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Why Has the Fraction of Contingent Workers Increased?

A case study of Japan¹

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Abstract

The fraction of contingent workers among all workers in Japan increased from 17% in 1986 to some 34% in 2008. This paper investigates the reason for this secular trend. Both demand and supply increases of contingent workers relative to regular workers are important, as evidenced by the stable relative wage to regular workers. The increase of female labor-force participation explains the supply increase, and the change of industrial composition explains the demand increase. These compositional changes explain about one quarter of the increase of contingent workers. Uncertainty surrounding product demand and the introduction of information and communication technologies increase firms' usage of contingent workers, but its quantitative effect is limited. These findings suggest that the declining importance of firm-specific human capital is a probable cause for the increase of contingent workers.

Keywords: contingent workers, female labor supply, uncertainty, ICT, Japan, and labor demand and labor supply.

JEL Classification: J23

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1. Introduction

The fraction of contingent workers in Japan's total employment steadily increased from 17 percent in 1986 to 34 percent in 2008 (Figure 1). This secular increase of contingent employment in Japan is perceived as a sign of declining job stability. Indeed, in the aftermath of the financial crisis in 2008, about 250,000 contingent workers had lost their jobs by the end of year 2009 (Labor and Welfare Ministry of Health, 2010). In response to heightened social pressure to suppress the increasing number of contingent workers, Japanese legislators plan to pass a law prohibiting the use of temporary staffing in the manufacturing and non-manufacturing sectors, except for 26 occupations that require "specialized" skills (*Rodou Seisaku Shingikai Toshin* February 24, 2010).

Despite heightened attention to the increasing number of contingent workers, we have only limited knowledge of the reasons for the increase. Global factors may have contributed to the increase of contingent workers, because the upsurge of the fraction of contingent workers in Japan coincides with the experience of many other developed countries, such as the US, the UK, continental European countries, and Korea (Organisation for Economic Co-operation and Development, 2002). On the labor-demand side, factors such as the need for a workforce that can be spontaneously adjusted to the fluctuation of product demand is identified as an important factor (Peter Cappelli and David Neumark, 2004, Susan Houseman, 2001, Masayuki Morikawa, 2010, Yukako Ono and Daniel G. Sullivan, 2006, Organisation for Economic Co-operation and Development, 2008, Matt Vidal and Leann M. Tigges, 2009). On the supply side, researchers point to the increase of female labor-force participation and the consequent demand for flexible work-schedule arrangements (Noel Gaston and Tomoko Kishi, 2007, Susan Houseman and Machiko Osawa, 1995).

In addition to global factors, Japan-specific factors may be also important. Japan used to be and still is characterized by a strong attachment between firms and workers, as evidenced by longer average job tenure. This strong attachment has helped foster the accumulation of human capital whose cost is financed by firms. Because of the two-decades long stagnation of the Japanese economy since the early 1990s, the rationale for the so-called Japanese employment system is claimed to be undermined (Junya Hamaaki et al., 2010). Since regular workers are confined in the nexus of implicit contracts and protected by labor law, adjustment among regular workers is sluggish. In this equilibrium, firms have incentives to absorb temporary demand shocks by hiring contingent workers without future commitment. Thus, the increase of contingent workers may well mirror the decline of long-term employment practices in Japan.

The aim of this paper is to account for the increase of contingent workers in the Japanese economy. First, the relative importance of demand and supply factors is assessed based on both wage and labor-hour quantity of contingent workers relative to regular workers. The analysis, based on the Basic Survey of Wage Structure, reveals that the wage of contingent workers relative to regular workers' was stable between 1989 and 2008, while the fraction of contingent workers among employed workers steadily increased. This finding implies that shifts in both demand and supply of contingent workers account for the increase of contingent workers.

Next, we separately investigate the causes for supply and demand shifts. On the labor-supply side, the increase in the female labor-force participation rate and women's demand for flexible work schedules are often pointed out. The importance of increased female labor-force participation is quantitatively accessed by decomposing the increase

of contingent workers into the increase of the female proportion of the total labor force and the increase of contingent employment among female and male workers. On the labor-demand side, it is often argued that the shift of industrial composition from the manufacturing sector to the service sector contributed to the increase of contingent workers, because the service sector requires more flexible staffing to accommodate demand fluctuation. To assess the impact of worker and industry compositions in the labor market on shifts of labor supply of and demand for contingent workers, we rely on the Labor Force Survey, 1986-2008.

The analysis reveals that increased female labor-force participation and industries' compositional changes partly explain the increase of contingent workers. These compositional changes explain one third of the increase of contingent workers, at most. The other two thirds of the change occurred within a demographic group and an industry. To further analyze the force behind the demand for contingent workers, we also employ a firm survey, Basic Survey of Firms' Activity, 1995-2007. The analysis reveals that uncertainty of sales growth plays a significant role as a determinant of the decision to hire contingent workers, but it does not explain the increase of contingent workers over the sample period.

The rest of paper is structured as follows. Section 2 introduces several definitions of contingent workers and overviews a time series of the fraction of contingent workers among employees. Section 3 implements a demand-supply analysis and quantifies the extent to which changes of demographic and industrial composition explain the increase of contingent workers. Section 4 examines the effect of uncertainty on the use of contingent workers, based on firm-level data. The last section provides the conclusion.

2. Capturing contingent workers by several definitions

Contingent workers are workers whose employment can be adjusted by employers at a lower cost compared to regular workers. This notion of an unstable relationship between employers and employees can be captured through several dimensions of the employment relationship. This paper employs several definitions of contingent workers, because various statistics define contingent workers in different ways. Government statistics that capture contingent workers most comprehensively are generated from the Labor Force Survey by Statistics Bureau of Ministry of General Affairs and Communications. The Labor Force Survey collects labor force status of 100,000 individuals age 15 and over from 40,000 households every month. The survey records the hours worked in the previous week, the period of employment contract, and what the respondent is called in the workplaces, if he or she is employed.

Based on Labor Force Survey statistics, we identify three definitions of contingent workers. To capture employees who work shorter hours than regular workers, we first define a contingent worker as an employee who works 35 hours per week or less. The second definition is based on contract period. An employee who works under a contract that lasts for one year or less is defined as a contingent worker. This second definition of contingent worker is used as the definition of temporary workers by Organization for Economic Co-operation and Development (OECD, 2002). The third definition is based on how a worker is categorized in the workplace. Regular full-time workers without a specific term contract in Japanese workplaces are typically called *Seishain*, which stands for a typical employee. Some workers, however, are not classified as *Seishain*, even among the workers who work full-time without term contract. These workers who are not classified as *Seishain* include *Part-time*, *Arubaito*, *Keiyaku Shain*, and

Shokutaku, who are hired and paid directly by employers, and *Haken Shain*, who are hired by temporary-work agencies and dispatched to the establishments where they work. The distinction between *Seishain* and non-*Seishain* lies mainly in the difference of their job career. *Seishain* is implicitly assumed to continue working for the current employer for longer period, and firms tend to protect their employment against negative economic shocks to guard a mutually trusting relationship between employers and employees. Ryo Kambayashi (2010) emphasizes the importance of this distinction in terms of firms' human-resource management and reports that the distinction between *Seishain* and non-*Seishain* explains the participation in firm-initiated training after controlling for the contract period and hours worked.

Table 1 tabulates the hours worked and the period by contract by the career classification of workers. Most regular workers work full-time and are employed under a permanent contract. It is worth noting, however, that among contingent workers, about 45 percent (=11.78 percent / 26.37 percent) work 35 hours per week or more. It is also notable that about 45 percent (=13.38 percent / 26.53 percent) of contingent workers are employed under a contract that extends for one year or longer. Thus, contingent workers are not necessarily part-time workers or temporary workers.

Figure 1 reports the percentage of contingent workers among all employees based on three definitions. The number of employees who work 35 hours or less has steadily increased, from less than 10 percent in 1986 to around 22 percent in 2002, but it fluctuates around this percentage after 2002. The workers with employment contracts of one year or less accounted for about 10 percent in 1986 and about 14 percent in 2008. The fraction of workers who are categorized as non-*Seishain* has increased from 16 percent to 33 percent. These trends suggest that an increase of workers who work

shorter hours could partly explain the recent increase of contingent workers, but shorter contract periods cannot explain it.

Grasping the importance of contingent workers among all employed workers based on head counts may disguise its importance, because contingent workers work fewer hours than regular workers. To avoid this problem, Figure 1 Panel B reports the percentage of hours worked by contingent workers among the total hours worked by all workers. Measured in hours worked, the importance of contingent workers is similarly observed.

3. Demand-Supply Analysis

a. Relative importance of demand and supply shifts

An increase of contingent workers in the economy can potentially be explained by shifts in labor demand, labor supply, or both. Increased uncertainty or diminished future prospects on firms' product demand may have increased labor demand for contingent workers, while the enhanced labor-force participation of female workers may have increased the supply of contingent workers. To assess the relative importance of demand and supply shifts, we examine a time series of the hourly wage of contingent workers relative to regular workers.

Since the Labor Force Survey only records annual earnings in brackets in its special survey, calculating hourly wage is erroneous. Thus a further investigation of wage utilizes the Basic Survey of Wage Structure, an establishment survey conducted by the Ministry of Health, Labor and Welfare that records over one million workers' hours worked and pay in June of every year. The survey asks establishments to transcribe randomly sampled individual workers' hours and pay from their payroll; thus the hourly rate of pay calculated from this information is accurate. This survey defines contingent

workers by the number of hours worked. Those workers who work less than regular workers at an establishment are defined as part-time workers.

Figure 2 shows the fraction of part-time workers and the relative wage of part-time workers to full-time workers over the past two decades. As can be seen from the figure, the fraction of part-time workers has steadily increased, with the exception of a dip in 2006. If the demand for part-time workers is stable during this period, it is expected that the relative wage of part-time workers decreases along with the supply increase. This is not observed, however: The relative wage of part-time workers is relatively stable (and rather increases) after the late 1990s, whereas the fraction of part-time workers substantially increases. Thus, the recent increase in part-time workers can be explained by increases in the demand for part-time workers and the supply of part-time workers.

b. Female Labor-Force Participation and Supply Shift

The increase of female workers in the labor force could potentially explain the labor-supply shift of contingent workers. Changing social norms and efficient household production technology have reduced the reservation wage of married female workers. At the same time, low- and medium-skilled married workers are confined to supply labor to the contingent labor market because of institutional settings, such as the social-security system (Yukiko Abe and Fumio Ohtake, 1997). Figure 3 illustrates the increase of female workers among all workers between 1986 and 2008, while the propensity for working as contingent workers remains persistently high among female workers. Thus the increase of the female proportion in total employment mechanically increases the fraction of contingent workers in the labor force.

The demographic composition of workers also changed according to sex between 1986

and 2008, as evidenced by Table 2, which is based on the Labor Force Survey. Among male workers, the fraction of college-educated workers has increased. This increase of college-educated workers contributes to a decrease in contingent workers, because college-educated workers are less likely to work as contingent workers. As for age structure, the number of workers ages 60 and above has increased. This could have contributed to the increasing fraction of contingent workers, because workers who experience mandatory retirement from a primary job at age 60 often find another job as a contingent worker. Among female workers, we find similar trends of an increase in college-educated workers and workers over age 60.

Given the changes of employed workers' sex composition and compositional changes within each sex, the analysis below decomposes the increase of contingent workers into the change of demographic composition of workers in the labor force and the change in the propensity to be contingent for each demographic group.

Suppose that the contingent status of individual worker i in year t , which is denoted as y_{it} , depends on the vector of demographic characteristics x_{it} . Then the contingent status y_{it} is denoted as:

$$y_{it} = x_{it}\beta_t + u_{it},$$

where β_t relates demographic characteristics with the probability of contingent status.

The change of the fraction of contingent worker is decomposed as:

$$\begin{aligned} E(y_{it}|t = 1) - E(y_{it}|t = 0) &= E(x_{it} | t = 1)\beta_1 - E(x_{it}|t = 0)\beta_0 \\ &= E(x_{it}|t = 0)(\beta_1 - \beta_0) + [E(x_{it}|t = 1) - E(x_{it}|t = 0)]\beta_1 \end{aligned}$$

The first term expresses the change of the probability of being a contingent worker within a demographic group. This term is called the within-industry effect. The second

term expresses the effect of the change of labor-force composition. This term is called the compositional effect.

Table 3 reports the regression coefficients of the contingent-status dummy variable on demographic characteristics. The increase of intercepts over the years indicates that high-school or junior-high-school graduates / ages between 15 and 19 / not married are become more likely to work as contingent workers. Older male workers are less likely to work as contingent workers except for those over age 60. The coefficients for the female dummy increased over years, reflecting the fact that more female workers are participating in labor force as contingent workers. The fraction of workers who work as contingent workers was heterogeneous across ages among female workers in 1987. For example, female ages between 30 and 39 were more likely to work as contingent workers, but this heterogeneity becomes less prevalent over the years. This trend reflects the fact that contingent work has changed from jobs for female workers with family commitments to jobs for female workers of all age groups.

Figure 4 Panel A reports the results of decomposition exercises. The change of the demographic composition of workers explains about one half of the increase of contingent workers until the mid 1990s, but it does not explain the rapid increase of contingent workers after that time. Overall, the change of the demographic composition of workers explains about one fifth of the increase in contingent workers between 1986 and 2008.

c. Change of Industrial Composition and Demand Shift

Table 4 reports the industrial composition of employees between 1986 and 2008. The manufacturing sector consisted of about 30% of total employment in 1986, but the

number declined to about 20% in 2008. In contrast, the service sector hired about 22% of total employees in 1986, and the figure increased to 32% in 2008. The shares of other industries were stable during the period. The dependence on contingent workers differs significantly across industries. Table 5 reports the regression coefficients of the contingent-worker dummy variable on the industry dummy variables. First, it is noticeable that the reliance on contingent workers was stronger in 2008 than in 1986 in manufacturing, transport and communications, wholesale/retail trade and restaurants, finance/insurance and real estate, and the service and government sectors. It also indicates that service industries demand more contingent workers than the manufacturing sector over the whole sample period. Thus, the increase of the service sector "mechanically" increases the fraction of contingent workers in the whole economy.

To decompose the increase of contingent workers into the increase within industries and the change of industrial composition, we repeat the decomposition exercise with respect to industries. Suppose that the contingent status of individual worker i in year t , which is denoted as y_{it} , depends on the vector of industry dummy variables z_{it} . Then the contingent status y_{it} is denoted as:

$$y_{it} = z_{it}\gamma_t + v_{it},$$

where γ_t relates demographic characteristics with the probability of contingent status.

The change of the fraction of contingent workers is decomposed as:

$$\begin{aligned} E(y_{it}|t = 1) - E(y_{it}|t = 0) &= E(z_{it}|t = 1)\gamma_1 - E(z_{it}|t = 0)\gamma_0 \\ &= E(z_{it}|t = 1)(\gamma_1 - \gamma_0) + [E(z_{it}|t = 1) - E(z_{it}|t = 0)]\gamma_0. \end{aligned}$$

The first term is the within-industry effect, and the second term is the composition effect.

Figure 4 Panel B illustrates the results of this decomposition exercise. The change of industrial composition explains up to a 2-percentage-point increase of contingent workers from 1986 to 2008, while the percentage of contingent workers increased by 16 percentage points. This result indicates that the change of relative demand for contingent workers within industries played a significant role.

What caused the increase of contingent workers within an industry? Looking at Table 2 Panel B again, increases of contingent workers within the wholesale and retail trade, and within service industries, are particularly significant. To understand this increase, occasional government surveys called "Comprehensive Survey on Diversifying Employment Forms" are useful (Labor and Welfare Ministry of Health, 2007, 2003). This survey asks employers the reasons why they employ contingent workers by letting them choose up to 3 of 13 possible choices, ranging from "cannot find regular employees" to "replacement of regular workers who are on maternity or elderly care leave." Employers in wholesale and retail trade and in service industries are far more likely to choose "to accommodate long operation hours" and "to accommodate hourly or daily demand fluctuations" than employers in other industries. For example, 39.4% of employers in retail industry and 35.9% of employers in restaurant and lodging industry chose "to accommodate long operation hours" as a reason to hire contingent workers, while 18.9% of employers in all industries choose this as a reason. Similarly, 51.9% of employers in the restaurant and lodging industry chose "to accommodate hourly or daily demand fluctuations" as a reason to hire contingent workers, while 31.8% of employers in all industries chose this as a reason. Other choice probabilities of wholesale/retail trade and service industries are not particularly different from those of other industries. This side evidence points to the importance of the change of consumers' preference over

the service hours or the increase of hourly or daily demand fluctuation as an explanation for the increase of contingent workers.

d. What are the other factors?

The analysis heretofore separately assessed contributions of changes in demographic and industrial compositions to the increase of contingent workers. What is then the total effect of the demographic and industrial compositions on the increase of contingent workers? Figure 4 Panel C reports the results of the decomposition exercise. The change of demographic and industrial compositions explains up to one half of the increase of contingent workers until the mid 1990s, but it does not explain the increase after that time. While contingent workers increased by 16 percentage points between 1986 and 2008, about 4 percentage points is explained by compositional changes.

Several papers report that the two-decade-long stagnation of the Japanese economy since the early 1990s has undermined so-called Japanese-employment practices, which are often characterized by long-term employment and a seniority wage system (Junya Hamaaki, Masahiro Hori, Saeko Maeda and Keiko Murata, 2010, Takao Kato and Ryo Kambayashi, 2009). Literature emphasizes the importance of mutual trust between employer and employees so that firms can induce employees' effort to accumulate firm-specific human capital. Even when the return to firm-specific human capital deteriorates, firms hesitate to renege on existing implicit contracts by cutting the employment of regular workers, because it would undermine the trust with its employees and result in decreased productivity of its regular workers. Instead of adjusting existing workers, firms are inclined to reduce the fraction of workers who enter this long-term relationship. With this generational adjustment, firms can reduce

the fraction of costly regular workers without undermining the beneficial trust relationship. This speculation is not grounded on firm evidence, but the Japanese economy's two-decade-long stagnation cannot be neglected as a major reason for the increase of contingent workers in the same period.

6. Demand Analysis using Firm Data

Results of decomposition exercises imply the importance of within-industry labor demand shifts toward contingent workers relative to regular workers over the period between 1986 and 2008. This section further analyzes why firms become more dependent on contingent workers, using firm-level panel data. Previous studies have proposed several hypotheses to explain the increased reliance on contingent workers. Diego Comin and Sunil Mulani (2006) and Diego Comin and Thomas Philippon (2006) report that firm-level sales-growth volatility has increased in recent years, based on data from US listed companies. Julian di Giovanni and Andrei A. Levchenko (2009) point out that exposure to international competition increases the volatility of firms' performance, while Erik Brynjolfsson et al. (2007) argue that the penetration of information and communication technology (ICT) enables firms to adopt new production organizations in a short period of time and intensify the degree of market competition. The stringent competition subsequently makes firms' performance more volatile.

Japanese firms try not to fire existing regular workers to avoid reneging its implicit contract with employers (Takao Kato and Ryo Kambayashi, 2009). In addition, Japanese Labor Contract Law Section 16 prohibits employers from firing employees without a good reason. Court precedents indicate that judges generally apply stricter

standards to firing regular workers than contingent workers. Because of these economic and legal costs associated with firing regular employees in the economic downturn, firms that face volatile future product demand hire more contingent workers. Masayuki Morikawa (2010) found that firms that experience volatile sales growth across years are more likely to hire contingent workers relative to regular workers. Our following analysis is close to his study, but extends the analysis by Yukako Ono and Daniel G. Sullivan (2006) and attempts to quantitatively assess the extent to which sales-growth uncertainty can explain the increase of contingent workers.

The data set used in this section is the Basic Survey of Japanese Business Structure and Activities collected by the Ministry of Economy, Trade, and Industry (METI) of the Japanese government. This is a firm-level census survey that covers all firms hiring 50 or more employees and holding 30 million yen or more in paid-up capital or investment funds. The available data cover 10 years, every year between 1997 and 2006, and the sample size is about 25,000 firms for each year. From the data sets, we extracted each firm's total sales, data on the firm's permanent employees who are hired under a contract that extends more than a month, the year the firm was founded, the firm's prefectural location, and the two-digit code indicating the industry in which the firm operates. After excluding observations with missing sales information or inconsistent employee records, there remained 195,616 firm-year observations. This unbalanced panel is the analysis sample for estimating the demand equation for contingent workers. The caveat of this data set is that its coverage of contingent workers is incomplete. The number of workers who are hired under a contract that extends less than a month or the workers who are dispatched through temporary staffing agencies is recorded only after the 2000 survey. Thus we focus only on the fraction of part-time workers among employees who work

under contracts that extend more than a month in this section. The descriptive statistics of the analysis data are reported in Table 6.

Previous studies capture the demand uncertainty that firms face by the fluctuation of sales growth around the expected sales growth (Diego Comin and Sunil Mulani, 2006, Diego Comin and Thomas Philippon, 2006, Masayuki Morikawa, 2010, Yukako Ono and Daniel G. Sullivan, 2006). We follow the same approach. We assume that sales growth, gs_{it} ($= \ln s_{it+1} - \ln s_{it}$), follows a first-order autoregressive process:

$$(1) \quad gs_{it} = \beta_i + \rho_i gs_{it-1} + \delta_t + v_{it},$$

where δ_t denotes time fixed effects. Based on this specification, we calculate the following variables that approximate the uncertainty that firms face.

Volatility:

$$\begin{aligned} \text{sd}(\ln s_{it} - E_{t-1}[\ln s_{it}]) &= \text{sd}(\ln s_{it} - E_{t-1}[\ln s_{it}] - \ln s_{it-1} + \ln s_{it-1}) = \\ &= \text{sd}(\ln s_{it} - \ln s_{it-1} - E_{t-1}[\ln s_{it} - \ln s_{it-1}]) = \text{sd}(gs_{it-1} - Egs_{it-1}) = \text{sd}(v_{it-1}) \equiv \sigma_i, \end{aligned}$$

Unexpected sale growth:

$$\ln s_{it} - E_{t-1}[\ln s_{it}] = \ln s_{it} - \ln s_{it-1} - E_{t-1}[\ln s_{it} - \ln s_{it-1}] = v_{it-1},$$

$$\text{Expected growth: } E_t[\ln s_{it+1}] - \ln s_{it} = E_t[\ln s_{it+1} - \ln s_{it}] = Egs_{it},$$

Lagged expected growth: Egs_{it-1} .

The determination of the fraction of contingent workers among the total number of workers in a firm, cont_{it} , is assumed to be:

$$(2) \quad \begin{aligned} \text{cont}_{it} &= \beta_0 + \beta_1 \sigma_i + \beta_2^+ v_{it-1}^+ + \beta_2^- v_{it-1}^- + \beta_3^+ Egs_{it}^+ + \beta_3^- Egs_{it}^- + \beta_4^+ Egs_{it-1}^+ \\ &\quad + \beta_4^- Egs_{it-1}^- + x_{it} \gamma + u_{it}. \end{aligned}$$

The greater the uncertainty that firms face, the larger the fraction of contingent workers is expected to be. Unexpected sales growth may well be absorbed by the adjustment of

contingent workers, but positive and negative unexpected shocks are likely to have different impacts on the usage of contingent workers. To allow for different positive effects from positive and negative shocks, different coefficients are assigned for each case. The expected sales growth between t and $t+1$ and between $t-1$ and t are expected to affect the ratio of contingent workers. The coefficient signs for these variables depend on whether or not firms expect the growth to continue. If firms expect the sales growth to continue, positive expected growth reduces the usage of contingent workers. In contrast, if firms expect the sales growth will not last long, the expected growth is absorbed by an increase of contingent workers. Again, different coefficients are assigned for positive and negative expected sales growth.

The construction of uncertainty variables forces us to drop 1995, 1996, and 2007 waves from the analysis sample. Although the waves between 1995 and 2007 are available to estimate the AR(1) model for constructing the uncertainty variables, $E_{94}[gs_{i,95}]$ and $E_{07}[gs_{i,08}]$ cannot be used to estimate the equation for the determination of contingent workers.

The other explanatory variables x_{it} include the use of IT. Mitsuru Sunada et al. (2004) claim that ICT saves the input of regular workers by standardizing job flow and reducing the value of regular workers' accumulated experience. Also, ICT usage makes it possible to subdivide jobs, and allocate some parts to contingent workers. To test whether ICT usage increases the usage of contingent workers, we include a dummy variable that takes one if a respondent company uses any type of network technology. As of 1998, 68 percent of respondent companies used network technology, while the number increased to 95 percent by 2006, as shown in Table 6. To capture intense ICT usage, we also include a dummy variable that takes one if the respondent company uses

ICT for commercial transactions. Only 1 percent of respondent firms answered “yes” to this question in 1997, but the figure grew to 34 percent in 2006. Thus this variable has sufficient variation across firms, even in recent years. These variables are only available for 1998 and 2001-2006 during the sample period, and thus the analysis using these variables is limited to these years.

The results using the firms in all industries are reported in Table 7. Column (1) reports the regression of the fraction of part-time employees among all employees on a constant and year dummy variables. From these regression results, 9.7 percent of employees was part-time workers in 1997, and this figure increased by 2.7 percentage points by 2006. Our aim is to explain the patterns of year dummy variables by adding explanatory variables that represent uncertainty and ICT usage. As reported in Column (2), adding industry dummy variables attenuates the coefficients for year dummy variables by about 30 percent. This implies that 30 percent of the increase of contingent workers between 1997 and 2006 is attributable to the change of industrial composition.

The result for the specification including the proxy variables for sales-growth uncertainty is reported in Column (3) of Table 7. Volatility, defined as the standard deviation of forecasting error, does not significantly explain the fraction of part-time workers. As a positive coefficient for "Shock (-)" indicates, negative shock to sales growth reduces the fraction of part-time workers. In contrast, positive coefficients for expected sales growth and lagged expected sale growth suggest that firms hire more part-time workers to accommodate future growth. Overall, firms increase part-time workers in response to expected future growth, and once the positive forecast is not realized, they accommodate the situation by reducing part-time workers. This adjustment pattern is consistent with the notion that contingent workers are used as a

buffer for demand fluctuation. Firms with larger log sales amounts employ fewer part-time workers, while those with many establishments employ more of such workers. Although estimated coefficients for uncertainty-related variables are reasonable and convincing, these variables do not seem to explain much about the increase of part-time workers, as evidenced by almost identical coefficients for year dummy variables in Columns (3) and (2). Uncertainty of sales growth well explains the cross-sectional variation of employment of part-time workers across firms, but it does not explain the time-series increase of part-time workers.

Results reported in Columns (4) through (6) assess ICT's impact on the employment of part-time workers. Because variables capturing ICT usage are limited to 1998 and 2001-2006, we first reproduce the regression only with year and industry dummy variables. Results in Column (4) imply a steady increase of the fraction of part-time workers over the period. Column (5) reports the result after adding the proxy variables for sales-growth uncertainty. The estimated coefficients are almost identical to the results in Column (3), implying that the change of sample period does not change the estimation results regarding the effects of sale-growth fluctuations. In contrast, the estimated coefficients for the year dummy variables in Column (5) have attenuated by about 40 percent from the results reported in Column (4). This significant change of estimated coefficients implies that the change of sales-growth uncertainty well explains the growth of part-time workers between 1998 and 2006. Column (6) reports a regression result that further includes variables for internet usage. Both usage of internet and engagement in commercial transactions using internet increase the employment of part-time workers. While adding these variables does not change the estimated coefficients for uncertainty-related variables, the coefficients for year dummy variables

further attenuate from Column (5) by 40 percent. A comparison of the coefficients for the year dummy variables for Columns (6) and (4) suggests that compositional change of industry, sales-growth uncertainty, and introduction of ICT into workplaces explain up to about 60 percent of the increase of part-time workers between 1998 and 2006.

Overall, the analysis in this section based on the Basic Survey of Japanese Business Structure and Activities points to the fact that sales-growth uncertainty and introduction of ICT into workplaces have certainly contributed to the increase of contingent workers. Firms increase the fraction of part-time workers when they expect future sale growth and reduce its fraction in the face of unexpected sales decline. Also, firms that utilize IT intensively rely more on contingent workers. Although these results confirm general perceptions and the findings from previous studies, its quantitative effect on the secular increase of contingent workers is limited.

7. Conclusion

In 2008, about one third of Japanese employees were contingent workers. This fraction increased from 16 percent in 1986 to 33 percent in 2008. This paper investigated factors that drive this secular trend.

First, we examined the relation between contingent status and hours worked or the period of contract, based on the Labor Force Survey. A close examination indicated that the increase of contingent workers is not characterized simply by an increase of workers who work less than 35 hours per week or under a contract that extends less than one year. Rather, the increase of contingent workers is characterized by an increase of workers who are classified as contingent workers at their workplaces. This finding suggests that the increase of contingent workers can be interpreted as an increase of

workers who are not included in the implicit long-term contract of career development from the viewpoint of human-resource management.

Second, we analyzed the increase of contingent workers in a simple framework of demand and supply. The wage of part-time workers relative to regular workers calculated from Basic Survey of Wage Structure was steady, around 45 percent, during the analysis period. This steady relative-wage trend, accompanied by a secular increase of part-time workers, implies that both demand and supply increases are behind the secular trend. Then, we quantitatively assessed the respective contributions of changes in demographic and industrial compositions for the demand and supply increases of contingent workers. The decomposition analysis indicated that one quarter of the increase of contingent workers is explained by demographic and industrial compositional changes. Another three quarters of the increase is explained by the increase of contingent workers within demographic and industrial groups. Regarding the supply factor, increases of the fractions of contingent workers among male youth and females of all ages are respectively notable. For the demand factor, the increase of contingent workers within consumer-oriented industries, such as transport and the communication industry, wholesale and retail trade, and service industries are particularly notable. Auxiliary survey information suggests that long operating hours and demand fluctuation within a day compel firms to rely on contingent workers.

Third, we analyzed factors that affect the demand for contingent workers, using firm-level panel data between 1997 and 2006. Estimation results show that firms that face uncertain sales growth rely more on contingent workers. In particular, firms that expect future sales growth hire contingent workers and fire them when the firms experience an unexpected sales decline. This finding is consistent with the notion that

contingent workers are hired as buffer stock for employment adjustment. Results also show that firms that use ICT intensively, particularly for the purpose of commercial transactions, hire more contingent workers than the firms that do not use ICT. While uncertainty and ICT use increase the employment of contingent workers, these factors cannot well explain the time-series increase of contingent workers.

Overall, factors that are pointed out as determinants for an increase of contingent workers, such as workers' demographic change, compositional change of industry, uncertainty of product demand, and IT, all explain the increase of contingent workers. However, these factors explain less than half of the secular increase of contingent workers over the past two-and-a-half decades.

This result left us to point to Japanese employment practices as an explanation for the secular increase of contingent workers in the economy. Japanese employment practices were once characterized by strong attachments between employers and employees that foster firm-specific human capital investment (Masanori Hashimoto and John Raisian, 1985 for the evidence in the 1970s, Chiaki Moriguchi, 2003 for its historical origin). Japanese firms and employees have avoided hold-up problems associated with relation-specific investment by using a reputation mechanism in a repeated game framework (Yoshitsugu Kanemoto and W. Bentley Macleod, 1992, 1989). At equilibrium, employees are given implicit assurance of secure employment and promotion opportunities, given sufficient human capital investment. This equilibrium is persistent among many Japanese firms, even today (Takao Kato, 2001, Hiroshi Ono and Chiaki Moriguchi, 2006), but the economic stagnation that lasted for two decades decreased the importance of long-term human-capital investment. As a result, the Japanese long-term employment relationship is on a secular declining trend (Junya

Hamaaki, Masahiro Hori, Saeko Maeda and Keiko Murata, 2010, Takao Kato and Ryo Kambayashi, 2009). Accommodating this trend is not easy for many firms, however, because they are still benefitting from keeping the long-term employment relationship with their employees by extracting additional effort and encouraging them to accumulate firm-specific human capital. As a way to accommodate the declining macroeconomic trend without renegeing on their implicit contract with core workers, firms utilize a classification of regular and contingent workers. Contingent workers are given fewer training opportunities and less job security (Toshie Ikenaga and Daiji Kawaguchi, 2010, Japan Institute for Labor Policy and Training, 2009), and their carrier perspectives are perceived to be different from those of regular workers. Thus if firms fire contingent workers in an economic downturn, it does not hurt "trust" between firms and regular employees. In this way, firms can accommodate the declining macroeconomic trend without losing the trust relationship with their regular core employees.

Although our analysis does not provide direct evidence for the causal relation between the fall of the return to firm-specific human capital and the increase of contingent workers, the secular increase of contingent workers cannot be understood without paying attention to the low growth rate of the Japanese economy over last two decades and the relative persistence of traditional employment practices among its core workers. Providing further evidence of this causal relation is left for future research.

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Table 1: Cross tabulation of classifications of workers

Career Classification	Working Hours			Contract Term		
	35 or more	Less than 35	Total	1 year or more	Less than 1 year	Total
Regular worker (<i>Seishain</i>)	1,011,028 (68.02)	83,327 (5.61)	1,094,355 (73.63)	1,100,296 (72.67)	12,095 (0.80)	1,112,391 (73.47)
Contingent worker (<i>paart, arubaito</i> , etc)	174,920 (11.78)	217,008 (14.60)	391,928 (26.37)	202,553 (13.38)	199,082 (13.15)	401,635 (26.53)
Total	1,185,948 (79.79)	300,335 (20.21)	1,486,283 (100.00)	1,302,849 (86.05)	211,177 (13.95)	1,514,026 (100.00)

Source: Authors' calculation from Monthly Labor Force Survey, 1986-2008.

Table 2: Changes in Demographic Composition of Employed Workers

	Male			Female		
	1986	1996	2006	1986	1996	2006
Male						
Junior/technical college	0.048	0.071	0.100	0.134	0.230	0.276
University	0.221	0.272	0.331	0.058	0.085	0.148
Age 20-24	0.088	0.095	0.066	0.162	0.147	0.095
Age 25-29	0.123	0.133	0.120	0.112	0.139	0.128
Age 30-34	0.147	0.124	0.148	0.098	0.097	0.127
Age 35-39	0.161	0.110	0.127	0.143	0.093	0.114
Age 40-44	0.130	0.121	0.115	0.137	0.123	0.114
Age 45-49	0.113	0.136	0.102	0.119	0.150	0.109
Age 50-54	0.100	0.103	0.104	0.099	0.107	0.113
Age 55-59	0.072	0.086	0.116	0.056	0.075	0.109
Age 60 or more	0.049	0.079	0.094	0.041	0.057	0.080
Married	0.736	0.681	0.659	0.607	0.581	0.575
NOBs	25,135	24,008	58,905	15,077	16,684	46,268

Source: Authors' calculation from Monthly Labor Force Survey, 1986-2008. Only statistics for 1986, 1996 and 2006 are reported.

Note: The Labor Force Survey Special Survey was conducted once a year in February from 1986 to 2001, but it has been changed into the monthly survey. The increased sample size in 2006 is a result of this change.

Table 3: Regression of Contingent Status on Demographic Characteristics

	1986		1996		2006	
Junior/technical college	-0.014	(0.007)	-0.026	(0.009)	-0.029	(0.006)
university	-0.028	(0.004)	-0.023	(0.005)	-0.049	(0.004)
Age 20-24	-0.048	(0.015)	-0.111	(0.020)	-0.022	(0.018)
Age 25-29	-0.055	(0.015)	-0.132	(0.020)	-0.096	(0.018)
Age 30-34	-0.037	(0.019)	-0.138	(0.020)	-0.137	(0.017)
Age 35-39	-0.042	(0.017)	-0.130	(0.020)	-0.148	(0.018)
Age 40-44	-0.042	(0.017)	-0.132	(0.020)	-0.149	(0.018)
Age 45-49	-0.035	(0.017)	-0.129	(0.020)	-0.140	(0.018)
Age 50-54	-0.011	(0.019)	-0.131	(0.020)	-0.128	(0.018)
Age 55-59	0.056	(0.018)	-0.090	(0.021)	-0.077	(0.018)
Age 60 or more	0.291	(0.025)	0.251	(0.021)	0.376	(0.018)
Married	-0.026	(0.008)	-0.042	(0.006)	-0.099	(0.004)
Female	-0.023	(0.019)	0.087	(0.030)	0.133	(0.024)
Female*Junior/technical college	-0.053	(0.016)	-0.055	(0.011)	-0.087	(0.007)
Female*university	-0.096	(0.016)	-0.123	(0.011)	-0.138	(0.007)
Female*Age 20-24	0.062	(0.021)	0.023	(0.032)	0.013	(0.026)
Female*Age 25-29	0.156	(0.026)	0.056	(0.032)	0.070	(0.026)
Female*Age 30-34	0.174	(0.028)	0.105	(0.033)	0.135	(0.026)
Female*Age 35-39	0.296	(0.025)	0.175	(0.033)	0.175	(0.026)
Female*Age 40-44	0.269	(0.025)	0.180	(0.033)	0.215	(0.026)
Female*Age 45-49	0.248	(0.026)	0.178	(0.032)	0.184	(0.026)
Female*Age 50-54	0.159	(0.028)	0.159	(0.033)	0.164	(0.026)
Female*Age 55-59	0.135	(0.029)	0.084	(0.033)	0.099	(0.026)

Female*Age 60 over	-0.035 (0.034)	-0.134 (0.034)	-0.234 (0.026)
Female*Married	0.180 (0.013)	0.255 (0.009)	0.272 (0.006)
Intercept	0.103 (0.014)	0.203 (0.018)	0.315 (0.017)
<hr/>			
R-squared	0.328	0.401	0.484
NOBs	40,212	40,692	104,896
<hr/>			

Source: Authors' calculation from Monthly Labor Force Survey, 1986-2008. Regression coefficients for 1986, 1996, and 2006 are reported.

Note: The same note applies as in Table 2.

Table 4: Changes in Industrial Composition of Employed Workers

	1986	1996	2006
Agriculture	0.004	0.006	0.007
Forestry	0.002	0.001	0.001
Fishery	0.004	0.002	0.002
Mining	0.001	0.002	0.001
Construction	0.090	0.097	0.076
Manufacturing	0.294	0.251	0.200
Electricity, etc.	0.008	0.009	0.007
Transport and Communications	0.081	0.079	0.089
Wholesale and Retail Trade	0.202	0.197	0.209
Finance and Insurance	0.047	0.047	0.038
Services	0.215	0.262	0.322
Government	0.049	0.042	0.043
Others	0.002	0.004	0.004
NOBs	40,685	40,980	106,906

Source: Authors' calculation from Monthly Labor Force Survey, 1986-2008. Only the statistics for 1986, 1996 and 2006 are reported.

Note: The same note applies as in Table 2.

Table 5: Regression of Contingent Status on Industrial Composition

	1986	1996	2006
Agriculture	0.380 (0.039)	0.408 (0.026)	0.489 (0.017)
Forestry	0.249 (0.045)	0.214 (0.056)	0.262 (0.047)
Fishery	0.201 (0.028)	0.161 (0.043)	0.302 (0.034)
Mining	0.034 (0.024)	0.041 (0.045)	0.100 (0.051)
Construction	0.156 (0.006)	0.130 (0.006)	0.181 (0.005)
Manufacturing	0.148 (0.004)	0.160 (0.004)	0.206 (0.003)
Electricity, etc.	0.071 (0.016)	0.051 (0.020)	0.090 (0.016)
Transport and Communications	0.065 (0.007)	0.130 (0.007)	0.200 (0.005)
Wholesale and Retail Trade	0.225 (0.006)	0.322 (0.004)	0.448 (0.003)
Finance and Insurance	0.080 (0.007)	0.127 (0.009)	0.227 (0.007)
Services	0.157 (0.004)	0.210 (0.004)	0.392 (0.002)
Government	0.100 (0.009)	0.091 (0.009)	0.157 (0.007)
Others	0.202 (0.048)	0.230 (0.030)	0.419 (0.022)
R-squared	0.170	0.224	0.354
NOBs	40,685	40,980	106,906

Source: Authors' calculation from Monthly Labor Force Survey, 1986-2008. Regression coefficients for 1986, 1996, and 2006 are reported.

Note: Regression coefficients of contingent status on industry dummy variables without constant are reported. Heteroskedasticity robust standard errors are in parentheses. Because of missing values in education level, the number of observations (NOBs) in Panel A is smaller than that in Panel B.

Table 6: Summary Statistics of Variables Used for Regression Analysis

	1998		2000		2002		2004		2006	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Contingent ratio	0.105	0.169	0.118	0.185	0.125	0.198	0.128	0.204	0.124	0.201
Uncertainty	0.114	0.114	0.117	0.111	0.116	0.107	0.113	0.109	0.107	0.108
Shock (+)	0.039	0.089	0.043	0.094	0.047	0.094	0.043	0.096	0.038	0.085
Shock (-)	-0.039	0.090	-0.043	0.101	-0.047	0.106	-0.042	0.104	-0.037	0.097
Expected growth (+)	0.010	0.048	0.049	0.073	0.024	0.058	0.049	0.071	0.052	0.093
Expected growth (-)	-0.085	0.084	-0.021	0.060	-0.043	0.065	-0.020	0.057	-0.020	0.069
Lagged expected growth (+)	0.028	0.061	0.026	0.068	0.013	0.046	0.040	0.066	0.047	0.074
Lagged expected growth (-)	-0.034	0.063	-0.037	0.062	-0.062	0.078	-0.023	0.054	-0.020	0.060
Log of sales	8.805	1.303	8.720	1.324	8.722	1.326	8.673	1.372	8.737	1.385
Log of # of establishments	1.526	1.159	1.576	1.179	1.604	1.189	1.582	1.206	1.605	1.215
Internet	0.679	0.467	-		0.887	0.317	0.931	0.254	0.948	0.221
E-commerce	0.010	0.101	-		0.264	0.441	0.309	0.462	0.336	0.472
NOB s	19,826		19,195		18,456		20,487		20,192	

Source: Authors' calculation from Basic Survey of Firm Structure, 1998, 2000, 2002, 2004. "Internet" is an indicator that takes one if the company uses the internet. "E-commerce" is an indicator that takes one if the company uses the internet for commercial transactions.

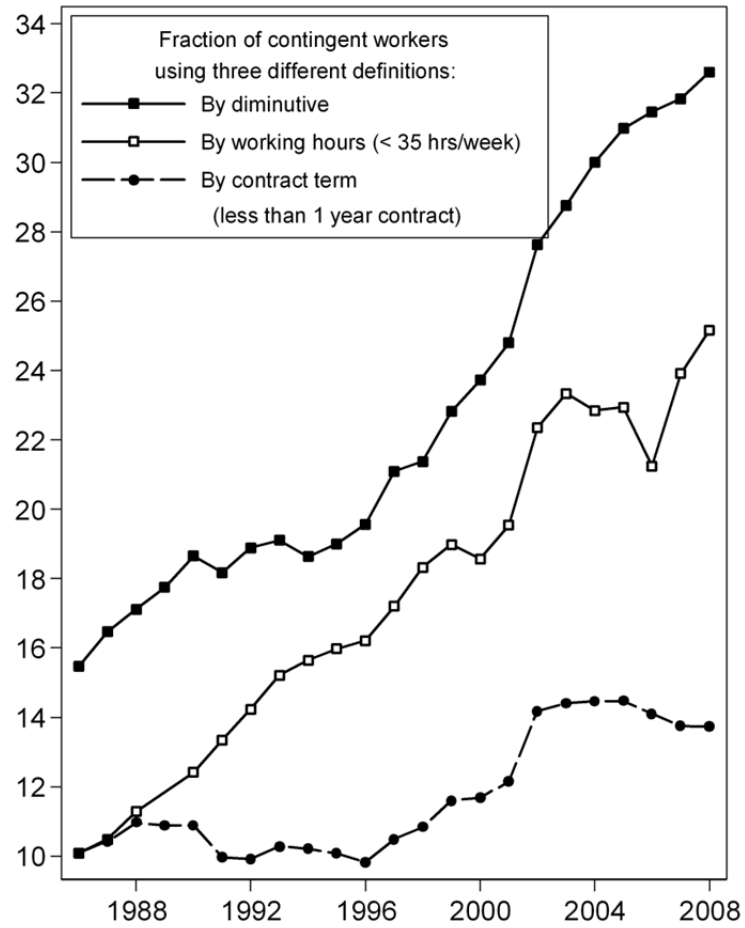
Table7: Determinants of Usage of Contingent Workers

Dependent Variable: Fraction of Contingent Workers

Sample: All Industry, Basic Survey of Firm Structure, 1997-2006 for columns (1) to (3), 1998, 2001-2006 for columns (4) to (6)

	(1)	(2)	(3)	(4)	(5)	(6)
Uncertainty			-0.001 (0.008)		0.000 (0.009)	0.001 (0.009)
Shock (+)			0.002 (0.003)		-0.004 (0.004)	-0.004 (0.004)
Shock (-)			0.032 (0.003)		0.027 (0.004)	0.028 (0.004)
Expected growth (+)			0.062 (0.008)		0.051 (0.009)	0.051 (0.009)
Expected growth (-)			-0.007 (0.007)		-0.017 (0.008)	-0.017 (0.008)
Lagged expected growth (+)			0.056 (0.008)		0.070 (0.009)	0.071 (0.009)
Lagged expected growth (-)			0.004 (0.007)		-0.001 (0.010)	-0.001 (0.010)
Log of sales			-0.015 (0.001)		-0.015 (0.001)	-0.016 (0.001)
Log of # of establishments			0.021 (0.001)		0.023 (0.001)	0.023 (0.001)
Internet						0.004 (0.002)
E-commerce						0.010 (0.002)
1998	0.008 (0.001)	0.006 (0.001)	0.007 (0.001)			
1999	0.011 (0.001)	0.008 (0.001)	0.009 (0.001)			
2000	0.021 (0.001)	0.014 (0.001)	0.012 (0.001)			
2001	0.025 (0.001)	0.016 (0.001)	0.015 (0.001)	0.018 (0.001)	0.008 (0.001)	0.005 (0.001)
2002	0.028 (0.001)	0.018 (0.001)	0.018 (0.001)	0.020 (0.001)	0.011 (0.001)	0.008 (0.001)
2003	0.027 (0.001)	0.020 (0.001)	0.018 (0.001)	0.020 (0.001)	0.012 (0.001)	0.008 (0.001)
2004	0.031 (0.001)	0.023 (0.001)	0.020 (0.001)	0.023 (0.001)	0.013 (0.001)	0.009 (0.002)
2005	0.030 (0.001)	0.022 (0.001)	0.019 (0.001)	0.022 (0.001)	0.013 (0.001)	0.008 (0.002)
2006	0.027 (0.001)	0.019 (0.001)	0.016 (0.001)	0.019 (0.001)	0.009 (0.001)	0.005 (0.002)
Intercept	0.097 (0.001)	0.038 (0.001)	0.050 (0.009)	0.105 (0.001)	0.107 (0.009)	0.113 (0.009)
Industry dummies	N	Y	Y	Na	Y	Y
NOBs	195,616	195,617	195,618	137,863	137,863	137,863
R-squared	0.003	0.380	0.391	0.001	0.402	0.402

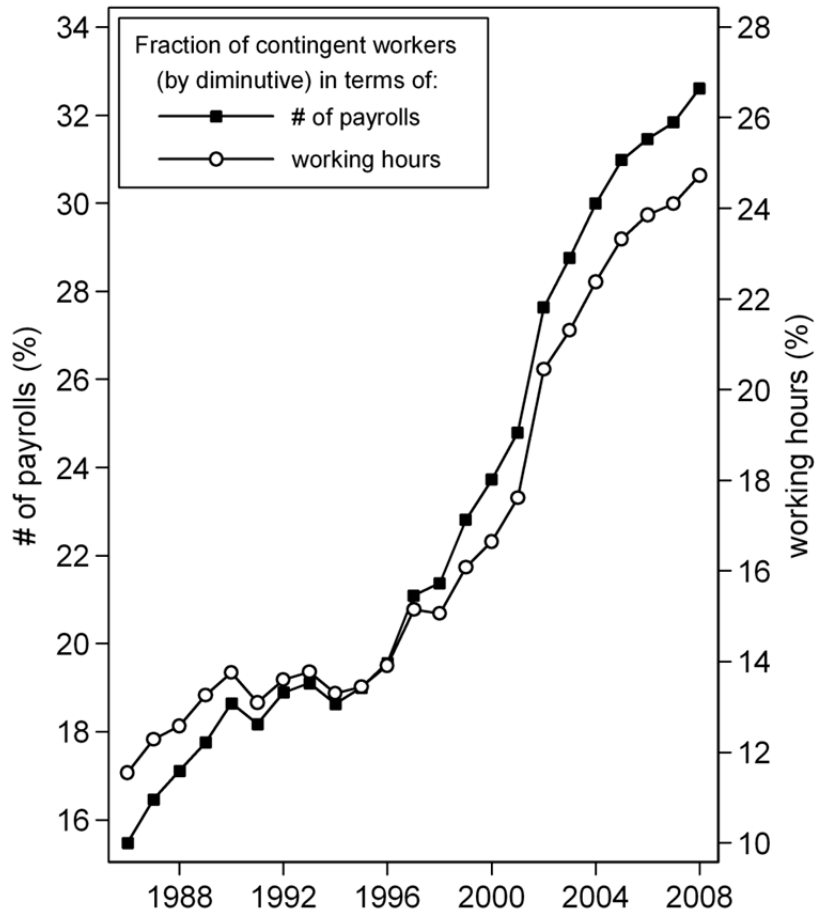
Figure 1: Fraction of contingent employment
Panel A



Source: Monthly Labor Force Survey, 1986-2008.

Note: Sampling weights are used. Those in schools are excluded.

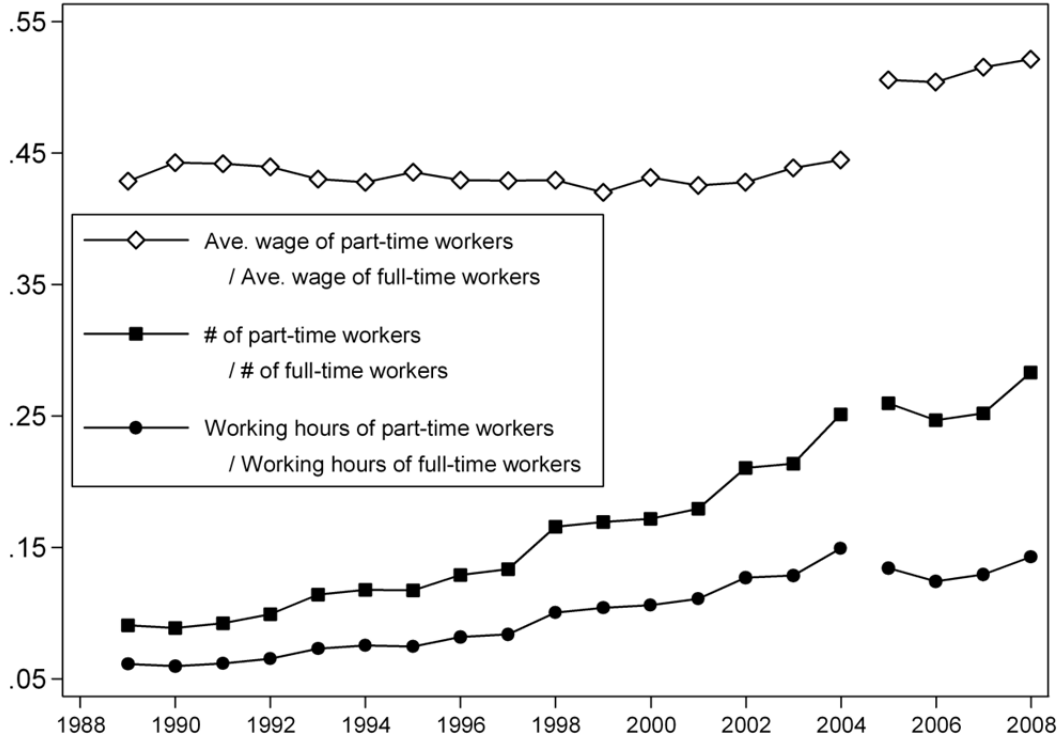
Panel B



Source: Monthly Labor Force Survey, 1986-2008.

Note: 'Contingent' workers include part-time workers, contract workers, and dispatched workers.

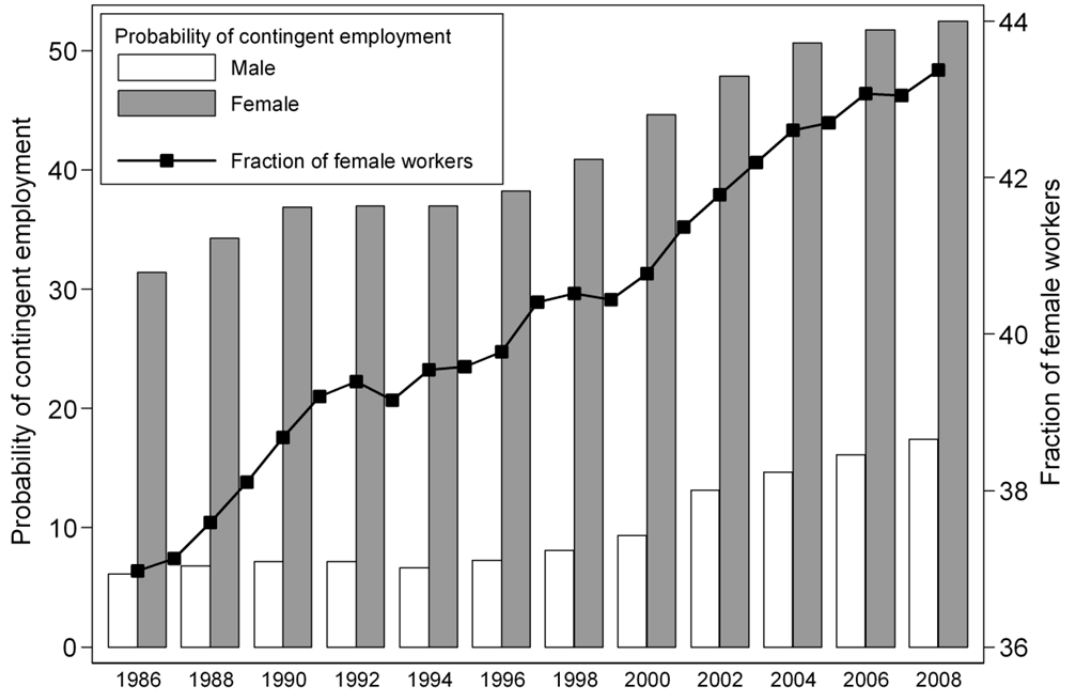
Figure 2: Relative Importance of Demand and Supply Shifts



Source: Basic Survey of Wage Structure, 1988-2008.

Note: Wage is calculated as hourly rate (monthly wage divided by total monthly hours of work). Wage includes bonus payment, and working hours are scheduled hours plus overtime hours. The correlation coefficient between the relative wage and the fraction of part-time workers is 0.71 (significant at the 1% level) and that between the relative wage and the relative working hours is 0.56 (significant at the 5% level).

Figure 3: Fraction of Female Workers and Probability of Part-Time Employment

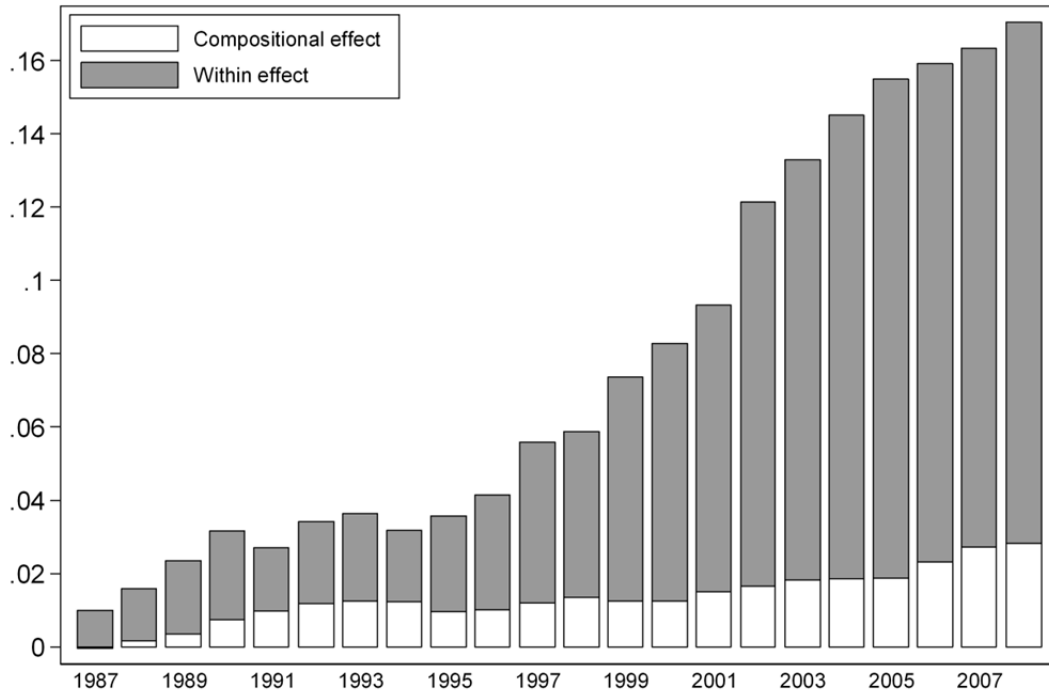


Source: Monthly Labor Force Survey, 1986-2008.

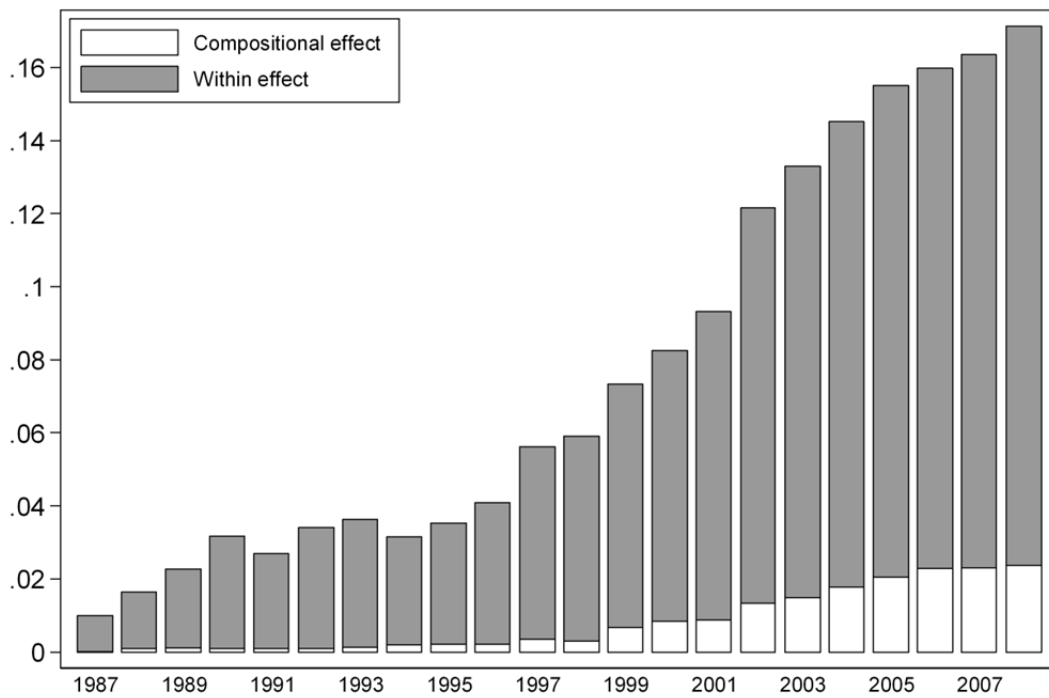
Note: Sampling weights are used.

Figure 4: Decomposition of Increases in Contingent Workers from 1986

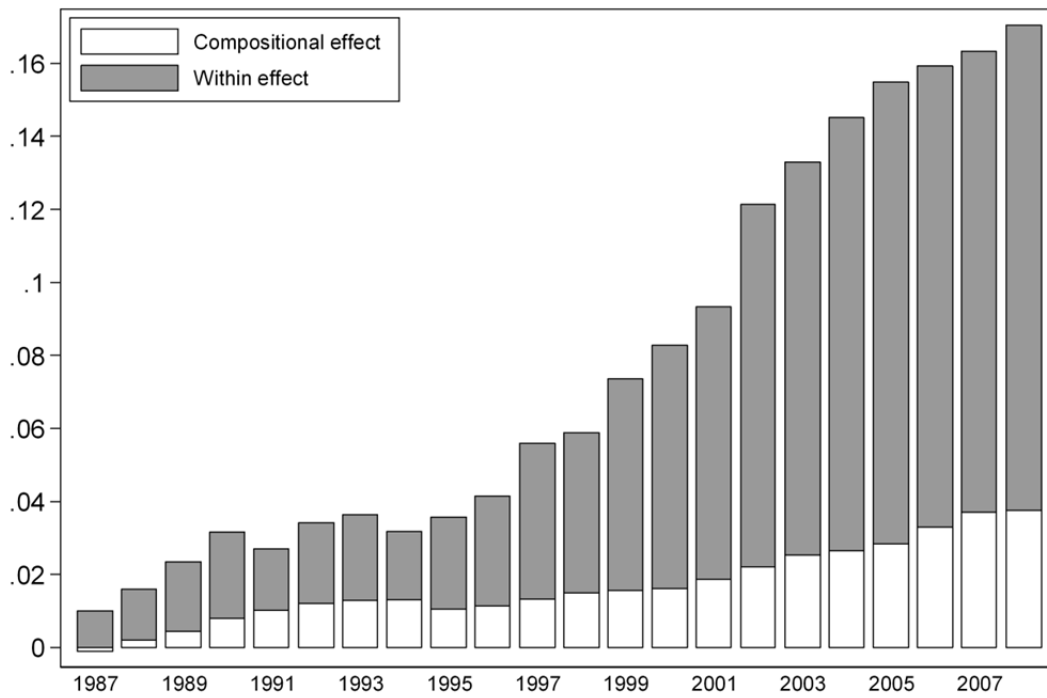
A) Demographic Characteristics



B) Industrial Composition



C) Demographic Characteristics and Industrial Composition



Source: Authors' calculation based on the results in Table 2 using Monthly Labor Force Survey, 1986-2008. Total change is decomposed into compositional effect and within-industry effect using the equation: $x_1b_1 - x_0b_0 = (x_1 - x_0)b_1 + x_0(b_1 - b_0)$.