The Diffusion of Parental Leave for Fathers in Japanese Firms: Exploring Antecedents and Performance Outcomes

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This study examines the diffusion of parental leave for fathers in Japanese firms, specifically exploring antecedents and performance outcomes. Using panel data on the Nikkei 225 firms from 2004 to 2020, we found that parental leave for fathers is more prevalent in firms that are proactive in work-life balance practices and that once the practice begins to diffuse, it diffuses by itself through peer effects within the firm. Meanwhile, we did not find any statistically significant effect on firm performance. These results imply that it may be difficult to expect the diffusion of parental leave for fathers through voluntary efforts by firms alone. The benefits of fathers taking parental leave are not necessarily limited to firms that employ them; rather, such benefits can be reaped by their wives, firms that employ their wives, and even society as a whole. In fact, to ensure that women can continue to build on their careers without interruption due to marriage, childbirth, or child-rearing, reforming men's work including parental leave is required. In this sense, externalities exist in parental leave for fathers, and efforts by individual firms alone may not be enough for a socially sufficient level, suggesting the need for policy intervention by the public sector.

I. Introduction

In June 2021, the Act on Childcare Leave, Caregiver Leave, and Other Measures for the Welfare of Workers Caring for Children or Other Family Members (hereinafter "CCFCLA") was amended, and then enforced in phases. The amended CCFCLA introduced a new scheme that enables fathers to take up to four weeks of parental leave (paternity leave)—which can be taken all at a time or as divided into two separate blocks—during the first eight weeks after a child's birth, in addition to the existing parental leave system. As a result, male workers can take parental leave in four separate blocks, including the paternity leave provided under the amended CCFCLA.

In addition, for firms with a workforce of 1,000 or more employees, information on male workers' use of parental leave should be available to the public from April 2023 under the amended act. This indicates that the development of a workplace environment conducive to parental leave for farther is emerging as an important challenge for Japanese firms.

Promoting parental leave for farther is a work-life balance (hereinafter, "WLB") practice to enable fathers to balance the needs of work and child-rearing. By providing parental leave for a certain period of time, relieving fathers of the burden of work, and encouraging their proactive involvement in child-rearing and other household responsibilities, the practice is expected to alleviate the disproportionate burden on mothers. There is an abundance of research so far concerning the antecedents that affect WLB practices and their impact on employing firms' performance, both in Japan and internationally (Konrad and Mangel 2000; Spell and Blum 2005; Yang and Konrad 2011; Anezaki 2010; Kawaguchi 2008; Yamamoto and Matsuura 2011), and recent research on Japanese firms has focused on WLB practices targeted at women (married women in particular) (Abe, Kodama, and Saito 2017; Yamaguchi 2017; Yamaguchi 2021). While research on WLB practices for women have accumulated, much less is known about WLB practices for men in Japanese firms. This is surprising given that the implementation of WLB practices for men in Japanese firms has also been gradually becoming an important point of debate, as exemplified by the promotion of the *Ikumen* Project (which aims to encourage more men to actively involved in child-rearing) by the Ministry of Health, Labour and Welfare (MHLW) since FY2010.[1]

From this perspective, our study analyzes the diffusion of parental leave for father in Japanese firms using panel data on the Nikkei 225 firms from FY2004 to 2020. In the past, few male workers took parental leave. As will be mentioned later, however, male parental leavers have started to rise in the late 2000s. Our study aims to contribute to research on WLB practices by identifying the antecedents of fathers' use of parental leave (what factors affect the diffusion of parental leave for father at firms) and its impact on firm performance (how the diffusion of parental leave for father affects firm performance).

This article is structured as follows. Chapter II provides an overview of previous studies on fathers' use of parental leave and Chapter III explains what Japan's parental leave system is. Chapter IV presents the data and analytical framework used in our study and Chapter V provides detailed explanations about the contents of our analysis. Chapter VI summarizes the estimation results obtained from the analysis and argues the implications obtained from the analysis. Finally, Chapter VII states the conclusion of our study and mentions unresolved research issues that should be addressed in the future.

II. Literature Review

Previous studies related to the diffusion of parental leave for father can be broadly divided into those investigating the antecedents that affect father's use of parental leave and those examining its consequences. Some studies that examined the antecedents that affect fathers' use of parental leave pointed out the importance of policy measures to encourage fathers to take parental leave. According to a study by O'Brien (2009), which analyzed parental leave systems in 24 countries, including European countries and other English-speaking countries (the United States, Canada, and Australia) in 2003–2007, fathers' use of statutory leave is greatest when high income replacement (50 percent or more of earnings) is combined with extended duration (more than fourteen days). Furthermore, a series of studies examining the effects of the father's quota system (a system that assigns fathers to take a certain amount of parental leave), which was adopted in Sweden (Duvander and Johansson 2012; Ekberg, Eriksson and Friebel 2013), Norway (Dahl, Løken and Mogstad 2014), Iceland (Olafsson and Steingrimsdottir 2020), and the Canadian province of Quebec (Patnaik 2019) to encourage men to take parental leave, have indicated that the introduction of these systems resulted in a significant increase in father's use of parental leave.

In particular, Dahl, Løken and Mogstad (2014) examined how the introduction of the father's quota system in Norway affected father's use of parental leave. In order to encourage fathers' involvement in child-rearing, Norway introduced the father's quota system in 1993. This system grants couples an additional month of parental leave when the father also takes paternity leave, compared to when only the mother takes such leave.[2] As a result of an analysis using data for the period from 1992 to 2006, it was found not only that the parental leave take-up rate among men rose 32% immediately after the introduction of the system but also that the rate rose further when there was a male sibling or workplace colleague who had taken parental leave. Such peer effect snowballs, with the first peer (the sibling or workplace colleague) affecting the behavior of the second peer, whose behavior in turn affects the third peer, and so on. As a result, the parental leave take-up rate among men in Norway rose to as high as around 70% in the first half of the 2000s.

Studies that examined the effects of father's use of parental leave found that fathers' leave-taking affected not only the parental sharing of child-rearing and other household responsibilities (Patnaik 2019) but also the affairs related to the medium- to long-term spousal relationship, including birth-giving (Duvander et al. 2019; Lappegård and Kornstad 2020) and divorce (Lappegård et al. 2020; Olafsson and Steingrimsdottir 2020). For example, Patnaik (2019) examined the effects of fathers' use of parental leave of parents living in Quebec on the sharing of child-rearing and other household responsibilities during the first to third years after the leave period. It was found that when fathers took parental leave, not only did they spend more time on child-rearing and other household responsibilities than when they did not, but mothers also devoted more time in paid work and were more likely to be employed full-time. This suggests that fathers' use of parental leave may have sustained effects on both parents' behavior and contribute to correcting the uneven parental sharing of child-rearing and other household responsibilities. On the other hand, Ekberg, Eriksson, and Friebel (2013) and Ugreninov (2013), who focused on the number of sick leave days taken to care for sick children as an indicator of the parental-sharing of child-rearing and other household responsibilities, did not observe any significant effect of fathers' use of parental leave. This suggests that the effects of paternity leave may differ depending on the specific household responsibilities and child-rearing.

Duvander et al. (2019) examined the effects of fathers' use of parental leave on the birth of a second and third child in Iceland, Norway, and Sweden from 1995-2009. The study found that fathers' use of parental leave had a positive effect on the birth of a second child in all of the three countries but that in the case of a third child, it did not have any statistically significant effect in Sweden and had a negative effect in Norway and Sweden. This suggests that fathers' use of parental leave may not necessarily encourage parents to have more children (particularly when the couple already has two children). Meanwhile, Lappegård and Kornstad (2020) investigated how social norms that developed in local communities as a result of the diffusion of parental leave for father may affect the decision on childbirth taken by parents living in the communities. Specifically, the study focused on Norway in 1989–2013 and found that the parental leave take-up rate among men in a certain community had a positive effect on the birth of first and second children for couples living in the community. In addition, this effect was found to be stronger in relation to the birth of a second child compared to that of a first child. These results suggest that in communities where parental leave for father diffuses widely and where fathers' involvement in child-rearing is taken for granted, fathers' engagement in child-rearing can be expected to be greater than in other regions, and thus it is easier to plan for childbirth and implement the plan.

Lappegård et al. (2020) analyzed the effects of fathers' use of parental leave on spousal relationship.[3] Specifically, the study, focusing on three Nordic countries—Iceland, Norway and Sweden—in 1993–2011, examined the effects of the fathers' use of parental leave on the divorce/separation of married or cohabiting couples. It was found that among couples where the man took parental leave, divorce/separation was less likely to occur compared to couples where the man did not take parental leave. This effect was consistently observed in the three countries. This is presumably because fathers' use of parental leave, through the sharing of child-

rearing and other household responsibilities, lead to greater couple satisfaction and stronger family ties. The results of the above analysis are consistent with the results of an analysis conducted by Olafsson and Steingrimsdottir (2020), which examined the effects of parental leave reforms implemented in Iceland in 1990–2016 to promote the wider use of parental leave among men. This study showed that after the reform, the probability of divorce is lower among parents who are entitled to paternity leave.[4] Moreover, it found that this effect not only persists throughout the first 15 years after the child is born but also has the strongest impact among couples where the mother has higher, or equal, educational attainment to that of the father.

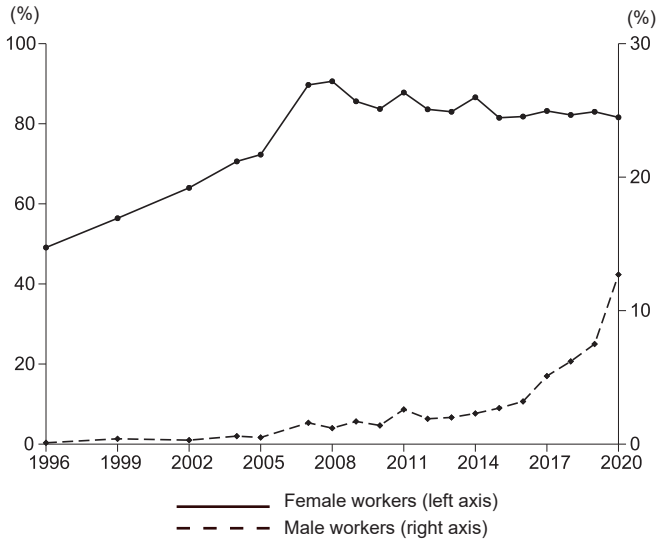
These previous studies suggest that the benefits of fathers' use of parental leave can be reaped by their wives, by the firms employing the wives, and, eventually, by society as a whole. On the other hand, there have been few studies conducted with respect to the benefits that may be reaped by the employer firms of the fathers. If the employer firms cannot enjoy the benefits, efforts made by individual firms alone may not be sufficient to raise the take-up rate of parental leave up to a socially satisfactory level. In fact, many of the reasons cited by Japanese fathers for not taking parental leave are attributable to factors related to the workplace environment, and thus efforts made by individual firms alone may not have been sufficient.[5] Therefore, focusing on firms where male workers took parental leave, this study considers what factors affect the diffusion of parental leave for father at firms and how it affects firm performance.

III. Japan's Parental Leave System

The Act on Childcare Leave, etc. (hereinafter the "Childcare Leave Act"), the predecessor of the current CCFCLA, was enforced in 1992.[6] Before that, the legal provisions for parental leave were contained in the Working Women's Welfare Act. Those provisions were inherited by the Act on Equal Opportunity and Treatment between Men and Women in Employment (hereinafter, the "Equal Employment Opportunity Act"), which was enforced in 1986 as an amended version of the Working Women's Welfare Act. Around the time of enforcement of the Equal Employment Opportunity Act, even before the enforcement of the Childcare Leave Act, some firms started to introduce a parental leave system as part of their efforts to develop a work environment conducive to retaining female workers.[7] However, in most of these cases, parental leave was granted only to female workers. Later, following the "1.57 Shock" in 1990,[8] social concerns over the declining birthrate grew, and as part of the legislative initiative to address this problem, the Childcare Leave Act was enacted in order to provide for parental leave as an entitlement for workers, including men (Sato and Takeishi 2004).

The Childcare Leave Act was based on the Workers with Family Responsibilities Convention, 1981 (No.156) and the Family Responsibilities Recommendation, 1981 (No.165), which was adopted by International Labour Organization in 1981. It enabled workers, both men and women, to take leave for a period of one year after a child's birth and stipulated that employer firms cannot deny employees' requests to take leave (Inoue 2018). After its enforcement in 1992, the Childcare Leave Act has undergone amendments to adapt it to changing circumstances. Specifically, the scope of workers eligible for parental leave, which was initially limited to regular workers, was later expanded to cover fixed-term workers as well. Furthermore, it was later allowed to extend the duration of parental leave, which in principle is one year after a child's birth, to a maximum of two years in cases where access to a childcare facility was not available.[9]

In parallel with the implementation of the succession of amendments, economic support during the period of parental leave were also introduced. At first, no income compensation was provided during the period of parental leave, but as a result of the amendment of the Employment Insurance Act in 1994, parental leave cash benefits were set up, and the payment of cash benefits equivalent to 25% of the pre-leave wage level started in 1995. Later, the wage replacement rate was gradually raised to 40% of the pre-leave wage level in 2001 and to 50% in 2007. In 2014, it was raised to 67% for the first six months of the leave while the rate for the rest of the leave



Source: Created by the authors based on the Basic Survey of Gender Equality in Employment Management (MHLW 2019).

Figure 1. The parental leave take-up rate in Japan

period was kept at 50% (MHLW 2016).[10]

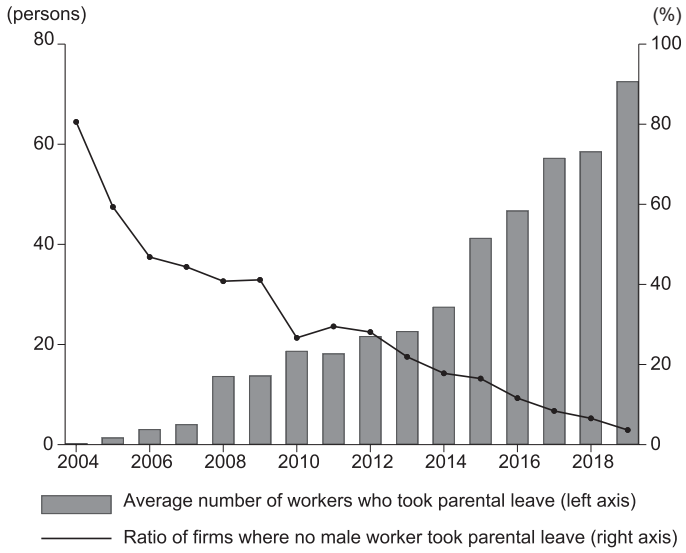
As a result of the enhancement of such public support for parental leave, Japan's parental leave system has become a generous one by global standards. Indeed, according to UNICEF's 2021 report *Where do rich countries stand on childcare?*, Japan ranked first among 41 countries (members of the Organization for Economic Cooperation and Development and the European Union) for providing the longest period of paid leave for fathers (Gromada and Richardson 2021). However, in practice, women mostly take parental leave, and the parental leave take-up rate among fathers still remains low. Figure 1, which shows the gender-wise parental leave take-up rates, demonstrates that the take-up rate among mothers started to rise gradually from 49.1% in FY1996 and has stayed at above 80% since the middle of the 2000s. On the other hand, the take-up rate among fathers, which was 0.1% in FY1996, remained flat for a while but started to rise moderately after surpassing 1% for the first time in FY2007. Although the uptrend became more pronounced in the second half of the 2010s, the take-up rate among fathers in FY2020, at 12.7%, remained much lower than the rate among mothers. That being said, given that the take-up rate among fathers remained below 1% until the middle of the 2000s, father's use of parental leave is steadily spreading, albeit at a moderate pace.

IV. Data and Analytical Framework

1. Data

The core data of our study is the number of male workers who took parental leave[11] that is contained in *CSR Company Hand Book* (published by Toyo Keizai). *CSR Company Hand Book*, which has been published annually since 2005, contains data on corporate social responsibility activities of Japanese firms. In our study, we collected data on the numbers of male workers who took parental leave in FY2004–2019 at the 225 firms that were designated as the components of the Nikkei 225 stock index as of the end of FY2019.[12] As data contained in *CSR Company Hand Book* are gathered through a questionnaire survey, firms that did not respond to the survey are not included. The data for the study was available for 210 Nikkei 225 firms.

Figure 2 shows changes over time in the average numbers of male workers who took parental leave and the



Source: Created by the authors based on *CSR Company Hand Book*. (Toyo Keizai 2007–2020).

Figure 2. Diffusion of parental leave for male workers at the Nikkei 225 firms

percentage of firms where no male worker who took parental leave among firm that responded to the survey in our sample. The average number of male workers who took parental leave, which was almost nil in FY2004, started to rise moderately in late 2000s, and the uptrend became more prominent in late 2010s. This is consistent with the trend indicated in Figure 1. The percentage of firms where no male worker who took parental leave continued to decline from the middle of the 2000s, falling below 5% in FY2019. This implies that the number of male workers who took parental leave increased at many firms, rather than that the number increased at particular firms.

In our study, the above data on the numbers of male workers who took parental leave is combined with other CSR data collected from *CSR Company Hand Book* and financial data obtained from *Financial QUEST* (provided by Nikkei) and *eol* (provided by I-N Information Systems). Regarding employer firms' performance, we collected data for the period until FY2020 because it presumably takes time before the effects of changes in the number of fathers who take parental leave appear in firm performance. Ultimately, the data used in our study are panel data concerning 210 Nikkei 225 firms in FY2004–2020.[13]

2. Analytical Framework

We first analyze the antecedents of the number of male workers who took parental leave (what factors affect the number of male workers who took parental leave in firms) and then examine its impact on the firm performance of the employer firms (how the number of male workers who took parental leave affects employer firms' performance). Regarding the antecedents, our study predicts that the use of parental leave increases at firms adopting a proactive approach to WLB practices and that once the fathers' use of parental leave has started to diffuse, the momentum of diffusion snowballs. That is because, at firms adopting a proactive approach to WLB practices, it is expected to be a well-established environment for promoting fathers' use of parental leave, resulting in the widespread of the practice, and because once the practice has started to diffuse, it will become more and more widespread of its own momentum through peer effect.[14]

With respect to the effects of the diffusion of parental leave for father on employer firms' performance, we consider the following three possibilities.[15] The first is the possibility that the diffusion of fathers' use of parental

leave may have a positive impact on firm performance. That is because the employee retention rate and morale are expected to improve in line with an increase in fathers' use of parental leave, resulting in better firm performance. The second is the possibility that the diffusion of fathers' use of parental leave may have a negative impact on firm performance. That is because if the work taken over by replacement employees during the period of parental leave does not proceed smoothly or if the procedures necessary for ensuring smooth implementation of the work taken over are too onerous, the employer firms are expected to endure a heavy burden of parental leave, leading to a decline in firm performance. The third is the possibility that the diffusion of fathers' use of parental leave will have no impact on firm performance because even if the employee retention rate and morale improve, the benefits for firm performance are expected to be offset in cases where the employer firm suffers equally strong countervailing costs.

V. Estimation Method and Measures

1. Antecedents

First, we conduct estimation concerning the factors that affect the number of male workers who took parental leave. Since the number of male workers taking parental leave is a count variable, we use the Poisson regression model and the negative binomial regression model: both models are representative approaches for handling count data.[16] In the case of the Poisson regression model, it is assumed that the Poisson distribution, which is usually used to describe the distribution of the numbers of events whose occurrence probability is small, represents the probability distribution of the explained variable Y_{it}. In this study, the number of male workers who took parental leave, expressed as *male parental leaversit*, is used as the explained variable Y_{it}, and it is assumed that the mean value of this variable, indicated as $E(Y_{it})$, is affected by other independent variables. The relationship between this variable and the various antecedents that affect male parental leavers, indicated as $x_{i,\ t-1}$, is expressed by Equation (1) below, which represents our estimation model.

$$E(Male\ parental\ leavers_{it} | x_{i,\ t-1},\ \phi_i) = \phi_i \cdot \exp(x_{i,\ t-1}\beta + \tau_t) \qquad (1)$$

The meanings of the subscripts in the equation are as follows: i = each firm; t = each fiscal year; ϕi = unobservable random scalar; β = estimated parameter vector. In our study, the impact of point-in-time differences, indicated as τ_t, is controlled by including the FY2007–2013 dummy (the dummy variable that takes 1 in the period from FY2007 to FY2013 and 0 in the period before FY2006 and after FY2014) and the FY2014–2019 dummy (the dummy variable that takes 1 in the period from FY2014 to FY2019 and 0 in the period before FY2013), with consideration to changes in the level of cash benefits of parental leave.[17]

As the Poisson regression model involves a constraint—the expected value of the explained variable Y_{it} is limited to the scope of the model's assumed probability distribution—our estimation also uses the negative binomial regression model, which is used for generalizing the Poisson regression model. In the case of the negative binomial regression model, it is assumed that the negative binomial distribution represents the probability distribution of the explained variable Y_{it}. As a result, this is a model that is more appropriate in cases where the distribution of the number of event occurrences is larger than the expected value.

The main explanatory variables used in our study are WLB practices and cumulative male parent leavers. As for WLB practices, we selected the following seven practices implemented by firms to support WLB: flexible working time arrangements (mean: 0.88; standard deviation: 0.33); short working hours scheme (mean: 0.96; standard deviation: 0.20) ; half-day paid leave (mean: 0.97; standard deviation: 0.17); childcare facilities/cash benefits (mean: 0.62; standard deviation: 0.49); working at home (mean: 0.47; standard deviation: 0.50); satellite office spaces (mean: 0.27; standard deviation: 0.44); and the discretionary work system (mean: 0.42; standard

Table 1. Analysis results (principal component analysis)

	First principal component
Flexible working time arrangements	0.213
Short working hours scheme	0.287
Half-day paid leave	0.209
Childcare facilities/cash benefits	0.460
Working at home	0.533
Satellite office spaces	0.436
Discretionary work system	0.378
Eigenvalue	2.154
Contribution rate	30.76%

Table 2. Descriptive statistics (antecedents)

		Mean	S.D.
(1)	Male parental leavers	33.01	84.89
(2)	WLB practices	0.06	1.39
(3)	Cumulative male parental leavers	120.35	438.46
(4)	ROE (%)	6.86	10.73
(5)	Per-employee sales (million yen)	336.96	1644.64
(6)	Number of employees (1,000 persons)	8.96	10.44
(7)	Male worker ratio (%)	81.26	13.00
(8)	Labor equipment ratio (million yen)	137.73	822.83
(9)	Average employee longevity	17.11	3.06
(10)	Paid leave take-up rate (%)	63.95	16.48
(11)	Female parental leavers	105.02	197.74
(12)	Foreign investor ratio (%)	28.87	10.70
(13)	FY2007–2013	0.47	0.50
(14)	FY2014–2019	0.41	0.49

Note: N=2,202. The figures for cumulative male parental leavers, per-employee sales, the number of employees, the average employee longevity, and female parental leavers are those before conversion into logarithm.

deviation: 0.49). Regarding each of those practices, we created a dummy variable which takes 1 when the practice was introduced and 0 when it was not. We conduct the principal component analysis and use the first principal component (contribution rate at 30.76%) whose eigenvalue is 1 or higher in reference to the scree plot. Table 1 shows the results of the principal component analysis. Cumulative male parent leavers refers to the cumulative number of male workers who took parental leave at each firm (expressed in logarithm) in the period after FY2004, which is the starting year of the analysis period.[18] As those variables are related to organizational systems for promoting parental leave and the peer effect, our study predicts that they have positive effects on male parental leavers.

While one of main explanatory variables is the cumulative male parent levers, it increases with the passage of time. Thus, it may be possible that the use of FY2007–2013 dummy and the FY2014–2019 dummy cannot sufficiently control for time effects. Therefore, we also conduct an additional analysis using the dummies developed for individual fiscal years.

Given the previous studies related to practice diffusion, including WLB practices (Naumovska, Gaba and Greve, 2021; Uchida, 2016), we included the following nine control variables: ROE (%); per-employee sales (expressed in logarithm); number of employees (expressed in logarithm); male worker ratio (%); labor equipment ratio (value of tangible fixed assets per employee; expressed in logarithm), average employee longevity (expressed in logarithm); paid-leave take-up rate (%), female parental leavers (the number of female workers who took parental leave, expressed in logarithm); and foreign investor ratio (%). All those explanatory variables took 1 year lag. Table 2 shows the descriptive statistics (mean and standard deviation) of the variables used in the Estimation Model (1).[19]

2. Impact on firm performance

We also analyze how fathers' use of parental leave affects employer firms' performance. To address endogeneity problems such as the presence of simultaneity[20] and omitted variables, we use industry male parental leavers as an instrumental variable. We calculate this variable by dividing the total number of male workers who took parental leave in each industry in each fiscal year by the total number of employees in each industry in each fiscal year[21] (mean: 0.01; standard deviation: 0.01). When calculating the variable for each firm, the number of male workers who took parental leave at the focal firm is excluded from the calculation. Thus, the value of the variable differs from firm to firm and from year to year. The estimation model that uses firm performance as an explained variable is expressed by Equation (2) below.

$$Performance_{i,\,t} = \alpha + \beta_1\, Male\ parental\ leavers_{i,\,t-k} + Z_{i,\,t-k}\,\gamma + \tau_t + F_i + \varepsilon_{i,\,t} \qquad (2)$$

The subscript i in the above equation represents each firm and the subscript t represents each fiscal year. The explained variable $Performance_{i,\,t}$ represents the employer firms' performance. In order to verify the robustness of the analysis, we use not only ROE and per-employee sales (expressed in logarithm) (Bloom, Kretschmer and Van Reenen, 2011) but also ROA and per-employee value added (expressed in logarithm).[22] β_1 is a parameter for male parental leavers. $Z_{i,\,t-k}$ is a matrix for other important variables that presumably affect firm performance. The subscript γ represents the vector of the parameter for each explanatory variable. F_i represents the fixed effect of each firm, while $\varepsilon_{i,\,t}$ represents an error term in cases where the presence of i.i.d is assumed. Taking into consideration changes in the level of parental leave benefits as in the case of Estimation Model (1), τ_t, which represents the effects of point-in-time differences, is controlled by including the FY2007–2013 dummy and the FY2014–2020 dummy (the dummy variable that takes 1 in FY2014–2020 and 0 before FY2013).[23]

The main explanatory variable of this analysis is male parental leavers— the number of male workers who took parental leave at each firm in each fiscal year. In addition to using the number of male workers who took parental leave in the t-1 (expressed in a logarithm),[24] the analysis also uses the variables for the t-2 and t-3 as well to examine the medium-term impact on firm performance. Moreover, in order to check whether or not male workers' use of parental leave had cumulative effects on firm performance, we also conduct an analysis using a stock basis, rather than flow basis, variable, i.e., the cumulative male parental levers in the t-1 (expressed in logarithm) [25] at each firm since FY2004, the starting year of this analysis.[26]

The control variables incorporated in this model are mainly variables used in Estimation Model (1): WLB practices; number of employees (expressed in a logarithm), male worker ratio (%), labor equipment ratio (expressed in a logarithm), average employee longevity (expressed in a logarithm), paid-leave take-up rate (%), female parental leavers (the number of female workers who took parental leave; expressed in a logarithm), and foreign investor ratio (%). Table 3 shows the descriptive statistics (mean and standard deviation) of the variables used in the Estimation Model (2).[27]

Table 3. Basic quantitative values (impact on business performance outcomes)

		Mean	S.D.
(1)	ROE (%)	6.49	9.59
(2)	ROA (%)	3.31	4.66
(3)	Per-employee sales (million yen)	215.77	355.98
(4)	Per-employee value added (million yen)	54.18	149.13
(5)	Male parental leavers	30.59	81.64
(6)	Cumulative male parental leavers	143.42	495.27
(7)	WLB practices	0.15	1.41
(8)	Number of employees (1,000 persons)	9.01	10.58
(9)	Male worker ratio (%)	81.24	13.14
(10)	Labor equipment ratio (million yen)	98.26	482.95
(11)	Average employee longevity	17.11	3.11
(12)	Paid leave take-up rate (%)	64.89	16.41
(13)	Female parental leavers	105.37	199.29
(14)	Foreign investor ratio (%)	28.67	10.69
(15)	FY2007–2013	0.44	0.50
(16)	FY2014–2020	0.45	0.50

Note: N=2,340. The figures for per-employee sales, per-employee value added, male parental leavers, cumulative male parental leavers, the number of employees, the average employee longevity, and female parental leavers are those before conversion into logarithmic values.

VI. Results

1. Antecedents

Table 4 shows the results of analysis of our panel data for FY2004–2019 with male parental leavers used as the explained variable.[28] Model 1 is results from the Poisson regression, and Model 2 is those from the negative binomial regression. Although the estimation results obtained from the two models were not largely different, the variance of male parental leavers (7,206.3) was significantly larger than its mean (33.01), and the results obtained from the negative binomial regression are better fitted (in terms of log-likelihood) than those obtained from the Poisson regression. Thus, we focus on the estimation results obtained from the negative binomial regression in the following.

The coefficients of WLB practices and male parental leavers—our main explanatory variables—took a positive value each at a significance level of 1%. In other words, it was confirmed that fathers' use of parental leave tends to diffuse at firms where WLB practices have already been introduced and that once the practice has started to diffuse, it tends to become more and more widespread of its own momentum through the workplace peer effect. When we examined the extent of the impact that those variables had on male parental leavers based on the parameters obtained from the estimation results, we found the following: when the variable for WLB practices alone was higher than the mean by 1 standard deviation (the variables for other explanatory variables were fixed at the mean), the estimated value of male parental leavers increased by 20.9%; and when the cumulative male parental levers was higher than the mean by 1 standard deviation, the estimated value of male parental leavers increased by 48.3%.

Among the control variables, the parameters for the male worker ratio, the paid leave take-up rate, the number of female workers who took parental leave, and the FY2007–2013 and FY2014–2019 dummies took a

Table 4. Analysis results (antecedents)

	(1)	(2)	(3)	(4)
	Poisson regression model	Negative binomial regression model	Poisson regression model	Negative binomial regression model
WLB practices	0.185*** (0.007)	0.135*** (0.023)	0.170*** (0.008)	0.085*** (0.024)
Cumulative male parental leavers	0.256*** (0.005)	0.313*** (0.019)	0.268*** (0.006)	0.217*** (0.023)
ROE	-0.001 (0.001)	0.002 (0.002)	-0.003*** (0.001)	0.002 (0.002)
Per-employee sales	0.036*** (0.011)	-0.030 (0.033)	0.014 (0.011)	-0.047 (0.034)
Number of employees	-0.065*** (0.011)	-0.126*** (0.033)	-0.056*** (0.011)	-0.112** (0.035)
Male worker ratio	0.031*** (0.001)	0.099** (0.003)	0.033*** (0.001)	0.015*** (0.003)
Labor equipment ratio	0.014† (0.008)	-0.008 (0.024)	0.015* (0.008)	-0.012 (0.025)
Average employee longevity	0.468*** (0.072)	-0.073 (0.132)	0.340*** (0.072)	-0.129 (0.134)
Paid leave take-up rate	0.009*** (0.000)	0.009*** (0.002)	0.008*** (0.000)	0.008*** (0.002)
Female parental leavers	0.527*** (0.011)	0.158*** (0.033)	0.538*** (0.011)	0.218*** (0.035)
Foreign investor ratio	-0.022*** (0.001)	-0.015*** (0.003)	-0.026*** (0.001)	-0.013*** (0.003)
FY2007–2013	0.700*** (0.035)	0.253** (0.093)		
FY2014–2019	1.110*** (0.039)	0.809*** (0.107)		
Constant		-1.188* (0.508)		-1.868*** (0.550)
Year dummy	NO	NO	YES	YES
Log-likelihood	-16374.53	-5561.71	-15966.14	-5522.63
Observations	2202	2202	2202	2202

Note: The figures in parentheses are standard errors. † $p<.1$ * $p<.05$ ** $p<.01$ *** $p<.001$

significant positive value each. In other words, in firms where the paid leave take-up rate and the number of female workers who took parental leave are high, it is easier to promote male workers' use of parental leave presumably because the working environment is favorable for taking paid leave or because there is workplace understanding and cumulative institutional experiences concerning parental leave. In addition, given the increase in male parental leavers after a rise in the level of parental leave benefits, institutional reform may have had some effects. When we examined the extent of the impact of a change of 1 standard deviation in the parameters for those variables on male parental leavers as in the case of the main explanatory variables, we found that the paid leave take-up rate increased by 15.6% and that the number of female workers who took parental leave increased by 22.4%. When we examined the effect of the FY2007–2013 dummy and the FY2014–2019 dummy, we found that the number increased by 28.8% in FY2007–2013 and by 124.5% in FY2014–2019 compared to the level before FY2006.

The parameters for the foreign investor ratio and the number of employees took a significant negative value each. This suggests that there may be strong pressures from foreign investors demanding better performance and that in firms with a large workforce, it is difficult to promote the introduction of new WLB practices, including parental leave for fathers, because of the structural inertia[29] at work. On the other hand, the variables for firm performance, such as ROE and per-employee sales, did not take a significant value. In other words, we did not observe a tendency for the number of male workers who took parental leave to be high in firms where the levels of firm performance level were high in the previous fiscal year.

In Models 3 and 4, the effects of point-in-time differences were controlled by using the dummy variable for each fiscal year. The analysis results obtained from those two models are mostly the same as the ones obtained from Models 1 and 2.

2. Impact on firm performance

Table 5 shows the results of analysis of our panel data for FY2004 to 2020 using ROE (t), ROA (t), per-employee sales (t), and per-employee value added (t) as explained variables and male parental leavers (t-1) as the main explanatory variable. Models 1 to 4 are the estimation results of the standard fixed-effect models, while Models 5 to 9 are the estimation results of the fixed-effect models using instrumental variables (Model 5 represents Stage 1 and Models 6 to 9 represent Stage 2). The results concerning the instrumental variables used in Model 5 shows that the value of each of the Cragg- Donald Wald F statistic and the Kleibergen-Paap rk Wald F statistic was higher than 10, which means that the instrumental variables did not have a weak correlation problem. The null hypothesis that the instrumental variables are under-identified was rejected because the value of the Kleibergen-Paap rk LM statistic was 49.6. Thus, the instrumental variables used in the analysis are considered to be valid. Regarding Models 1 to 4 and 6 to 9, the coefficient of male parental leavers, which is the variable of most interest, took a significant negative value in Model 3, which is a standard fixed-effects model, but did not take a significant value, either positive or negative, in the analysis of any of the fixed-effects models using instrumental variables. When we conducted an analysis using male parental leavers (t-2), male parental leavers (t-3), and the cumulative male parental levers (t-1) as the main explanatory variables, we did not observe their significant effects on firm performance in any of these models, which aligns with results in Table 5.[30]

VII. Discussion

To contribute to the body of research related to WLB practices by identifying the antecedents of male workers' use of parental leave and its impact on firm performance, we developed panel data of the Nikkei 225 firms and analyzed the data. As a result of analyzing the antecedents that affect the diffusion of parental leave for father, we found that the parameters for WLB practices and the cumulative male parental leavers took a significant positive value. This finding implies that fathers' use of parental leave is more likely to diffuse widely at firms that take a more proactive approach to WLB practices and that once fathers' use of parental leave has started to diffuse, the practice becomes more and more widespread of its own momentum through the workplace peer effect.

On the other hand, the analysis of the impact on firm performance did not find any statistically significant level of effect. This suggests that while the positive effects, such as improvements in the employee retention rate and morale, may not be enough to improve firm performance, the burden on employer firms from fathers' use of parental leave, such as the need to secure replacement personnel, does not necessarily outweigh the benefits and lower firm performance. Amid social expectations for an increase in fathers' use of parental leave, it is one of our important findings that at the least, the diffusion of parental leave for fathers does not have an obvious negative impact on firm performance.

Table 5. Analysis results (impact on firm performance)

	Fixed effects				Fixed effects + instrumental variable				
						Second stage			
	ROE	ROA	Per-employee sales	Per-employee value added	First stage	ROE	ROA	Per-employee sales	Per-employee value added
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Male parental leavers	-0.095 (0.196)	-0.110 (0.098)	-0.019† (0.011)	0.000 (0.011)		-0.074 (1.412)	0.821 (0.784)	0.018 (0.112)	0.153 (0.094)
WLB practices	0.077 (0.310)	-0.128 (0.153)	-0.004 (0.014)	0.001 (0.013)	0.277*** (0.043)	0.072 (0.497)	-0.371 (0.238)	-0.014 (0.032)	-0.039 (0.029)
Number of employees	-1.348† (0.746)	-0.706† (0.422)	0.061 (0.069)	-0.058 (0.052)	0.045 (0.132)	-1.349† (0.742)	-0.764 (0.494)	0.059 (0.071)	-0.068 (0.066)
Male worker ratio	-0.028 (0.075)	-0.024 (0.040)	0.002 (0.006)	-0.007 (0.005)	-0.004 (0.015)	-0.028 (0.075)	-0.011 (0.046)	0.003 (0.006)	-0.005 (0.006)
Labor equipment ratio	0.070 (0.362)	0.040 (0.193)	0.230** (0.071)	0.128* (0.060)	-0.064 (0.060)	0.072 (0.394)	0.114 (0.204)	0.233*** (0.070)	0.141* (0.058)
Average employee longevity	0.106 (3.765)	-1.751 (2.245)	0.332** (0.126)	0.201† (0.103)	0.014 (0.320)	0.102 (3.753)	-1.910 (2.382)	0.326** (0.125)	0.175 (0.113)
Paid leave take-up rate	-0.085* (0.038)	-0.019 (0.018)	-0.005** (0.002)	-0.003† (0.001)	0.016** (0.005)	-0.085† (0.049)	-0.038 (0.027)	-0.005* (0.003)	-0.006* (0.002)
Female parental leavers	0.007 (0.548)	0.043 (0.241)	0.010 (0.024)	-0.010 (0.023)	0.202* (0.094)	0.003 (0.606)	-0.138 (0.281)	0.003 (0.033)	-0.040 (0.032)
Foreign investor ratio	0.176** (0.058)	0.122*** (0.030)	0.007** (0.002)	0.004* (0.002)	-0.008 (0.006)	0.176** (0.061)	0.131*** (0.031)	0.007** (0.003)	0.005* (0.002)
FY2007−2013	-5.287*** (0.870)	-1.982*** (0.362)	-0.150*** (0.036)	-0.083* (0.034)	0.504*** (0.116)	-5.298*** (1.037)	-2.478*** (0.569)	-0.170* (0.070)	-0.164* (0.067)
FY2014−2020	-3.849*** (1.007)	-1.355** (0.436)	-0.069 (0.048)	-0.009 (0.041)	1.288*** (0.162)	-3.877† (2.105)	-2.648* (1.108)	-0.120 (0.153)	-0.222 (0.139)
Industry male parental leavers					42.268*** (9.882)				
Constant	24.412† (12.741)	15.332* (7.294)	2.639** (0.932)	4.565*** (0.728)	-0.739 (1.413)	24.422† (12.696)	15.817* (7.266)	2.659** (0.932)	4.645*** (0.795)
Kleibergen-Paap rk LM statistic					49.599 (0.000)				
Cragg-Donald Wald F statistic					48.435				
Kleibergen-Paap rk Wald F statistic					48.923				
Observations	2340	2340	2340	2340	2340	2340	2340	2340	2340

Note: The figures in parentheses are standard errors. † $p<.1$ * $p<.05$ ** $p<.01$ *** $p<.001$

These findings provide implications for policies on fathers' use of parental leave. If promoting fathers' use of parental leave leads to better firm performance, firms are expected to make voluntary efforts to encourage parental leave for father. However, as indicated by the results of analysis in our study, it may be difficult to expect firms to make voluntary efforts if benefits for business performance cannot be confirmed. The benefits of fathers' use of parental leave are not necessarily limited to their employer firms; rather, the benefits can be reaped by their wives, firms that employ the wives, and eventually, society as a whole. In fact, in Japan where domestic chores tend to be concentrated in the hands of women, to ensure that women can continue to build on

their careers without interruption due to marriage, childbirth, or child-rearing, it is essential to reform men's work styles, including the use of parental leave for father (Higuchi, Ishi, and Sato 2018; Yamaguchi 2017). In this sense, externalities are involved in fathers' use of parental leave, and thus efforts by individual firms alone may not be sufficient to bring it up to a socially satisfactory level. This suggests the need for policy intervention by the public sector.

The findings also suggest that public-sector policy interventions should be focused on firms where WLB practices, including parental leave for fathers, are inadequate. The results of analysis indicate that embracing WLB creates a virtuous circle: not only is parental leave for fathers more likely to diffuse at firms that are more proactive toward WLB practices because the environment necessary for promoting the practice exists, but also, once fathers' use of parental leave has started to diffuse, the practice continues to become more and more widespread through workplace peer effect. Conversely, failing to embrace WLB may create a vicious circle: at firms that are negative toward WLB, parental leave for fathers does not diffuse because the environment necessary for promoting it is not created, which means the absence of the peer effect, and as a result, fathers' use of parental leave continues to lack the momentum that it needs in order to diffuse. In light of those mechanisms, the public sector should conduct policy interventions that trigger a shift from a vicious to virtuous circle, focusing on firms where WLB practices, including parental leave for fathers, are inadequate, in order to help ensure that fathers' use of parental leave continues to become more and more widespread of its own momentum in the workplace.

While our study has these contributions, it leaves several research issues unresolved. First, although the results suggest that peer effect can work in the case of parental leave for fathers in Japan, a specific mechanism whereby male workers' use of parental leave may diffuse in Japanese workplaces has not yet been clarified. We expect future research to answer questions, such as how increased use of parental leave by fathers may affect and facilitate the development of a workplace environment favorable for taking leave and what factors promote or inhibit the development of a favorable environment.

Second, while our study analyzed the effects of fathers' use of parental leave on firm-level indicators, i.e., employer firms' performance, it did not explore the effects on individual-level indicators, such as employee turnover and promotion. Although our study did not find significant effects on firm-level indicators, that does not necessarily mean the results will be the same in the case of individual-level indicators.[31] Future studies should further elucidate the effects that the diffusion of fathers' use of parental leave may have on firms by analyzing changes in individual-level indicators of male workers who took parental leave before and after leave-taking.

Third, our study did not take into consideration the duration of parental leave taken by individual workers. That is not only because of data constraints but also because the duration of leave taken by most male workers is short, less than two weeks.[32] However, as fathers use parental leave more widely, future studies can investigate not only the number of male workers who took parental leave but also the duration of leave taken by individual workers.

Fourth, as our research targets are Nikkei 225 firms, there are significant sampling biases in terms of firm size, industry category, and regional location.[33] As a result, we were unable to conduct analysis categorized by size, industry, or region. The antecedents that affect the diffusion of fathers' use of parental leave and the impact on firm performance may differ between large firms and small and medium-size ones, and vary by industry or by region. Future research is expected to conduct such an analysis.

Despite these limitations, to the best of our knowledge, this is the first research paper to provide a systematic analysis of the diffusion of parental leave for fathers in Japanese firms. It can contribute to the body of research related to WLB practices by clarifying the antecedents of parental leave for fathers and its impact on firm performance. We hope that this study can be a bridge to future research on this topic.

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Notes

1. The *Ikumen* project (*Ikumen* is a Japanese coined word that means fathers involved in child-rearing) is a project intended to encourage working men to be more actively involved in child-rearing and lift up a social mood for working father's use of parental leave (MHLW 2010).
2. Even before the introduction, each couple was able to take a total of one year of parental leave, but in most cases, only women used parental leave. Therefore, when this system was introduced in 1993, men alone were entitled to an additional period (one month) of parental leave in order to encourage fathers to take parental leave.
3. Not only married couples but also cohabiting couples were included in the analysis.
4. This study did not identify individuals who actually took parental leave but assumed that 82.4% of the parents who were eligible for this system took parental leave based on the fact that this was the percentage of parents who took leave in 2001, the system's starting year.
5. According to the "Fact-finding survey on balancing work and childrearing, 2017" (a survey commissioned by MHLW), from among the reasons for why male workers did not take parental leave that were presented to the survey respondents as reply options, "There was a manpower shortage in the workplace due to busy operations" was chosen by the largest percentage of respondents, or 27.8%, followed by "the firm did not have a parental leave system in place," chosen by 27.5%, and by "the workplace atmosphere was not favorable for taking parental leave," chosen by 25.4% (Mitsubishi UFJ Research and Consulting 2018).
6. With the addition of caregiving provisions in 1995, the Childcare Leave Act was renamed the Act on Childcare Leave, Caregiver Leave, and Other Measures for the Welfare of Workers Caring for Children or Other Family Members.
7. Nippon Telegraph and Telephone Public Corporation, which introduced a parental leave system in 1965, is said to be the pioneer. (Sato and Takeishi 2004).
8. The "1.57 Shock" refers to the setting of a new postwar lowest of 1.57% for the total fertility rate in 1989, which was announced in 1990, and which rewrote the previous lowest of 1.58% recorded in 1966, which fell in the "year of the fire horse" in the Chinese zodiac cycle, when the tendency to avoid pregnancy is relatively strong presumably because of superstitious prejudice.
9. The historical development of the parental leave system was described in detail by Inoue (2018) and Kim (2020).
10. As for the effects of financial support during the parental leave period, see Asai (2015) and Yamaguchi (2019).
11. Since the *CSR Company Hand Book* in the 2016 and later editions contains data on the parental leave take-up rate among male workers only for some firms, systematic data collection is impossible. Therefore, our study uses the number of male workers who took parental leave.
12. The 2008 edition of the *CSR Company Hand Book* (which was published in 2007 and contains data for FY2006) indicates the number of male workers who took parental leave. Since each edition contains data for the past three years, we were able to collect data for the period from FY2004.
13. Regarding some firms, there are data deficiencies for some portions of the analysis period, so this is an unbalanced panel data.
14. In our study, which focused on the relationship between cumulative male parental leavers (t-1) and male parental leavers (t); when a positive correlation was observed, it was deemed that an increase in the use of parental leave by male workers fostered a workplace atmosphere favorable for taking parental leave, leading to a further increase in the use of parental leave. In other words, it was implicitly assumed that an increase in the number of leave takers automatically fostered a favorable atmosphere. As a result, what kind of specific mechanism fostered a favorable workplace atmosphere remains unknown. This point is discussed again in Chapter VII.
15. Our study assumed these possibilities because preceding studies have not provided consistent findings concerning WLB practices' impact on firm performance. For example, Yamamoto and Matsuura (2011), who analyzed the relationship between firms' voluntary initiatives to adopt parental leave policies that are more generous than legal requirements and firm performance, found no evidence indicating that the presence of a parental leave system more generous than the legal requirements consistently raises total factor productivity (TFP).
16. As for detailed information on Poisson regression and negative binomial regression models using panel data, see Wooldridge (1999).
17. In 2007, the income replacement rate was raised from 40% to 50%, and in 2014, the income replacement rate for the first six months of leave was raised from 50% to 67%.
18. Based on the presence of firms where no male worker took parental leave, male parental leavers was converted into logarithmic form after the addition of 1.
19. Due to space limitations, the table does not show the correlation coefficients of the variables used for the analysis in Estimation Model (1). When we calculated the VIF (variance inflation factor) in order to consider the possibility that there may be a multicollinearity problem, the VIF value of the explanatory variable was lower than 5 in all models. Thus, it was confirmed that our analysis did not necessarily involve a serious multicollinearity problem.
20. Our study examined the impact of the diffusion of male workers' use of parental leave on firm performance, nonetheless, the latter may also affect the former. In short, there may be reciprocal effects between the diffusion of male workers' use of parental leave and firm

performance.

21. The industry classification used here divided the firms into the 17 industry categories as classified for the TOPIX-17 Series (a series of stock price indexes each representing the firms in one of the 17 industry categories into which all firms listed on the First Section of the Tokyo Stock Exchange have been classified).
22. As per-employee value added may take a negative value in some cases, 51 (the minimum value was minus 50.59) was added to the value added when the figure was converted into logarithmic form in order to ensure that the variable always takes a positive value.
23. We collected data on firm performance for the period up to FY2020, thereby employing the FY2014–2020 dummy.
24. In light of the presence of firms where no male worker took parental leave in the relevant year, the number of male workers who took parental leave was converted into logarithmic form after the addition of 1.
25. In light of the presence of firms where no male worker took parental leave, male parental leavers was converted into logarithmic form after the addition of 1.
26. Industry male parental leavers, which was used as an instrumental variable, was calculated in a way to correspond to the number of male workers who took parental leave. Specifically, when male parental leavers (t-2) was used as the explanatory variable, first, data on the number of male workers who took parental leave in the t-2 were aggregated on a year-by-year, industry-by-industry basis, and then, industry male parental leavers was calculated by dividing the year-by-year, industry-by-industry number of male workers who took parental leave (t-2) by the number of male employees (t-2).
27. Due to space limitations, the table does not show the correlation coefficients of the variables used for the analysis in Estimation Model (2). When we calculated the VIF, the VIF value of the explanatory variable was lower than 5 in all models. Thus, it was confirmed that our analysis did not necessarily involve a serious multicollinearity problem.
28. The estimation in the fixed-effects model that used the logarithm value of male parental leavers as an explained variable produced results similar to those obtained from the estimation in the Poisson regression model and the negative binomial regression model.
29. Structural inertia refers to organizational tendency to prefer the status quo and resist changes. One of the key determinant factors of structural inertia is the organization size. The larger an organization's workforce size is, the more strongly the organization tends to prefer the status quo and resist changes (Hannan and Freeman 1984).
30. Due to space limitations, the table does not show the results of the additional analysis.
31. It should be noted that indicators at the individual-level may not reflect the burden on firms, such as the need to secure replacement personnel.
32. According to the Basic Survey of Gender Equality in Employment Management in FY2018 (MHLW 2019), among the male workers who returned to the workplace after the expiration of parental leave, the duration of parental leave taken was less than 5 days for 36.3%, less than two weeks for 71.4%, and less than one month for 81%.
33. Not only did the firms under analysis in our study have a large workforce, with the average number of employees at around 9,000, but also their head offices were concentrated in the three major metropolitan areas—the Metropolitan area, the Kinki region (Osaka area), and the Chukyo region (Nagoya area). Regarding the industry category, specific manufacturing industries, such as electrical equipment, chemicals, machinery and transportation equipment, accounted for a large percentage of the total number of firms analyzed. These sampling biases made it difficult to appropriately examine the differences by firm size, industry category, and regional location.

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