 2) the presence of a health manager, 3) safety and health education and 4) execution of safety and health activities. All of these variables are expressed in terms of the share of establishments. For example, the share of establishments with safety managers among all establishments in each industry and firm-size group becomes one of the independent variables.

Because the survey was conducted in 1995, other variables are also from that year. Therefore, it becomes a complete cross section analysis. The method used to estimate the results was weighted instrumental variable method treating industrial accident frequency rates as an endogenous variable. The instruments used were all exogenous variables included in the independent variables, the share of high school graduates, and the share of middle-aged and older workers.

Table 3 presents the estimated results where safety and health variables were included in the regression one by one. The table shows that the frequency rate of industrial accidents is significantly negative in every case. This means that workers are more likely to separate from industries with many industrial accidents. All the coefficients of the safety and health index have positive signs, and are significant except for a few cases. This suggests that safety and health activities are effective in raising workers' welfare and thus preventing quits.

4. Conclusion

It is widely alleged that the Japanese labor market is going to be more fluid and the average tenure of workers will become shorter. Furthermore, Japan is experiencing a rapid aging of its labor force. On the other hand, as reported in this paper, the industrial accident rate depends positively on the average age and negatively on the average tenure of the workforce. Aging puts people in greater jeopardy, and a more fluid labor market produces workers who are not fully accustomed to the operation of machinery. Therefore, there is the possibility that industrial accidents will become a serious problem and further safety education for all workers is in order. Currently, white-collar workers are under great stress and suffer from various mental diseases that are linked with industrial accidents. However, the object of this paper was

mainly the manufacturing industries. This element is not necessarily included in current safety and health activities, for example, the importance of interpersonal relationships. The economic impact of industrial accidents resulting from mental stress is left for future research.

Notes:

* This is a substantially abbreviated version of my earlier paper published in the *Japanese Journal of Labour Studies* (Ohta, 2001a).

- (1) Actually, when the Labour Standards Inspection Office rules that an accident occurred “on the job,” insurance benefits from workers’ accident compensation insurance are provided to the worker. However, there is no explicit statement in the Workers’ Accident Compensation Insurance Law concerning what an “on the job” accident is. Thus, the opinion of the Ministry of Labour, Health and Welfare and judicial precedents are playing crucial roles. In general, for an accident to be ruled as occurring “on the job,” it must originate in business. To fulfill this condition, it is usually required that, among the various causes of disability, the causes related to business are more important than any other causes. This is what we call “Reasonable Cause Theory,” which is explained by Inoue (1996) and Hobara, Yamaguchi, and Nishimura eds. (1998). Ohta (2001b), on the other hand, provides an economic analysis of accident compensation insurance.
- (2) Inoue (1997) has authored a good textbook on this law.
- (3) This ministry was renamed the Ministry of Health, Labour and Welfare in 2001. Hereafter, the author uses the former name. This applies to the other ministries as well.
- (4) The figures mentioned above are from the *White Paper on Labour 2000*.
- (5) Those classified as “dead” or “completely or permanently unable to work” with first to third class injuries are assumed to be absent 7,500 days. Those with fourth to 14th class injuries are assumed to be absent 50 (14th class) to 5,500 (fourth class) days. For those classified as “temporarily unable to work,” the number of days absent is multiplied by 300/365.
- (6) Ohta (2001a) simplified the model developed in Ohashi (1988) and applied it to cases where there are industrial accidents.
- (7) Viscusi (1979) has done pioneering work on this type of research. However, he did not investigate the relationship

between tenure and industrial accidents.

- (8) Since data on average wage is classified only by industry, the author could not use many industry dummies. Thus, the author classified the industries into four types: (1) light industries (material production type), (2) light industries (consumption goods production type), (3) heavy chemical industries (material production type), (4) heavy chemical industries (processing and assembly type), and constructed three industry dummies.
- (9) It is assumed here that the wages of workers with relatively long tenure are closely related to their productivity, and in large part, these workers acquired their skills within the company. In this case, higher wages represent a larger merit of long-term work contracts.
- (10) When both the frequency rate and the severity rate are used as independent variables, the problem of multicollinearity occurs because both have a strong correlation.

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OPINIONS REQUESTED

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