Does Working with a Future Executive Make Junior Employees More Likely to Be Promoted?*

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Abstract

We estimate long-term peer effects in the workplace by investigating whether working with a future executive makes junior employees more likely to be promoted. Using the data on comprehensive career history at the Japanese central administration from 1946 to 2019, we find that long-term peer effects are substantial and persistent: Junior employees who work with a future executive in the same division during the first few years of their employment are promoted significantly faster, on average, than employees who do not. Additional empirical analysis suggests that improved network connections between senior and junior employees are crucial for the promotion.

Keywords: Long-Term Peer Effect, Promotion, Future Executive, Junior Employees, Social Connection

J.E.L. Codes: J01, J24, M12, M51

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1 Introduction

The peer effect in the workplace is one of the most important topics in human resource management and labor economics. The interaction between bosses and coworkers can significantly affect employees' motivation, productivity, and promotion opportunities, which may influence a firm's performance and productivity in the long run. Given that employees' compensation is one of firms' largest expenses, firms would be significantly better off if they could allocate human resources efficiently by taking peer effects in the workplace into account.[1]

In this paper, we focus on peer effects in the workplace and ask whether working with a future executive helps an employee be promoted in the future. Although the importance of peer effects in the workplace is widely recognized, empirical evidence on the long-term peer effects on an employee's promotion is limited due to two challenges. First, estimating causality between peer effects and future promotion is difficult because of endogeneity. An employee's promotion could be based on a number of different factors, such as their ability, productivity, and character, which are difficult to measure. Therefore, there could be an unobserved factor that causes the omitted-variable problem between the peer effect and an employee's future promotion. Second, the availability of extensive human resource panel data following the long-term career histories of employees is limited. The scarcity of data makes it difficult for researchers to analyze the causality between peer effects and long-term promotion.

We overcome these obstacles by using a novel human resource dataset from the Japanese Ministry of Finance (MOF) that records the comprehensive career history of employees for more than 70 years between 1946 and 2019. The advantage of using this dataset is that the matching between a junior and senior employee in the first few years can be regarded as exogenous on promotion. This is because the early job assignments of junior employees are considered part of their on-the-job training (OJT) and are based on rotations, regardless of individual characteristics. Therefore, exposure to more and less productive senior employees is not driven by unobserved propensities to excel.

[1] For various aspects of personnel economics, see Lazear (2011).

By exploiting this institutional feature, we focus on junior employees' first five years of employment and define the treatment as working in the same division with a senior employee who will be an executive in the future. Executive positions are fairly competitive, with only 14 percent of employees promoted 30 years after employment on average. Since the treatment is based on divisions managed by directors, who still have several years to be promoted to the executive level, whether a senior employee becomes an executive in the future is not known at the time of the treatment.

We employ several econometric models to estimate the long-term peer effect on promotion. We start by using the linear probability and two-way fixed effect models to estimate the average treatment effect by comparing the control and treatment groups. The results of the balance test and the pre-event trend are consistent with the assumption that the early assignment is exogenous, finding no significant difference between the control and treatment groups. The empirical results show that the long-term peer effects are substantial and persistent—junior employees who work with a future executive in the same division during the first five years of their careers are promoted significantly faster than other employees, on average, and are more likely to be promoted to the executive level in the future. For example, the probability of becoming an executive is 2.8 percentage points higher for the treatment group than for the control group, which is an approximately 20 percent increase relative to the average promotion rate.

Then, we estimate the dynamic treatment effect by using the event study—we focus on those employees who received the treatment at different times. The event study is valid as long as there is no trend in the outcomes before the peer effect shocks occur, and the data is consistent with this implication. The results of the event study show that employees who receive a positive peer effect shock are promoted significantly faster after the shock, and the effects last over the course of employees' careers.

We discuss two possible mechanisms that are consistent with the significant and persistent peer effects found in this paper: enhanced productivity through the accumulation of human capital or improved network connections holding productivity fixed. To disentangle these two mechanisms, we exploit the heterogeneity of the treatment group to find

the following two tendencies: 1) the grade of a future executive should be relatively close to that of a junior employee at the time of the treatment to have significantly positive peer effects, and 2) the peer effects are proportional to the number of interactions with future executives. Given the nature of network connections and the diminishing marginal return of learning, these results likely suggest that improved network connections between senior and junior employees are crucial to explaining the rapid promotion of junior employees who have worked with future executives.[2]

There are two potential concerns for the internal validity of our estimates. The estimates may capture the common shocks for both junior and senior employees in the same division rather than the peer effects. To address this issue, we control the common shocks by using each division's index of performance as published by the MOF. The main results remain the same, which rules out the possibility of common shocks. Another concern is the existence of reverse causality, in which the promotion of senior employees is influenced by the performance of junior employees. Due to the OJT nature of the first few years of work and the strictly hierarchical structure of the MOF, the chance that junior employees' performance affects senior employees' promotions is slim. Therefore, it is reasonable to assume that our estimates correctly capture the peer effects from senior to junior employees.

We provide several robustness checks for which the main results are robust. First, we employ logit and probit models to incorporate nonlinearity into the specifications. Second, we use an alternative specification to eliminate the mismatch of time variation in the linear probability model. Third, we consider a possible structural break in 2001, when the Japanese government restructured the central administrations. Fourth, we run the regression without female employees. Finally, we exclude the most recent cohorts to focus on employees who have finished their careers.

This paper makes three contributions to the literature: First, it is one of the first attempts to quantify the long-term peer effects on employees' promotion over more than

[2]By studying the promotion of political elites in China, Jia et al. (2015), Li and Zhou (2005), and Shih et al. (2012) also highlighted the importance of network connections.

20 years.[3] Empirical analysis shows that junior employees will be promoted significantly faster after working with future executives, confirming the influence of superiors as in Hoffman and Tadelis (2021), Lazear et al. (2015), and Lyle and Smith (2014). Second, this paper finds that the dynamic characteristics of peers, which cannot be observed at the moment of interaction, could be an important factor in explaining long-term peer effects. The literature typically focuses on the static characteristics of peers that remain unchanged over time, such as gender by Cullen and Perez-Truglia (2019), race by Giuliano et al. (2011), and ability by Mas and Moretti (2009).[4] However, this paper finds that the ex-post status of senior employees with whom junior employees interact at an early stage in their careers is crucial for the promotion of those junior employees in the long run. This implication is consistent with the findings of various studies that experience at an early stage of people's lives could affect their decisions and career outcomes for the rest of their lives.[5] Last but not least, this paper contributes to the rising literature on professional bureaucracies, including Bertrand et al. (2019), which discusses incentives and performance of elite government officials. This paper also finds that social connections between junior and senior employees play a key role in their future promotion, which could have significant implications for the performance of professional bureaucracies.[6]

The remainder of this paper is organized as follows: Section 2 describes the institutional background to motivate the analysis. Sections 3 and 4 set out the data and

[3]Note that there is nontrivial literature in organizational sociology and management. For details, see Watson (2008) and Boxall and Purcell (2016).

[4]A series of papers, including Amodio and Martinez-Carrasco (2018), Bandiera et al. (2005), Bandiera et al. (2007), Bandiera et al. (2009), Bandiera et al. (2010), Bandiera et al. (2013), Brune et al. (2021), Cornelissen et al. (2017), and Park (2019), analyzed the peer effects inside firms to show that peers in the workplace significantly affect a worker's effort and productivity. Other papers focused on the peer effects outside firms in experimental settings, such as Booij et al. (2017) and Falk and Ichino (2006), schools or class rooms such as Ammermueller and Pischke (2009), Azoulay et al. (2010), Booij et al. (2017), Booth et al. (2018), Carrell et al. (2009), Dustmann et al. (2018), Eisenkopf et al. (2015), Hahn et al. (2018), Jackson (2012), Jackson and Bruegmann (2009), Lavy et al. (2012), Park et al. (2018), and Stinebrickner and Stinebrickner (2006), or sports teams, such as Arcidiacono et al. (2017), Gould and Kaplan (2011), and Guryan et al. (2009). Most of these studies found statistically and economically significant peer effects.

[5]For example, see Genda et al. (2010), Kawaguchi and Kondo (2020), von Wachter (2020), and von Wachter and Bender (2006) for the labor market outcomes, Giuliano and Spilimbergo (2013) and Malmendier and Nagel (2011) for people's beliefs and risk tolerance, and Malmendier et al. (2021) for monetary policy stance.

[6]For example, Aman-Rana (2021) and Khan et al. (2019) studied the incentives and promotion of bureaucrats in Pakistan.

methods used. Section 5 presents the main empirical results. Section 6 provides a discussion on mechanisms, validity, and robustness checks, and section 7 offers concluding remarks.

2 Institutional Background

The MOF is in charge of formulating fiscal policy in Japan. As indicated in Figure 1, it has six internal bureaus (the Minister's secretariat, Budget bureau, Tax bureau, Customs and Tariff bureau, Financial bureau, and International bureau), with 55 subdivisions. According to the budget for the fiscal year 2020, 1,966 employees worked in the MOF's central administration.

At the MOF, there are three institutional features in human resource management that make our dataset unique for analyzing long-term peer effects. These institutional features provide researchers with an ideal environment for a natural experiment to measure peer effects at an early stage in an employee's career on promotion in the long run.

2.1 Long-Term Competition for Executive Positions

The first institutional feature is that a small and closed group of candidates competes for executive positions over a long period. There are three reasons for this. First, recruitment and human resource management for the managerial and technical tracks are completely separate from the beginning, and all the executive positions in the central administration are held by employees on the managerial track.[7] Transfers between the managerial and technical tracks midway through an employee's career are also not possible by design. As there are no external entrants, only a small group of managerial-track employees are eligible for executive positions in the central administration. In this paper, we focus on employees on the managerial track to analyze promotions to executive positions.

Second, employees are expected to work at the MOF and related organizations for

[7]For example, as of October 2019, 90.6 percent of managerial positions (directors of internal subdivisions) and all executive positions (directors of internal bureaus and above) were occupied by employees on the managerial track.

their entire professional careers, from recruitment until retirement. The implicit selection process for managerial positions typically starts in the middle of their careers, with candidates being promoted to managerial positions 20 years into their careers. Promotions to executive positions start after approximately 30 years.

Third, the promotion of employees is strictly hierarchical and is based on the seniority and performance of employees. In particular, an employee's age and the year they started working at the MOF are critical for human resource management, and executive positions are usually succeeded by employees younger than incumbents. As a result, a fairly closed cohort of employees (approximately 20 on the managerial track each year) who begin working at the MOF in the same year will compete for managerial positions for over 20 years. Normally, only one employee in a cohort can become the chief administrative officer of the ministry (*Jimu-Jikan* in Japanese), and the other employees in that cohort will leave the central administration when that happens.[8]

Due to these institutional features, competition for executive positions at the MOF is similar to a tournament, as described by Lazear and Rosen (1981) and Lazear (2018), in which the employee who performs the best among the competitors receives a prize. In other words, the relative performance of employees, compared to their cohort, and their long-term reputation in the organization are crucial for their future promotion.

2.2 Job Assignments for Junior Employees

Job assignments for junior employees at the MOF can be regarded as exogenous for three reasons. First, job assignments are centrally controlled by the human resources department and frequently change. This practice aims to expose junior employees to various types of jobs at the MOF and relevant organizations and train them as generalists to manage the organization in the future.

Second, junior employees are treated equally, and their positions are assigned based on a rotation, regardless of their performance and characteristics. This is because the first few years of work at the MOF are regarded as part of OJT to understand its structure

[8]Similar practices in human resource management are common across other Japanese firms and organizations, as discussed by Moriguchi (2014) and Kambayashi and Kato (2017).

and workflow. Typically, junior employees spend a few years at different internal bureaus of the MOF or other ministries.[9] In contrast, senior employees are more likely to remain in a bureau, because they specialize in certain administrative areas. Since employment at the MOF tends to be for an employee's entire career, this practice is regarded as essential in the organization and has not changed for more than 70 years.

Third, junior employees are relatively homogeneous in terms of productivity, age, and educational background. Job seekers at the MOF are required to pass the national qualifying exams and go through multiple job interviews to control productivity at entry level. Since mid-career employment is rare, the majority of employees start working at the MOF immediately after graduating from college, which makes most of them in their early twenties. Most of them graduate from the University of Tokyo, one of Japan's most prestigious institutions.

2.3 Interactive Nature of the Work

The work at the central administration is interactive, which provides ample opportunities for junior employees to learn from senior employees and for senior employees to observe the characteristics of junior employees. The primary work unit of the central administration is an internal division that is led by a director and consists of several deputy directors and section chiefs. The size of the divisions is relatively small—a typical division consists of ten to twenty employees, with approximately five to ten employees on the managerial track. Junior employees' primary tasks are to coordinate logistical matters, carry out general surveys, and draft policy documents under the supervision of the section chiefs and deputy directors. The directors are in charge of consulting on policy matters with executives at the central administration and policymakers.

As their first few years are regarded as part of OJT, junior employees have many opportunities to learn from senior employees and accumulate their human capital. On the other hand, senior employees have ample opportunity to observe junior employees' abilities, productivity, and characteristics, which reduces asymmetric information between

[9] In fact, a director of the human resources department told the authors that job assignments for junior employees are part of a routine and do not affect their future promotion.

senior and junior employees.

3 Data

We construct a panel of human resource data at the MOF between 1946 and 2019, using the MOF's annually published human resource directories augmented with administrative data. The data includes two key pieces of information: the job titles of the employees and the divisions to which they belong. As shown in Table 1, job titles are associated with employees' grades, which are the basis of their salary. The grades indicate the rank of government officials and increase as they are promoted.[10] We use these grades as a time-varying measure of promotion and regard the grades of 9 and above as the executives at the MOF.[11] We also construct the time-invariant measure of promotion, such as the probability of becoming an executive or the chief executive of the MOF.

Information on the internal bureaus and divisions to which employees belong enables us to identify the individual members of the divisions in a specific year and match the junior and senior employees in the same division. We also have information on years of experience, majors in college, and other educational backgrounds. We use this information for control variables.

We primarily focus on the data after 1946 because the central administration in Japan was significantly reorganized after World War II, and we want to avoid this structural break affecting the results. We do not use the samples in which employees are transferred outside the central administration, such as to local organizations or organizations in foreign countries, to maintain the compatibility of titles and grades. We also focus on employees who started work at the MOF immediately after graduation because mid-career employment is rare.

Table 2 summarizes the descriptive statistics of the final sample, which consists of 25,765 observations covering 1,669 employees. The probability of becoming the chief

[10]The grades in this paper combine the grades in the regular salary table for bureaucrats and the grades in the salary tables for designated administrators.

[11]In the fiscal year 2020, there were 7 titles at MOF (director general of 5 internal bureaus and 2 vice ministers of finance) associated with the grades of 9 and above.

executive is 3.8 percent, and the probability of becoming an executive is 14.1 percent, suggesting that the positions of executives are fairly competitive. On average, employees work at the MOF for 26.9 years and become executives after 29.9 years. Focusing on the interactions with future executives within the first five years leads to approximately 1,819 interactions among 6,049 observations, which makes the chance of working with a future executive in the first five years of employment 30.1 percent.

Figure 2 illustrates the career history of one chief executive, with his grades and the number of years he was promoted after joining the MOF. Different colors correspond to the MOF's different internal bureaus. As is evident from the figure, the job rotations of employees at the MOF are frequent and diverse—this chief executive changed titles across different bureaus every few years and was often transferred outside the MOF. His promotion was gradual and took a long time. It took him 31 years after joining the MOF to reach the executive level with the grade of 10, and it took him an additional 4 years to become the chief executive.

4 Methodology

4.1 Construction of the Baseline Shock Variable

We construct an indicator of whether a junior employee within five years of joining the MOF worked in the same division with a senior employee who subsequently became an executive. By regarding this indicator as a shock to a junior employee's career, we investigate the long-term peer effects on a junior employee's promotion up to 20 years after experiencing the shock.

To formally define the variable, we introduce some notations. First, we denote the set of employees in the sample as $\mathcal{E}$ and the set of years covered by the sample period as $\mathcal{T}$. Second, we define the subset of employees who became an executive—with the grades of 9 and above—at some point in their career as $\mathcal{F} \equiv \{i : i \in \mathcal{E},\ \exists t \in \mathcal{T},\ Grade_{i,t} \geq 9\}$, where $Grade_{i,t}$ denotes the grade of employee i at year t. Third, we denote the year that employee i started working at the MOF as t_i^0. Then, the shock variables for $t \in [t_i^0, t_i^0 + 5]$

are defined as follows.

$$Shock_{i,t} \equiv \begin{cases} 1 & , \text{ if } \exists\ i \in \mathcal{E},\ j \in \mathcal{F}, \\ & Division_{i,t} = Division_{j,t} \text{ and } t_i^0 > t_j^0, \\ 0 & \text{otherwise,} \end{cases} \tag{1}$$

where $Division_{i,t}$ denotes the division that employee i belongs to at year t. In other words, $Shock_{i,t}$ is an indicator of whether junior employee i, within five years of joining the MOF, works in the same division with future executive j, who is more senior than the junior employee.

The underlying assumption for constructing this indicator as an exogenous shock is that the opportunity for junior employees to work with a future executive during the first five years of their careers can be regarded as exogenous due to institutional features. Therefore, unobservable factors, such as non-cognitive skills or productivity, do not affect their opportunities. This provides an ideal environment for a natural experiment. To see whether there is no significant difference prior to the shock between the employees who received the shock and those who did not, we provide a balance test for the characteristics of employees. As shown in Table 3, there is no significant difference between the control and treatment groups in many respects, such as grades, hometown, specialization, and measures of productivity (the colleges and graduate schools from which employees graduated). Although there are two exceptions, fractions of female employees and M.A. holders at the University of Tokyo, their magnitudes are minute and do not affect the main results.[12] The results show that junior employees are similar in many observable characteristics, which is consistent with the underlying assumption.

[12]We provide the robustness check excluding female employees in Section 6.3.4.

4.2 Linear Probability Model

We first define the outcome of the promotion as follows:

$$Executive_{i,t} \equiv \begin{cases} 1 & \text{if } \exists\ t \in \mathcal{T}, Grade_{i,t} \geq 9, \text{ for } i \in \mathcal{E}, \\ 0 & \text{otherwise.} \end{cases} \tag{2}$$

Note that this outcome variable is an indicator of whether an employee becomes an executive at a point in time and does not vary across time, even though it has a t subscript. To identify the causal effect of working with a future executive on the future promotion of junior employees, we estimate the following linear probability model:

$$Executive_{i,t} = \alpha + \beta Shock_{i,t} + \gamma X_i + \delta T_t + \varepsilon_{i,t}, \tag{3}$$

where X_i is a vector of individual characteristics and T_t is a vector of year dummies. Since the shock variables are only defined for $t \in [t_i^0, t_i^0 + 5]$, we effectively focus on the first five years of an employee's career history to run this regression.[13] The parameter of interest is β, which shows the impact of working with a future executive on whether a junior employee will become an executive in the future. If the shock is exogenous and not correlated with the error term, β will be consistently estimated using OLS.

4.3 Two-Way Fixed Effect Model

To estimate the average peer effects on future promotion across time, we also run the regression using the whole sample. First, we define the variant of shock variable as follows:

$$Shock_{i,t}^{DID} \equiv \begin{cases} 1 & \text{for } t \in [\tau, \tau + h] \text{ if } Shock_{i,\tau} = 1, \\ 0 & \text{otherwise.} \end{cases} \tag{4}$$

In other words, $Shock_{i,t}^{DID}$ takes one for h years after employee i received the shock and zero otherwise, where h can be interpreted as the length of the period during which the

[13] This regression model is similar to the alternative model omitting the time variation. The estimates based on this model are presented in Section 6.3.2.

shock may last. We estimate the effect of the shock across years using the following two-way fixed effect model, in which both individual fixed effects, λ_i, and time trend, T_t, are controlled:

$$Grade_{i,t} = \alpha + \beta Shock_{i,t}^{DID} + \gamma X_i + \delta T_t + \varepsilon_{i,t}. \tag{5}$$

The estimation is based on the minimization problem involving deviations of the dependent and independent variables from the mean across time and individuals.[14] The underlying assumption is that there is no significant difference between the control and treatment groups in the trend of the outcome variable before the shock, which is shown in Figure 3. For inference, unless noted otherwise, we use the cluster-robust standard errors throughout the paper which consider the clusters in individual employees and years.

4.4 Event-Study Analysis

In addition to estimating the average treatment effect, we also estimate the dynamic treatment effect of working with a future executive by focusing on the employees who received the shock. First, we denote the year when the junior employee had a shock as t_i^s. Then, we define the following treatment indicator based on $Shock_{i,t_i^s}$ to measure the dynamic effect of the shock after k years:

$$Event_{i,t}^k \equiv \begin{cases} 1 & \text{if } t = t_i^s + k, \\ 0 & \text{if } t \neq t_i^s + k. \end{cases} \tag{6}$$

There are several things to note on this indicator variable. First, it has the dimension of k, in addition to individuals i and time t, which corresponds to the horizon of the dynamic effects that we wish to estimate. Second, k ranges between -5 and K, which starts from the negative value to check if there is any trend before the shock and ends at the maximum period of employment, K. For illustration, suppose that a junior employee, i, received a shock in 1980, $Shock_{i,1980} = 1$. Then, we have $Event_{i,1975}^{-5} = \cdots = Event_{i,1981}^{1} = \cdots = Event_{i,1980+K}^{K} = 1$ and $Event_{i,1981}^{2} = Event_{i,1981}^{3} = \cdots = Event_{i,1981}^{K} = 0$ for 1981.[15]

[14] For details, see Chapter 3 of Baltagi (2013) and Imai and Kim (2020).
[15] For details, see Schmidheiny and Siegloch (2019).

Using this variable, we run the following event-study regression:

$$Grade_{i,t} = \alpha + \sum_{k \neq -1}^{K} \beta_k Event_{i,t}^k + \gamma X_i + \varepsilon_{i,t}, \tag{7}$$

where the dependent variable is the time-varying grade of employee i in year t, and X_i is a vector of individual characteristics. $k = -1$ is excluded from the regression to use the time before the treatment as the reference point. The parameter of interest is β_k, which estimates the dynamic treatment effects on the junior employee who received the shock.

Instead of comparing the control and treatment groups, as we did in the linear probability and two-way fixed effect models, we exploit the variations in the treatment group in terms of the timing of the treatment. More specifically, we assume that there is no ex-ante difference between the employees who received the shock, and the timing of the shock is orthogonal to their grades prior to the shock. This assumption also implies that employees display no anticipation behavior. Given that employees' preferences are rarely considered in job rotations at the MOF, and employees are not given much notice of a transfer to a different workplace, this no-anticipation condition is likely to be satisfied. This assumption can be directly tested by seeing if there are any significant differences in the time trends in the grades prior to the shocks.[16] This assumption will be discussed with the results.

5 Empirical Results

5.1 Linear Probability Model

Table 4 shows the estimates, based on the linear probability model in Equation (3), for different dependent variables of promotion. The dependent variable of the first specification is the probability of becoming a chief executive and that of the second specification is the probability of becoming an executive. The first column in Table 4 shows that the opportunity to work with a future executive increases the probability of becoming the chief executive of the MOF by 1.7 percentage points. Similarly, the second column shows

[16] For details, see Borusyak et al. (2021).

that having a peer effect with a future executive increases the probability of becoming an executive by 2.8 percentage points, which is an approximately 20 percent increase relative to the average promotion rate.

5.2 Two-Way Fixed Effect Model

Table 5 shows the estimates based on the two-way fixed effect regression in Equation (5) for the time-varying grades. The coefficient of the shock is estimated to be significantly positive with a magnitude of 0.54.[17] Given that the mean of the dependent variables is 3.87, the estimate implies that junior employees who had an opportunity to work with a future executive are at a greater grade by 14.0 percentage points relative to junior employees who did not have this opportunity.

5.3 Event-Study Analysis

Figure 4 and Table 6 show the estimates of the dynamic causal effect based on the event study. Figure 4 plots the average treatment effect of working with a future executive on an employee's future promotions—the horizontal axis shows the years after the shock that are normalized to happen at year zero. The figure shows that there is no significant trend prior to the shock, which validates the identification assumption.[18] The figure further illustrates that junior employees who worked with a future executive had a significantly positive peer effect immediately after the shock, which increases their average grades. In addition, the figure indicates that the positive peer effect is persistent and lasts for a long time over the course of employees' careers. Table 6 lists the corresponding econometric results, up to 20 years, with the different definitions of shocks. Even if we change the group of junior employees who received the shock from the first five years to the first six or seven years, the results are robust, and the peer effect is significant and persistent. For example, the magnitude of the peer effect is estimated to be 0.67 after 5 years, 1.11 after

[17] The results using $h = 5$ are presented as a benchmark, but the results are robust for different choices of h.

[18] The only exception is the estimates at year $t - 2$, in which the magnitude of the estimates is very close to zero, but the tight standard error makes the estimates significantly negative.

10 years, and 2.18 after 20 years. These estimates imply that the peer effects of working with a future executive accumulate over time.

Figure 5 and Table 7 show the results of the event study when we change the definition of exogenous shocks to working with a future chief executive in the first five, six, or seven years. Figure 5 also indicates that there is no significant trend prior to the shock. Similar to the shock with future executives, the estimated peer effects are significant and persistent. The magnitude of the estimates is also slightly larger than in the case where the shocks are based on work experience with a future executive. For example, the estimate is 2.89 after 20 years.

6 Mechanism, Validity, and Robustness

6.1 Two Possible Mechanisms

There are two possible mechanisms to explain the significant and persistent peer effects found in this paper: increased accumulation of human capital or social connections between junior and senior employees. Increased accumulation of human capital, the first hypothesis, focuses on the improved learning of junior employees. Working with a future executive, who is a particularly talented and competent employee in their cohort, will have positive externality on the productivity of junior employees. More specifically, the productivity of junior employees improves by learning from future executives and exchanging ideas with them. As junior employees' productivity increases, their improved performance is recognized in the organization, which increases the speed of their promotion. This explanation is consistent with a series of papers in the literature, such as Guryan et al. (2009), Cornelissen et al. (2017), and Jarosch et al. (2020), on positive externality in the workplace.

On the other hand, the second hypothesis claims that the experience of working with a future executive gives junior employees a strong social connection inside the organization without improving their productivity. Given the interactive nature of the work at the MOF, senior employees have a strong incentive to have competent people, whose ability

and characteristics are well known, working under them. As a result, senior employees may prefer to work with junior employees with whom they have worked previously. As senior employees are promoted, these junior employees are promoted faster than the other employees in their cohort. In other words, the experience of working with a future executive alleviates the problem of asymmetric information between senior and junior employees, making these junior employees more likely to be promoted in the future. This mechanism is consistent with the effects of social connections and decision making discussed in Cullen and Perez-Truglia (2019), Michelman et al. (2021), and Shue (2013).

6.1.1 Heterogeneity Across Employees

It is challenging to disentangle the mechanisms of accumulating human capital and social connections using the observed data and empirical results, as these mechanisms are closely intertwined and involve various unobservable characteristics of employees. To shed some light on this issue, this subsection provides two additional analyses, the results of which are summarized in Table 8.

First, we investigate whether the gap in the grades of junior employees and future executives affects the estimates of the peer effects. Figure 6 illustrates the distribution of the gaps in the grades between junior and senior employees within the first five years. It shows that the distribution is relatively uniform, except for the gaps of grades 2 and 5. To estimate the heterogeneous effects of the gap in the grades, we first construct the disaggregated shock variable as follows:

$$Shock^{g}_{i,t} \equiv \begin{cases} 1 & \text{if } \exists\ i \in \mathcal{E},\ j \in \mathcal{F}, g \in [1,5] \\ & Division_{i,t} = Division_{j,t} \text{ and } g = Grade_{j,t} - Grade_{i,t}, \\ 0 & \text{otherwise.} \end{cases} \tag{8}$$

Then, we estimate the following regression:

$$Executive_{i,t} = \alpha + \sum_{g=1}^{5} \beta_g Shock^{g}_{i,t} + \gamma X_i + \delta T_t + \varepsilon_{i,t}. \tag{9}$$

Panel A of Table 8 shows that the peer effects stem mainly from interactions with a future executive with a smaller gap in the grades, particularly the gaps of 2 and 3. For example, a junior employee who worked with a future executive, whose grade is greater by 3, is more likely to be an executive in the future by 3.3 percentage points, while that probability falls to 2.0 percentage points if the gap is 4. Roughly speaking, a gap in 3 grades corresponds to 10 to 15 years of gap between the years employees joined the MOF. These results suggest that the peer effects are stronger in cases where junior employees interact with a future executive whose grades are relatively close.

Second, we analyze whether the number of interactions with future executives is crucial for the promotion of junior employees. Figure 7 shows the distribution of the number of years worked with future executives in the first five years, illustrating that the majority of employees have one or two years of interaction with future executives. Panel B of Table 8 shows the results of the linear probability model using the disaggregated shock variable analogous to those based on gaps.[19] The results show that the number of interactions with future executives is associated with significantly positive effects on future promotion. For example, the probability of becoming an executive in the future is 3.3 percentage points higher if a junior employee works with future executives for 2 years in their first 5 years at the MOF.[20]

6.1.2 Interpretation of Results

Additional analysis exploits the heterogeneity among the treatment group in the main analysis to find two tendencies, both of which seem to be consistent with the social connection hypothesis. First, the grade of the future executive should be relatively close to that of the junior employee at the time of interaction to have significantly positive peer effects, which is consistent with the social connection hypothesis. This is because the social connection that junior employees build in the first few years at the MOF is effective until senior employees retire. As a result, social connections would last longer if

[19] The sample of 5 years is not used, as its sample size is too small.

[20] Note that we count the number of years with any future executives, and the exposure could be to different future executives.

the grades of junior and senior employees were closer, which would make the estimated peer effects significant. On the other hand, the difference in grades does not matter under the human capital hypothesis because junior employees could potentially learn from any competent future executives, and the gap in the grades simply reflects the differences in the set of skills they learn.[21]

Second, the peer effects are proportional to the number of interactions with future executives, which is likely to be consistent with the social connection hypothesis because junior employees' network connections proportionally expand as the number of interactions with future executives increases. On the other hand, the peer effects are likely to diminish under the human capital hypothesis as the number of interactions increases, due to the diminishing marginal return on the accumulation of human capital.[22]

Both tendencies found in the additional analysis seems to suggest that the positive peer effects found in this paper are consistent with the formation of social network connections, although this is not conclusive. Since the social connections between junior and senior employees are crucial for future promotion, junior employees who are lucky enough to work with future executives at an early stage in their career tend to be promoted faster than other employees.

6.2 Further Analysis on Internal Validity

The key identification assumption is that the job assignments of junior employees for the first few years are exogenous for promotion. Although the balance test discussed in Section 4.1 is consistent with this assumption, estimates of the peer effect on long-term promotion could be contaminated by other factors for several reasons. To mitigate the concerns on the internal validity of our analysis, we discuss the effects of common shocks and reverse causality.

[21] Note that the results may reflect the effectiveness of mentorship on productivity, particularly when a mentor has characteristics similar to those of a mentee, as discussed in Porter and Serra (2020).

[22] This discussion implicitly assumes that other inputs in the production function, such as skill levels or physical capital, are fixed for the first few years. However, there could be complementarity between human capital and other inputs, which may offset the diminishing marginal return on human capital accumulation in the long run. For details, see Chapter 10 of Acemoglu (2009).

6.2.1 Controlling Common Shocks

The estimate of peer effects may capture the common shocks for both junior and senior employees. Since identification is based on the divisions to which employees belong, the estimates may be influenced by common shocks that affect all employees in a division. More specifically, if a division's performance in a particular year is outstanding, all employees in that division may be likely to be promoted. If this is the case, the estimates in the main analysis simply reflect the outstanding performance of that division, not the peer effects.[23]

To address this issue, we control the effects of common shocks by using the index of performance of each division, which the MOF publishes as part of its annual policy evaluation. Performance is evaluated on a five-point scale, depending on the achievement of goals set at the beginning of a year. Although the MOF initially determines the index of performance, it is reviewed by relevant experts outside the MOF before authorization.

Table 9 shows the results of using this index as control variables.[24] Similar to the main analysis, the estimated peer effects are positive and statistically significant, and the magnitudes of estimates are only 0.2 percentage points lower than those of the main results.

6.2.2 Discussion on Reverse Causality

The estimates of the peer effect may be contaminated by the reverse causality. Since the construction of shock variables is based on the interaction of junior employees with senior employees, who will be future executives, the interpretation would be different if the promotion of senior employees were influenced by the performance of junior employees.

Although the reverse causality could be a serious econometric issue to estimate the long-term peer effects in general, such a concern is alleviated in this paper's context due to the two institutional features discussed in Section 2. First, the weight on junior employees' performance is small when evaluating the performance of the divisions because

[23] For a detailed discussion of common shocks, see Lyle (2007).

[24] The index is only available after 2001, and we use the average of each section between 2001 and 2020 as a proxy before 2001.

junior employees' first few years are regarded as OJT. Second, the performance of these employees when they are young, particularly during the first few years of employment, is heavily discounted when evaluating their long-term performance. This is because competition at the MOF is over a long period and promotion is strictly hierarchical based on seniority.[25] Therefore, it is reasonable to assume that the concern of reverse causality is negligible in the context of this study.

6.3 Robustness Checks

In this section, we provide five robustness checks for which the main results are robust.

6.3.1 Logit and Probit Models

We estimate the peer effect of working with a future executive using the logit and probit models. More specifically, we focus on the conditional probability of the binary outcome of promotion, $P\left(Executive_{i,t} = 1 | Z_{i,t}\right)$, where $Z_{i,t}$ is the controls in Equation (3), and estimate it by assuming that the underlying distribution is the normal distribution (probit model) or the logistic distribution (logit model). Unlike the linear probability model, these models do not assume a constant marginal effect and the predicted values range between 0 and 1, satisfying the boundary condition for probability.

Appendix Table A1 reports the results. Similar to the main results, the estimates are positive and statistically significant, suggesting that working with a future executive increases the speed of promotion of a junior employee.

6.3.2 Alternative Specification

We then present the results based on an alternative specification omitting the time variation. This specification is potentially useful since the linear probability model in Equation (3) uses an indicator variable invariant across time as an outcome variable and estimating the peer effects in a dynamic framework may lead to some econometric issues. To describe the specification, we first define the set of years in which employee i works with

[25] Not surprisingly, this practice makes work in the ministries less attractive for young people, as described in Kobara (2021).

a future executive as $\mathcal{T}_i \equiv \{t : t \in [t_i^0, t_i^0 + 5], s.t.\ Shock_{i,t} = 1\}$. Then, we define an indicator variable that corresponds to the number of years that they interact with the future executive as follows:

$$Shock_i^n \equiv \begin{cases} 1 & \text{if } |\mathcal{T}_i| = n, \\ 0 & \text{otherwise.} \end{cases} \tag{10}$$

Using this indicator variable, we run the following regression to estimate the effect on future promotion:

$$Executive_i = \alpha + \sum_{n=1}^{4} \beta_n Shock_i^n + \varepsilon_i, \tag{11}$$

where $Executive_i$ is made by omitting the time variation from $Executive_{i,t}$ in Equation (2). The parameters of interest are $\{\beta_n\}_{n=1}^4$, which capture the individual effects of the number of years spent working with a future executive.

Appendix Table A2 shows the results, which are similar to the results in the previous subsection. Some estimates are statistically significant, and the magnitudes are large, particularly when the junior employee interacts with future executives multiple times.

6.3.3 Possible Structural Break

We conduct the analysis using the sample before 2001 to avoid the effects of a potential structural break. Since the original sample covers a relatively long period from 1946 to 2019, there could be a structural break affecting the outcomes of promotions. One potential structural break occurred in 2001 when the Japanese government restructured the central administration into twelve ministries and one cabinet office to promote transparency and efficiency.[26] As a result of this restructure, two internal bureaus of the MOF (banking and securities) were detached and established as an independent institution, the Financial Service Agency, and the Japanese name of the MOF was changed from *Okura-Sho* to *Zaimu-Sho*. These organizational changes could have substantially changed the practice of hiring and promotion. To avoid this structural change affecting the estimates of the peer effects, we estimate the main model using the samples prior to 2001.

[26] For details, see the Ministry of Foreign Affair's website.

Appendix Table A3 shows the results, which are generally similar to the main analysis. There are positive and statistically significant peer effects from future executives, even before the structural break. The subperiod after 2001 is not used due to the short sample.

6.3.4 Excluding Females

We run regressions by excluding female employees to see whether the difference in gender composition in the first five years could affect the main results. This is because the proportion of female employees is one of the few things that is not balanced between the control and treatment groups, though the magnitude is small.[27]

Appendix Table A4 shows the results, which are generally similar to the main analysis. The estimates are positive, suggesting that the peer effects are not driven by the difference in gender composition.

6.3.5 Excluding Recent Cohorts

Finally, we exclude recent cohorts to focus on employees who have reached executive positions. This is to check whether recent cohorts, who are within 20 years of entering the MOF, affect the main results.

The results, shown in Appendix Table A5, are similar to our main results with positive peer effects.

7 Conclusion

Using the novel dataset of comprehensive career history at the Japanese central administration, this paper shows that long-term peer effects are substantial and persistent—junior employees who work with a future executive in the same division in the first few years of their career will be promoted significantly faster, on average, and they are more likely to be promoted to the executive level in the future. The additional analysis suggests that social connections between senior and junior employees play a key role.

[27] For an overview of the literature on gender and promotion, see Azmat et al. (2020).

The importance of social connections has the opposite implications on performance depending on whether the promotion rule is based on meritocratic or cronyism. On the one hand, if executives are selected by meritocracy, then their positive peer effects on junior employees suggest a virtual cycle of human capital accumulation. On the other hand, the estimated peer effect may suggest that promotions are decided based on personal favors and cronyism. Such a promotion system incentivizes corruption and lowers the quality of public service, as discussed extensively in the development literature. It would be beyond the scope of this paper to discuss what is likely to be the case at the MOF. However, it is worth noting that the MOF is not an exception in terms of alleged scandals involving bribery and harassment[28], although Japan is a developed economy. Investigating the long-term peer effects on promotions in light of professional bureaucracies is an important question, which we leave it for future research.

[28]Several executives pleaded guilty to charges of bribery in 1998, and the vice minister and another executive resigned due to allegations of sexual harassment and falsification of official documents in 2018. For details, see Wudunn (1998), Harding (2018a), and Harding (2018b).

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Organization Chart(As of January 2020)

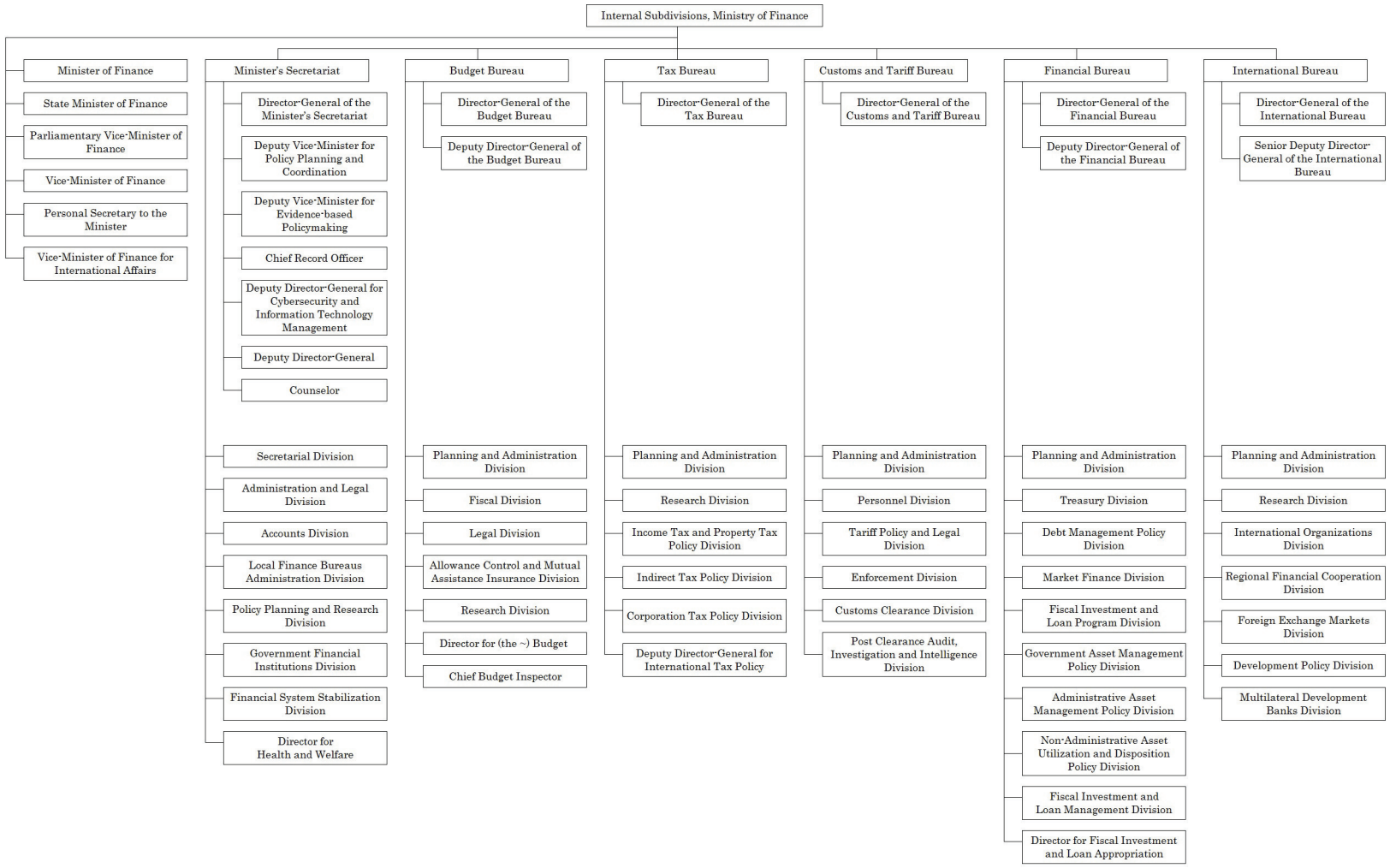

Figure 1: Organizational Structure of the MOF

Note: This figure is taken from the MOF's website.

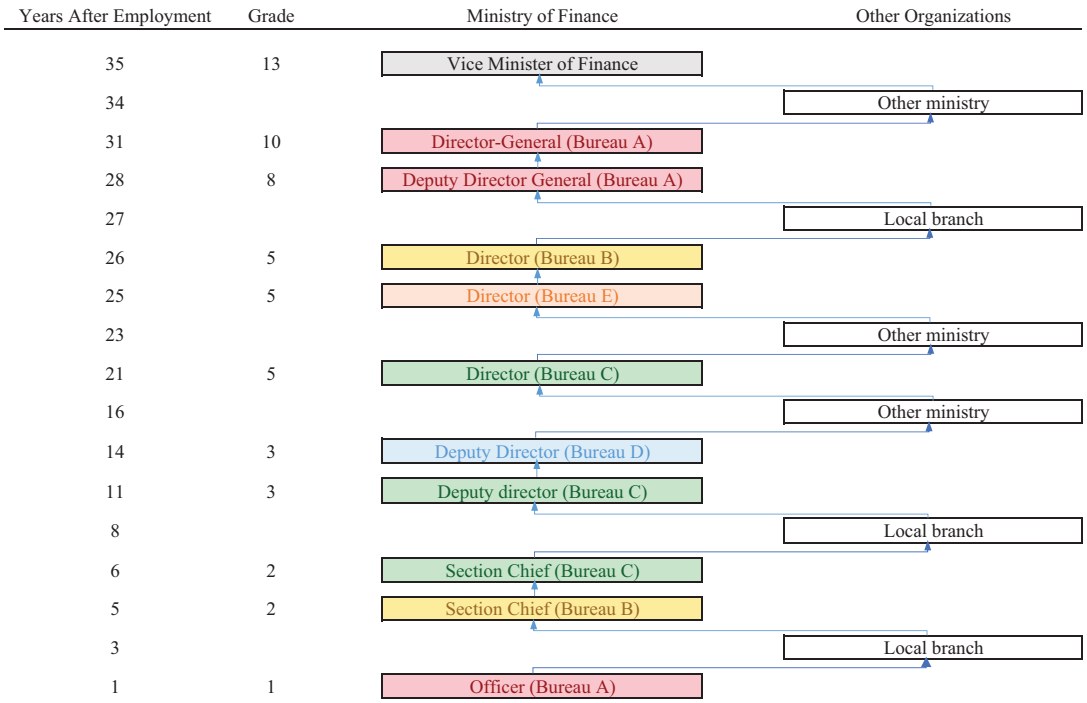

Figure 2: Example of the Career History of a Chief Executive

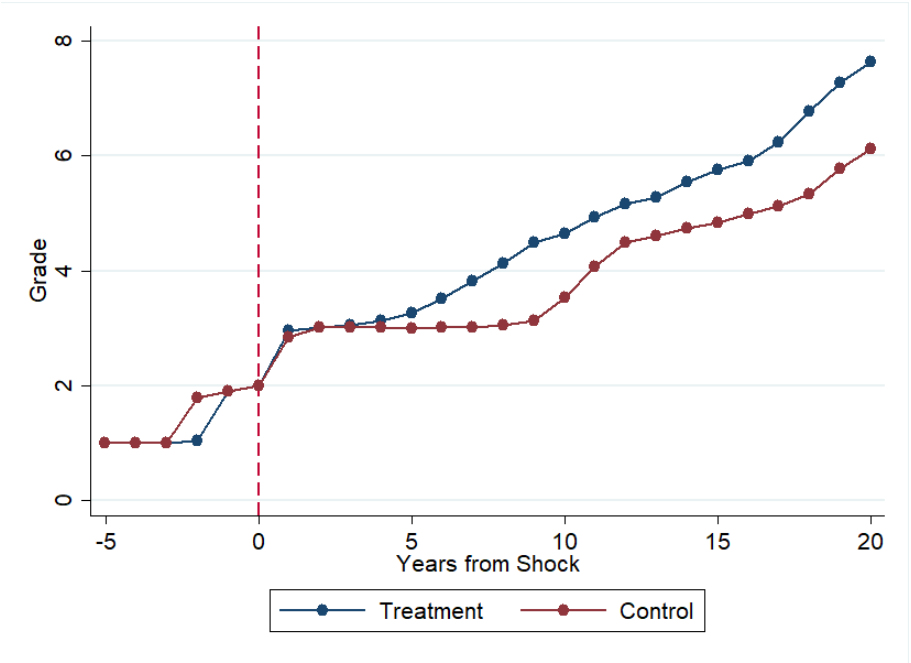

Figure 3: Trend of the Grades of the Control and Treatment Groups

Note: This figure plots the grades of the treatment and control groups over time. The treatment group receives the shock at Year 0, while the control group never receives the shock.

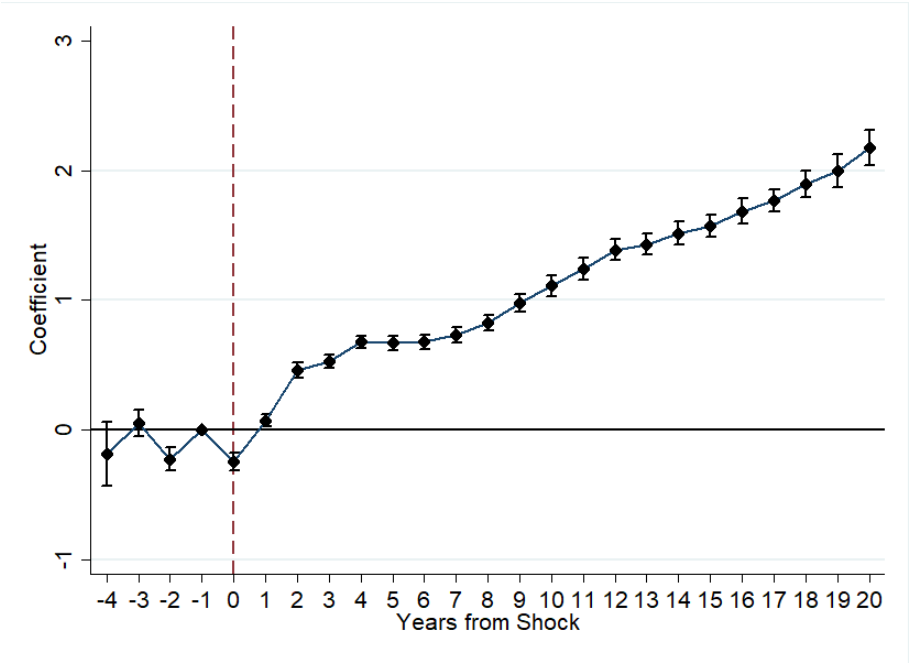

Figure 4: Event Study of the Shocks of Working with Future Executives

Note: This figure shows the estimates of the event study described in Equation (7). The point estimates and corresponding 90 percent confidence intervals are plotted. The dotted vertical line is drawn one year before the shock.

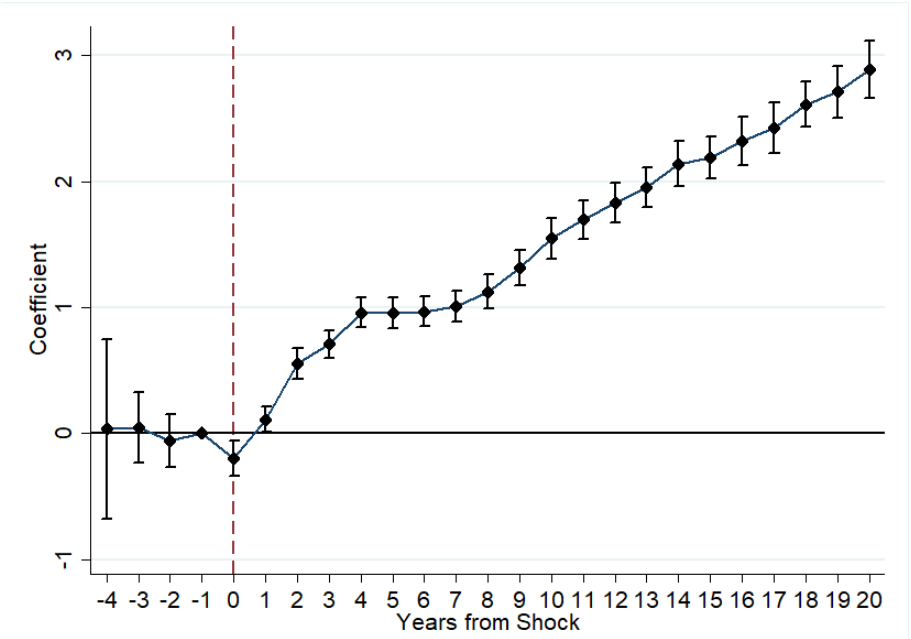

Figure 5: Event Study of the Shocks of Working with Future Chief Executives

Note: See the note in Figure 4.

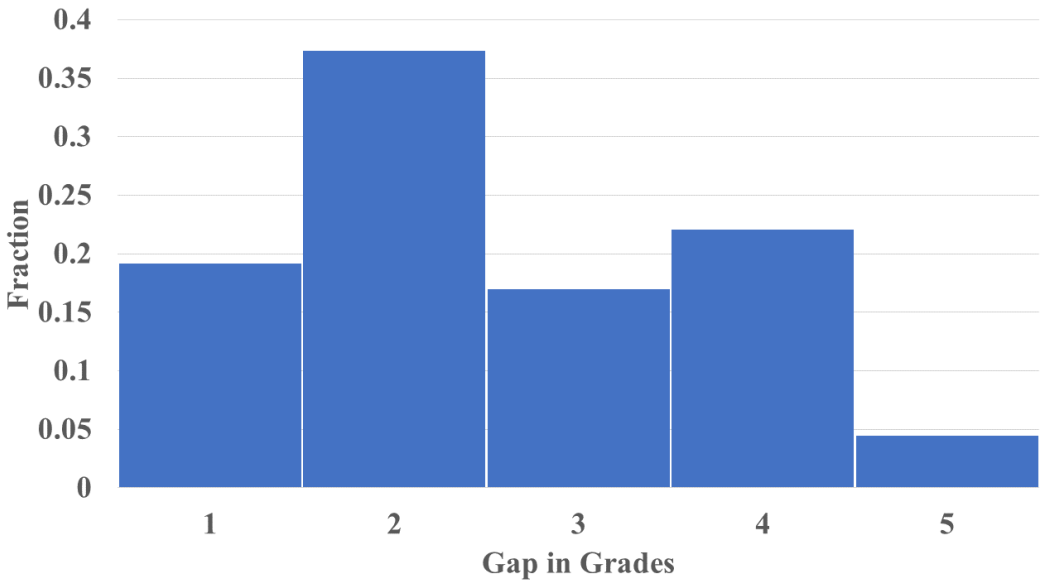

Figure 6: Distribution of the Gap in Grades

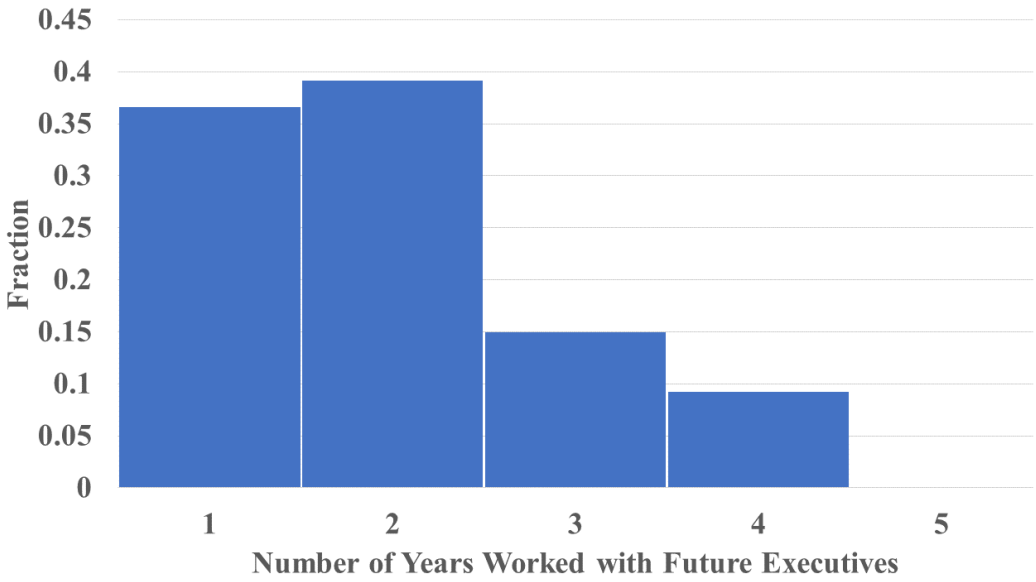

Figure 7: Distribution of the Number of Years Worked with Future Executives

Table 1: Grade, Title, and Annual Salary of Employees at the MOF

Grade	Title	Annual Salary
1.	Official	$ 31,530
2.	Chief	$ 45,360
3.	Deputy Director of a Division	$ 73,140
4.	Director of an Office	—
5.	Director of a Division	$ 125,330
6.	Director of a Planning and Administration Division	—
7.	Deputy Director-General of a Bureau	—
8.	Deputy Vice-Minister	—
9.	Director-General (Customs and Tariff Bureau, Policy and Markets Bureau)	—
10.	Director-General (Tax Bureau, Financial Bureau, International Bureau, Strategy Development and Management Bureau, Supervision Bureau), Director-General of the Minister's Secretariat	$ 178,040
11.	Director-General of the Budget Bureau, Vice Minister for International Affairs	—
12.	Vice-Minister of Finance for International Affairs Commissioner of Financial Services Agency	—
13.	Vice-Minister of Finance	$ 233,740

[a.] This table summarizes the grade, title, and annual salary of employees at the MOF.

[b.] Annual salary is based on the examples disclosed by the Cabinet Bureau of Personnel Affairs (https://www.cas.go.jp/jp/gaiyou/jimu/jinjikyoku/pdf/r01_kyuyo.pdf(in Japanese)) and converted using the exchange rate of 100 Japanese yen per US dollar.

Table 2: Descriptive Statistics for Main Variables

Variables	Mean	Std. Deviation
Grade	3.873	2.154
Probability of Becoming the Chief Executive	0.038	0.190
Probability of Becoming an Executive	0.141	0.348
Probability of Working with a Future Executive Within the First Five Years	0.301	0.459
Average Years of Work	26.923	7.033
Average Years of Becoming an Executive	29.948	4.525
Number of Observations	25,765	25,765

[a.] This table reports the descriptive statistics of the main variables that cover the sample period between 1946 and 2019.

Table 3: Balance Tests Prior to the Shock

	Means		Difference	Std. Error
	Treatment	Control		
Grade	1.366	1.380	0.014	0.014
Hometown: Tokyo	0.408	0.384	-0.024	0.014
Specialization: Economics	0.268	0.262	-0.006	0.012
Law	0.679	0.668	-0.011	0.013
Education: Univ. of Tokyo	0.827	0.812	-0.016	0.011
Univ. of Tokyo × MA	0.020	0.034	0.014	0.005
Kyoto Univ.	0.078	0.082	0.004	0.008
Kyoto Univ. × MA	0.005	0.005	0.001	0.002
Hitotsubashi Univ.	0.048	0.040	-0.008	0.006
Hitotsubashi Univ. × MA	0.003	0.005	0.003	0.002
Tokyo Tech Univ.	0.002	0.003	0.001	0.001
Tokyo Tech Univ.× MA	0.002	0.001	0.001	0.001
Keio Univ.	0.017	0.023	0.006	0.004
Keio Univ. × MA	0.001	0.001	0.000	0.001
Waseda Univ.	0.024	0.025	0.002	0.004
Waseda Univ. × MA	0.000	0.001	0.001	0.001
Gender: Female	0.021	0.052	0.031	0.006
Turnover Within the First Five Years	0.001	0.002	0.001	0.001
Number of Observations	1,819	4,230		

[a.] This table reports the means of the treatment and control groups (employees who receive the shock and those who do not) prior to the shock, the differences of the means, and the corresponding standard errors.

Table 4: Results of Linear Probability Model

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Shock	0.017	0.028
	(0.005)	(0.009)
Dependent Variable Mean	0.037	0.141
Adjusted R^2	0.035	0.108
Number of Observations	6,049	6,049

[a.] This table shows the estimates of the linear probability model based on the OLS described in Equation (3).

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Table 5: Results of Two-Way Fixed Effect Model

Shock	0.541
	(0.026)
Individual and Year FE	YES
Dependent Variable Mean	3.873
Adjusted R^2	0.054
Number of Observations	25,765

[a.] This table shows the estimates of the two-way fixed effect model described in Equation (5).

[b.] Cluster-robust standard error across time and individuals is reported in parentheses.

Table 6: Results of Event Study (Working with Future Executive)

Years from the Shock	(1)	(2)	(3)
-6			-0.501
			(0.471)
-5		0.026	0.197
		(0.293)	(0.133)
-4	-0.185	-0.015	-0.067
	(0.147)	(0.126)	(0.085)
-3	0.052	-0.015	-0.043
	(0.062)	(0.052)	(0.050)
-2	-0.227	-0.140	-0.139
	(0.054)	(0.052)	(0.050)
+0	-0.250	-0.145	-0.135
	(0.041)	(0.043)	(0.037)
+1	0.070	0.124	0.114
	(0.029)	(0.030)	(0.025)
+2	0.459	0.504	0.466
	(0.035)	(0.035)	(0.029)
+3	0.527	0.559	0.518
	(0.029)	(0.028)	(0.027)
+4	0.678	0.709	0.657
	(0.028)	(0.026)	(0.023)
+5	0.668	0.682	0.629
	(0.035)	(0.033)	(0.031)
+6	0.678	0.696	0.634
	(0.034)	(0.032)	(0.028)
+7	0.731	0.742	0.672
	(0.034)	(0.032)	(0.030)
+8	0.827	0.837	0.776
	(0.036)	(0.034)	(0.031)
+9	0.977	0.990	0.909
	(0.042)	(0.041)	(0.039)
+10	1.109	1.121	1.049
	(0.047)	(0.044)	(0.040)
+15	1.571	1.552	1.442
	(0.051)	(0.048)	(0.043)
+20	2.175	2.129	1.966
	(0.082)	(0.076)	(0.075)
Years of Experience Before the Shock	5	6	7
Fixed Effects	YES	YES	YES
Dependent Variable Mean	3.941	3.941	3.941
Adjusted R^2	0.659	0.651	0.635
Number of Observations	16,079	16,429	16,800

[a.] This table shows the estimates of β_k on Equation (7). Three specifications are reported depending on the years of experience before the shock: (1) five years, (2) six years, and (3) seven years.

[b.] Cluster-robust standard errors across time and individuals are reported in parentheses.

Table 7: Results of Event Study (Working with Future Chief Executive)

Years from the Shock	(1)	(2)	(3)
-6			-0.233
			(1.087)
-5		-1.659	-0.545
		(0.365)	(0.311)
-4	0.041	-0.293	-0.297
	(0.427)	(0.267)	(0.189)
-3	0.056	-0.127	-0.083
	(0.167)	(0.135)	(0.120)
-2	-0.062	-0.036	0.003
	(0.124)	(0.107)	(0.102)
+0	-0.198	-0.147	-0.130
	(0.081)	(0.074)	(0.065)
+1	0.112	0.127	0.126
	(0.061)	(0.056)	(0.049)
+2	0.553	0.556	0.533
	(0.071)	(0.065)	(0.056)
+3	0.710	0.707	0.677
	(0.066)	(0.062)	(0.053)
+4	0.962	0.953	0.910
	(0.072)	(0.066)	(0.057)
+5	0.961	0.943	0.900
	(0.074)	(0.068)	(0.061)
+6	0.972	0.955	0.912
	(0.072)	(0.067)	(0.060)
+7	1.014	0.993	0.951
	(0.072)	(0.067)	(0.061)
+8	1.131	1.112	1.080
	(0.078)	(0.075)	(0.069)
+9	1.320	1.292	1.269
	(0.080)	(0.073)	(0.069)
+10	1.556	1.533	1.486
	(0.094)	(0.087)	(0.080)
+15	2.200	2.166	2.086
	(0.097)	(0.095)	(0.086)
+20	2.891	2.809	2.716
	(0.135)	(0.129)	(0.134)
Years of Experience Before the Shock	5	6	7
Fixed Effects	YES	YES	YES
Dependent Variable Mean	3.941	3.941	3.941
Adjusted R^2	0.674	0.662	0.642
Number of Observations	10,206	10,532	10,881

[a.] This table shows the estimates of β_k on Equation (7). Three specifications are reported depending on the years of experience before the shock: (1) five years, (2) six years, and (3) seven years.

[b.] Cluster-robust standard errors across time and individuals are reported in parentheses.

Table 8: Results Analyzing the Heterogeneity Among the Treatment Group

Dependent Variable	(1) *Chief Executive*	(2) *Executive*
Panel A: Gaps in Grades		
Shock (Gap: 1)	0.015	0.039
	(0.012)	(0.021)
Shock (Gap: 2)	0.019	0.030
	(0.011)	(0.018)
Shock (Gap: 3)	0.024	0.033
	(0.009)	(0.015)
Shock (Gap: 4)	0.011	0.020
	(0.006)	(0.011)
Shock (Gap: 5)	0.020	0.006
	(0.015)	(0.021)
Adjusted R^2	0.035	0.108
Number of Observations	6,049	6,049
Panel B: Number of Interactions		
Number of Shocks: 1	0.014	-0.005
	(0.005)	(0.010)
Number of Shocks: 2	0.023	0.033
	(0.005)	(0.010)
Number of Shocks: 3	0.017	0.035
	(0.007)	(0.015)
Number of Shocks: 4	0.049	0.100
	(0.012)	(0.021)
Adjusted R^2	0.039	0.114
Number of Observations	6,074	6,074

[a.] This table shows the results of robustness checks based on the model in Equation (8). *Panel A* shows the results when the shocks are constructed considering the gaps in the grades. *Panel B* shows the results when the shocks are constructed considering the number of interactions with future executives.

[b.] Cluster-robust standard errors across time and individuals are reported in parentheses.

Table 9: Results Controlling for the Common Shocks

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Shock	0.015	0.026
	(0.005)	(0.009)
Dependent Variable Mean	0.037	0.141
Adjusted R^2	0.036	0.108
Number of Observations	6,049	6,049

[a.] This table shows the estimates of the linear probability model based on the OLS described in Equation (3), with a variable that controls for the performance of the divisions.

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Online Appendix for "Does Working with a Future Executive Make Junior Employees More Likely to Be Promoted?" by Natsuki Arai and Nobuhiko Nakazawa

A Tables for Robustness Checks

Table A1: Results of Probit and Logit Models

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Panel A: Probit Model		
Shock	0.364	0.170
	(0.092)	(0.062)
Pseudo R^2	0.121	0.107
Panel B: Logit Model		
Shock	0.728	0.316
	(0.205)	(0.112)
Pseudo R^2	0.121	0.106
Number of Observations	3,553	3,659

[a.] This table shows the estimates of the logit and probit models based on Equation (3).

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Table A2: Results Based on Alternative Specification Omitting Time Variation

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Number of Shocks: 1	0.008	-0.012
	(0.009)	(0.017)
Number of Shocks: 2	0.016	0.018
	(0.009)	(0.018)
Number of Shocks: 3	0.008	0.027
	(0.013)	(0.028)
Number of Shocks: 4	0.045	0.079
	(0.026)	(0.041)
Dependent Variable Mean	0.020	0.086
Adjusted R^2	0.020	0.046
Number of Observations	1,669	1,669

[a.] This table shows the results of robustness checks based on the alternative specification in Equation (11).

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Table A3: Results Using the Sample Prior to 2001

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Shock	0.020	0.033
	(0.006)	(0.010)
Dependent Variable Mean	0.037	0.141
Adjusted R^2	0.033	0.091
Number of Observations	4,535	4,535

[a.] This table shows the results of robustness checks based on the linear probability model in Equation (3), where the sample period is restricted to the years prior to 2001.

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Table A4: Results Excluding Female Employees

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Shock	0.017	0.028
	(0.005)	(0.009)
Dependent Variable Mean	0.038	0.144
Adjusted R^2	0.035	0.106
Number of Observations	5,792	5,792

[a.] This table shows the results of robustness checks based on the linear probability model in Equation (3), where the sample of female employees is excluded.

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

Table A5: Results Excluding Recent Cohorts

	(1)	(2)
Dependent Variable	*Chief Executive*	*Executive*
Shock	0.020	0.033
	(0.006)	(0.011)
Dependent Variable Mean	0.038	0.144
Adjusted R^2	0.033	0.089
Number of Observations	4,466	4,466

[a.] This table shows the results of the linear probability model in Equation (3), in which recent cohorts, who are within 20 years of joining the MOF, are excluded.

[b.] Heteroskedasticity-robust standard errors are reported in parentheses.

B Data Source

In this paper, we constructed the data on individual government officials' career history at the MOF from multiple sources. The primary source of data is the government officials' directory, *Shokuin-Roku* (in Japanese), which is published annually as a book. The directory covers officials whose grades are 2 or higher and contains their names, titles, grades, and internal bureaus and divisions.

We also used the government officials' handbook, *Seikan-Youran* (in Japanese), which is published twice a year, to obtain information on the high schools and colleges from which the government officials graduated.

Information on the assignments of officials whose grade is 1, which typically covers the first two years of employment, was obtained from the MOF. Upon request, we can contact the relevant officials at the MOF and assist researchers in obtaining permission to use the data.

We combined the information above by organizing the data by name and year. The summary statistics from our final dataset are described in Table 2.

The data of the index of performance used in the robustness check are publicly available on the MOF's website: https://www.mof.go.jp/about_mof/policy_evaluation/.