



## Successful and Dead-end Jobs in a Bureaucracy: Evidence from Japan\*

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【 Abstract 】 This paper develops a novel method that assigns a job a value to capture both the likelihood and speed of promotion from each job to a top executive and applies it to investigate the career paths of bureaucrats in Japan. We find that outwardly similar jobs within the same hierarchical rank, estimated using the standard method in Baker, Gibbs, and Holmstrom (1994), have very different opportunities to be promoted to a top executive. We can also detect frequent real demotions and the presence of early selection (read fast track) of elite bureaucrats unable to be detected through use of hierarchical rank.

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# 1 Introduction

The internal labor market has been widely investigated since Doeringer and Piore (1971), and its characteristics have been shown to be quite different from those of the external labor market. The main reason is that employees within an organization are shielded from competition in a series of spot markets. Instead, employees face career paths in the organization that are relatively stable over time. Because it is likely that these career paths are designed to play several functions, including skill accumulation, as a screening device and as an incentive mechanism, the accumulated evidence on internal labor market attracts theorists by providing several empirical regularities that must be explained by economic theory (e.g., Gibbons and Waldman (1999a, 1999b, 2006)).

One of the obstacles to a solid quantitative examination of career paths is that most important job characteristics are qualitative along several dimensions, such as function, location, and business unit. Furthermore, there are uncoded characteristics of jobs, such as skill requirements. Although the previous literature typically uses either an organization chart or transition matrices between major job titles to identify the level in a hierarchical organization (e.g., Baker, Gibbs, and Holmstrom (1994), Lin (2005)), a significant heterogeneity of job characteristics is likely to remain at the same hierarchical level. This heterogeneity could be critically important for the analysis of promotions.

This would be particularly true for the examination of promotions in the public sector. As argued by Tirole (1994), because government generally pursues multiple goals, many of which are challenging to measure, it is difficult to provide high powered incentives through a formal salary. Therefore, career concerns could be one of the most important motivations for hard work. Likewise, because the number of highly ranked positions in a hierarchical organization is limited, it is more likely that the public sector strategically employs lateral transfers at the same hierarchical level to motivate workers than does the private sector.

This paper develops a new method to assign each job a value that can evaluate both the likelihood and speed of promotion from each job to a top executive and applies it to the personnel data of an elite group of white-collar government officials working in the

Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT). We show that our method can reveal a silent feature of career paths for Japanese elite officials, which cannot be uncovered by either an official organization chart or the standard method developed by Baker, Gibbs, and Holmstrom (1994).

As in the seminal study by Baker, Gibbs, and Holmstrom (1994), we use the transition across jobs as the basic information used to evaluate each job. However, unlike Baker, Gibbs, and Holmstrom (1994), which used information on moves between major job titles to define levels, where the major titles are selected from their data set, we estimate transition probabilities between all individual jobs available in our data set. We can distinguish these not only by the job titles, but also by functional departments and business units. Using these transition probabilities, we define the value of each job using the discounted expected probability of becoming a top executive. As a result, this evaluates not only the likelihood of being promoted to a top executive position, but also the speed of promotion. Using the job value, we can then extract the heterogeneity of individual jobs within the same formal rank typically passed over in existing studies. We then compare the pattern of promotions to higher valued jobs with that of promotions to jobs at a higher hierarchical rank.

We find that there are significant differences in job values within the same hierarchical rank. We also show that within the same relatively high hierarchical rank, there are both successful jobs, whose discounted expected probabilities of being promoted to top executive are nearly one, and so-called dead-end jobs, whose discounted expected probabilities are nearly zero. This suggests that the heterogeneity of jobs within the same hierarchical rank is important for the analysis of promotions in the Japanese public sector.

We also find frequent real demotions (or job relegation) in the sense of downgrading to a job with a lower job value. However, this is not in the sense of downgrading to a lower hierarchical rank. This finding suggests that officials are likely to face intense competition for top executive positions through job assignment.

Finally, we can also detect the existence of implicit fast tracks for elite officials, a

matter undetected by the hierarchical rank. Our data shows that most officials are promoted to directors, and that it is rare to observe more than two hierarchical rank differences for elite officials of the same tenure until they attain 30 years of tenure. Because the majority of officials retire by 35 years of tenure, they are seemingly treated equally for the most of their careers. This confirms the late selection of officials, which is pointed out by several Japanese labor economists (e.g., Koike (2002)) as a common feature of internal labor markets in Japanese firms. However, we also find that the variation in job values within the same tenure gradually rises as the tenure of officials increases, even during the early stages of their careers. This suggests that the public sector may select officials during a much earlier stage of their careers than we usually consider.

To confirm the presence of fast tracks, we conduct regression analysis. We find that after controlling for tenure in the ministry and tenure at the current job value, the length of tenure at the previous job value has a negative association with the increase in current job value. However, we cannot find the same result using hierarchical rank. We also find that while officials' educational background does not have any significant relationship with their current hierarchical rank, a prestigious education dummy has a significant positive relationship with their current job value. Moreover, we also find that while officials' hierarchical ranks in the early stages of their career have a negative association with their current hierarchical rank, job values at the same stage have a positive association with their current job values. All these findings support the hypothesis that while the Japanese government does not formally differentiate between officials throughout their careers, it does select promising young officials through lateral transfer much earlier than usually believed.

There have already been several attempts to analyze personnel data and provide the stylized features of the internal labor market of an organization (e.g., Medoff and Abraham (1980, 1981), Rosenbaum (1984), Baker, Gibbs, and Holmstrom (1994), Seltzer and Merrett (2000), Treble, Gamenen, Bridges, and Barmby (2001), Lin (2005), and Kauhanen and Napari (2012)). Most recently, several studies have begun to pay attention

to movement within a hierarchical rank (e.g., Gibbs and Hendricks (2004), Gittings (2012)). At least some of these examine how the frequency and broadness of lateral transfers influence promotion (Koike (2002), Dohmen, Kriechel, and Pfann (2004), Ariga (2006), Clemens (2012), Jin and Waldman (2016), Frederiksen and Kato (2018), Belzil, Bognanno, and Poinas (2018)), while Takii, Sasaki, and Wan (2018) examine the timing of promotion and lateral transfer. In addition, a number of other studies provide theories on the role of job rotation (e.g., Ickes and Samuelson (1987), Cosgel and Miceli (1999), Ortega (2001), Eguchi (2004, 2005), Eriksson and Ortega (2006), Jin and Waldman (2016)). However, none of these consider the heterogeneity of individual jobs within the same formal rank.

Other studies of personnel data in Japanese firms consider the particular heterogeneity of the jobs observed in the data. Similar to our approach, these studies point out that the differentials in job assignment between promising and other employees can be observed before a difference in the speed of promotion arises in both Japanese firms (Matsushige (2000), Umezaki (2000), and Uehara (2007)) and the public sector (Ichise (2013)). However, because these analyses do not include systematic measurement to quantify the prospects for promotion to top executive for each job, they can only identify jobs with a distinguishing trait through casual observation. Therefore, they cannot detect the broad heterogeneity of each job within the same level of hierarchy. They also cannot detect demotion from the perspective of competition for promotion.

Our paper also contributes to the literature by providing valuable evidence of an internal labor market in the public sector. At present, there are few attempts to examine an internal labor market in the public sector. Inoki (1995), Inatsugu (1996), Gibbs (2001), Inoki (2002) and Ichise (2013) are exceptions. In particular, like ourselves, Ichise (2013) reviews the personnel records of police bureaucrats in Japan and finds that experience in a specific job influences their future careers. However, as discussed, this approach cannot grasp a full understanding of the broad heterogeneity of individual jobs in the same rank and the evolution of promotion competitions throughout careers. For our part, we can show that the Japanese government gradually selects promising people

during their early careers and the competition for promotion becomes more intense as they spend more and more of their career in a public sector organizations.

The paper is organized as follows. The next section explains our data set. The third section provides evidence using a hierarchical rank. The fourth section investigates career paths using a job value. The fifth section conducts regression analysis using hierarchical ranks and job values and shows that we can detect a fast track only when we use the job value. The final section concludes and discusses future research extensions.

## 2 Data

The data set used in this paper is the personnel records for an elite group of white-collar officials working in the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT). This ministry was established in 2001 through the merger of four government offices: the Ministry of Construction (MOC), the Ministry of Transport (MOT), the National Land Agency, and the Hokkaido Development Agency.

We mainly construct the data set using 13 editions of the *Kokudo Kotsu Sho Meikan* (*Directory of MLIT officials*) from 2003 to 2015 published by *Jihyo Sha*. Each edition includes all middle managers (*Kacho* class) and higher-ranked officials in the internal bureaus of both the ministry and the extra-ministerial agencies as of October 31 each year.<sup>1</sup> Each observation contains an official's name, date of birth, education, job title, the departments and sections of the current job, the year and month of taking up the current job, and the official's past job history.

It is a common personnel practice in the Japanese bureaucracy to exchange officials between the central government and other organizations. Those transferred to external organizations usually return to the central government after a few years. The directories also include all the top management and directors in some external organizations

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<sup>1</sup>Specifically, the extra-ministerial agencies are four organizations attached to the MLIT. These are the Japan Coast Guard, the Japan Meteorological Agency, the Japan Tourism Agency, and the Japan Transport Safety Board, along with two agencies formerly attached to the Prime Minister's Office, being the National Land Agency and the Hokkaido Development Agency.

such as local branch offices, research institutes, and educational facilities established in affiliation with the ministry. However, data are not available for retired officials and those transferred to the other external organizations, including other ministries, embassies, local governments, and public or private firms.

To fill part of these missing data, we also use *iJAMP* as supplemental material, which is an internet service on public administrative information provided by *Jiji Press*. This data source enables us to obtain information on careers for almost all middle- and high-rank managers in the internal bureaus of most Japanese ministries.

Finally, we include the omitted jobs for some officials by referring to the files of personnel changes for all officials in MLIT since April 1, 2004, which are publicly available on the MLIT website. These files also allow us to specify the retirement date for retired officials, whereas the other two aforementioned data sources do not identify whether officials not included in the data sources have retired or were transferred to an external organization.

Through the data enrichment process discussed, once an official is assigned to a middle- or high-rank management position in an internal bureau or an affiliate of MLIT between 2003 and 2015, we thereafter have a complete job history. Hence, we can investigate the career paths for middle- or high-rank managers without too much concern about any sample selection bias.

To obtain information on early careers before managers enter a middle management position, however, we need to rely on their recall of events. This presents two potential problems. First, some managers do not report all of their early jobs. Hence, the job history records of low-rank positions for some of these managers are not perfect. When we encounter data that do not exhibit any job changes over the long term, we can only assume that these managers have remained in the same job.

Second, if some officials retire from the ministry before becoming middle managers, then they are also omitted from our data set. Figure 1 illustrates the representativeness of our data set. In total, there are 659 officials, of which 284 entered MOC and 375 entered MOT over the period 1969–2000. The dark shaded bar in Figure 1 represents

the number of the officials included in the data set for each entry year. The light shaded area represents the officials we could not capture because they either retired or were not yet promoted to middle manager. As shown, while our data set covers more than 70 percent of all officials who entered the two ministries in each entry year during the period 1974–1988, it does not for other entry years.

<< Figure 1 here >>

To maximize the amount of information we can extract from the data and to minimize any potential sample selection bias, we utilize two different samples from our data set.

1. To obtain an overall picture of career paths that includes the early career, we combine our complete panel data with the early career recall data and construct data profiles for the entire personnel history following entry. Hereafter, we refer to this as the sample of job histories with recall data. To minimize any potential sample selection biases, we sometimes utilize a subsample of this data. We report which (sub)sample is used in each figure or table.
2. When we pay greater attention to the career paths of middle- or high-rank management positions, we use the panel data of officials between 2003 and 2015 because we can observe their full job histories. Hereafter, we refer to this as the sample of complete job histories for middle- or high-rank managers.

### **3 Hierarchical Rank**

We can potentially identify the hierarchical rank of each job using the name of the title of each official. The standard names of job titles and their ranks are prescribed by Japanese cabinet ordinance and the hierarchy in the internal organization of a ministry consists of the eight ranks listed in Table 1. The ordinance also provides a formal statement on the required abilities and skills for each rank, though it would be difficult to grasp the precise contents of the required skills from the statement. The salary



structure is prescribed by other laws and rules so that the range of wage levels has a solid link with job ranks. It is almost certain that the ranks of job titles play an important role in characterizing the hierarchy of bureaucracy.

<< Table 1 here >>

One of the difficulties in identifying the hierarchical ranks is that our data set contains many job titles other than the prescribed standard titles; therefore, their ranks are not straightforward. To assign a hierarchical rank to all jobs, we apply the method developed in Baker, Gibbs, and Holmstrom (1994) to the sample of job histories with recall data.

To start, we construct a transition matrix to represent the moves between jobs with the selected major titles in the internal bureaus of the MLIT and classify each one into one of seven ranks (Ranks 2–8). We additionally assign Rank 1 to the first job of each official by taking advantage of the fact that there is a single port of entry for new graduates into the ministry. Next, we assign appropriate ranks to the jobs with titles other than the major ones based on the transition patterns between titles. Because it is common to exchange officials between internal bureaus and other organizations, we require additional procedures not prescribed by Baker, Gibbs, and Holmstrom (1994). We provide more details on this procedure in the Appendix.

### 3.1 Promotion and Demotion

Table 2 provides the transition matrix between the hierarchical ranks using the sample of complete job histories for middle- or high-rank managers after each official is observed in the directory.<sup>2</sup> In this table, moves to the right of a boxed cell are promotions, and moves to the left are demotions. As shown, promotions of more than one rank and demotions are quite rare, with the probability of moving one rank below being quite low, and the probability of moving more than two ranks above also being low. These

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<sup>2</sup>We report the same transition matrix using the sample of job histories with recall data in the Appendix.

observations are consistent with the stylized facts presented in the literature, including by Baker, Gibbs, and Holmstrom (1994).

<< Table 2 here >>

Table 3 details how many officials belong in each hierarchical rank at any given years of tenure. To examine the selection process from entry for 35 years, we use the sample of job histories with recall data for those entering the ministry between 1974 and 1980. Note that these account for 87.2 percent of all officials in the same cohort and that all officials in this sample have more than 35 years of tenure. Hence, this sample minimizes any possible sample selection bias in early careers.

As shown, holding tenure constant, there is no significant difference in the speed of promotion until officials spend about 30 years of their careers in the ministry. Even if we can observe some differences in the speed of promotion, they seem not to last long. For example, most of the surviving officials are in Rank 3 at 12 years of tenure. Some differentials seem to appear at 15 years of tenure, but disappear at 18 years of tenure.

The different patterns of selection procedure gradually appear after 30 years of tenure. For example, 70 percent of the surviving officials are in Rank 6 at 31 years of tenure. The various ranks of officials are evident at 33 years of tenure and this difference does not contract thereafter. This suggests that the selection procedure for the Japanese bureaucracy is quite slow. Several Japanese labor economists, including Koike (2002), have pointed out that the late selection is a prominent feature of the internal labor market in Japanese firms. Our result provides similar evidence for the Japanese public sector.<sup>3</sup>

<< Table 3 here >>

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<sup>3</sup>Ichise (2013) shows that there is “quite late selection” in the National Police Agency, another Japanese government organization. In other words, the difference in the speed of promotion does not last until the unpromising officials retire.

### 3.2 Retirement

We can finalize the competition for promotion when an official retires. Many officials seem to retire as soon as the selection appears to occur. We now more closely look at the retirement of officials. Table 4 presents the timing of retirement for 255 officials retiring over the period 2004–2015. Panel (A) in this table shows the number of officials who have retired at each hierarchical rank of their last jobs by tenure at retirement. As shown, most officials have retired at Rank 6 or higher before the mandatory retirement age.

In actuality, there is an institutional arrangement in the Japanese bureaucracy designed to motivate officials to retire following promotion to Rank 6. Firstly, officials belonging to Ranks 6–8, called “officials of designated service (*shitei-shoku*),” receive discontinuously higher salaries as a reward for their promotion from Rank 5 because the salary schedule applied to them has changed according to the remuneration act.<sup>4</sup> The higher salaries for designated officials also result in much higher retirement allowances, which ultimately depend on the salaries for the last jobs of their careers. Secondly, as Inoki (1995) showed, officials who have retired at Rank 6 or higher tend to be assigned to higher positions as executive officers in public or private firms and receive greater remuneration following retirement. In Japanese, this practice is called *amakudari*. Thus, being a designated official is economically important in that it has a considerable influence on lifetime wages. Under this system, officials are likely to have a great incentive to remain in service until promotion to Rank 6.

<< Table 4 here >>

Interestingly, most officials retire as soon as they are promoted to Rank 6. Panel (B) in Table 4 details the years of tenure at retirement only for the 131 officials who have retired at Rank 6 in relation to tenure at their promotion to that rank. We

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<sup>4</sup> *The Annual Report on Salaries of National Public Officials 2011* published by the National Personnel Authority states that university-graduate officials at Rank 5 to whom the highest salary grade is applied receive on average 559,810 yen per month, whereas the lowest monthly salary for designated officials is 724,000 yen.

find that 26.7 percent of these retired one year after their promotion to Rank 6 and that 71.7 percent retired within four years after their promotion. This exit behavior suggests that they are making the best possible use of *amakudari* because the outside options of officials significantly improve when they are promoted to Rank 6. We can also conjecture that because officials who do not retire tend to be promoted to Rank 7, they are already aware of their opportunities of being promoted to Rank 7 when promoted to Rank 6.

## 4 Job Value

The promotion and retirement pattern observed in the previous section suggests that all officials are equally treated during most of their careers before they become officials of designated service (Rank 6). Once promoted to Rank 6, most officials soon retire. For their part, the remaining officials are promoted to top executives. Therefore, officials seem to recognize their own likelihood of being promoted to top executive before being promoted to Rank 6. A relevant question is then when and how they learn about their future promotion likelihood. We would like to argue that the career path itself reveals how they are evaluated by their supervisors.

For this purpose, we develop a method to value each individual job by not only the prospects but also the speed of promotion to top executive. If an official is promoted to top executive with a high probability shortly after being assigned to a certain job, we assign the job a high value. In our method, we utilize richer information on jobs than in the method of identifying the hierarchical ranks employed in the previous section because individual jobs are distinguished by organizations and functional departments as well as job titles.

### 4.1 Definition

More specifically, let  $V_i^* \equiv (1 - \delta) V_i$  be the value of job  $i$ , where  $V_i$  satisfies

$$V_i = w_i + \delta \sum_{j=1}^n P(j|i) V_j, \text{ for all } i, j, \quad (1)$$

and  $w_i$  is the instantaneous value of job  $i$ ;  $\delta$  is a discount factor;  $n$  is the number of available jobs including retirement; and  $P(j|i)$  is the probability that an official currently belonging to job  $i$  would be transferred to job  $j$  in the next period, which can be calculated from the half-yearly panel data from personnel records.<sup>5</sup> Using the matrix notation such as

$$\mathbf{V} = \begin{bmatrix} V_1 \\ \vdots \\ V_n \end{bmatrix}, \mathbf{w} = \begin{bmatrix} w_1 \\ \vdots \\ w_n \end{bmatrix}, \mathbf{P} = \begin{bmatrix} P(1|1) & \cdots & P(n|1) \\ \vdots & \ddots & \vdots \\ P(1|n) & \cdots & P(n|n) \end{bmatrix},$$

(1) can be expressed as

$$\mathbf{V} = \mathbf{w} + \delta \mathbf{P} \mathbf{V}.$$

Hence, we can compute the job value by

$$\mathbf{V}^* \equiv (1 - \delta) (\mathbf{I} - \delta \mathbf{P})^{-1} \mathbf{w}, \quad (2)$$

where  $\mathbf{I}$  is an identity matrix.

We assume that  $w_i = 1$  if job  $i$  indicates a top management position or retirement after top executive, and  $w_i = 0$  otherwise. We set the probability when retiring as  $P(r|r) = 1$  and  $P(j|r) = 0$  for any  $j \neq r$ , where  $r$  denotes retirement. Under these assumptions,  $V_i^* = 1$  when  $i$  indicates either a top executive or retirement after top executive, and  $V_i^* = 0$  when  $i$  denotes retirement after jobs other than top executive. Hence, the value of a job is close to one when the official in the job has a high probability of shortly being promoted to top management, while the value is close to zero either when the job has a high probability of retirement without being promoted to top management or when it is expected to take a long time to become a top executive from this job. Thus, our measure can capture both the likelihood and speed of promotion from each job to top executive.

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<sup>5</sup>If there exists a job  $k$  first appearing in the last period of the data set, it is impossible to compute the values of the job  $k$  and the previous jobs that are transferred to job  $k$  because there is no information on job transitions to other jobs from job  $k$ . We assume that  $P(k|k) = 1$  and  $P(j|k) = 0$  for any  $j \neq k$  for such job  $k$ . In this way, the value of job  $k$  is set to be 0.

To estimate the job value, we must specify which jobs are the top management positions. We identify these based on the formal rules and directives by the National Personnel Authority about salary grades for officials of designated service.<sup>6</sup> Top executives are defined as jobs in the internal bureaus of ministries accompanied by Grade 5 salary or more.<sup>7</sup> The set of top executives defined in this way is a subset of jobs at hierarchical ranks 7 and 8, 87 percent of which are top management positions as defined here. We assume that once an official reaches a top management position, they remain assigned to a top management position. Because we are interested in promotion to the top management position, once an official is promoted to the top executive, we omit that data thereafter.

## 4.2 Successful and Dead-end Jobs

Assuming that  $\delta = 0.97$ , which is frequently used by many macroeconomists as being most appropriate, we compute the job values for all individual jobs. The distribution of the job values using the sample of complete job histories for middle- or high-rank managers is presented in Figure 2.<sup>8</sup> This boxplot shows that while jobs at a high hierarchical rank have on average high job values, there are still large variations in job values within the same hierarchical rank. Within the jobs at Rank 5 or greater, in particular, there are both *successful jobs*, whose job values are nearly one, and *dead-end jobs*, whose job values are nearly zero. When an official is assigned to a successful job, that official would be in a position near the top executive.

<< Figure 2 here >>

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<sup>6</sup>The rule of the National Personnel Authority No. 9–42 provides an ambiguous expression of the links between individual jobs and salary grades for designated officials. The particular rules are prescribed by the directives of the National Personnel Authority, which are not publicly available. However, specific links were revealed by the formal answers submitted to an ordinary session of the Diet (the Japanese parliament) to questions from a member of the House of Councilors in May 2011.

<sup>7</sup>There are eight salary grades for officials of designated service according to rule No. 9–42 by the National Personnel Authority.

<sup>8</sup>We report the same transition matrix using the sample of job histories with recall data in the Appendix.

The lower images in Figure 2 show that the variations in job values gradually increase with the hierarchical rank, which may suggest that officials are gradually screened within the organization. Within Rank 4, the share of the jobs whose job values are higher than 0.15 is very low, but a small number of jobs whose job values are higher than 0.3 are observed within Rank 5. The jobs at Rank 6 can be divided into three groups: a very few successful jobs, some middle-valued jobs, and many dead-end jobs. This confirms our previous conjecture that assigned jobs make many officials realize their likelihood of being promoted to top executive when promoted to Rank 6.

To investigate how the heterogeneity of job values develops through officials' tenure, we match the calculated job values to individual panel data and plot the relationship between the value of the job each official belongs to and the tenure of the officials. Figure 3 depicts the result using the sample of job histories with recall data for those entering the ministry between 1974 and 1980. A darker point in the figure indicates that more officials belong to that job value. As expected, this shows that the variance of job values gradually increases as tenure becomes longer. The increase in the variance appears even before 20 years of tenure, but certainly accelerates after 20 years. Hence, it is likely that the competition for promotion becomes more intense after 20 years of tenure. The majority of officials seem to be screened out before 20–25 years of tenure. Finally, after 36 years of tenure, there is a clear separation between officials in jobs that almost guarantee their being promoted to top executive and officials in the jobs that have no chance of being promoted to the top executive.

<< Figure 3 here >>

Nonetheless, Figure 3 may provide a misleading picture of the variability of early career jobs. The values of early jobs must be low and have small variations as by definition they are heavily influenced by the discount factor  $\delta$ . To eliminate the influence of the discount factor, we construct a measure of relative job value by dividing an official's job value at some year of tenure by the mean of the job value over officials with the same length of tenure.

Table 5 details the distribution of relative job value by tenure using the sample of job histories with recall data for those entering the service of the ministry between 1974 and 1980. In contrast to the distribution of the hierarchical ranks by tenure in Table 3, we can observe a gradual increase in the variation of relative job values. The proportion of relative values between 0.75 and 1.25 is down to 80 percent up until 16 years of tenure, and further declines to 70 percent at 20 years of tenure, 50 percent at 26 years of tenure and 17 percent at 30 years of tenure. While it is true that the variation in relative job values rapidly increases after 20 years of tenure, the increase up until 20 years of tenure cannot be ignored. This leads us to surmise that the ministry might also differentiate among officials, even early in their careers. While we previously found that the ministry seems not to formally differentiate between officials until 30 years of tenure, the results in this table suggest the possibility of the tacit selection of promising officials through job assignment.

<< Table 5 here >>

We also examine the persistence of the values of jobs in which officials belong. For this purpose, we construct a transition matrix among “the value ranks” classified into each quintiles of job values calculated using the sample of complete job histories for middle- or high-rank managers. Table 6 provides the result. As shown, most of the bottom quintile remain in the bottom quintile and most of the top quintile either remain in the top quintile or are promoted to the top executive in the next 6 months. This confirms a strong persistency for the job values in which officials belong for low- and high-value jobs. That is, there are sets of almost always dead-end jobs and almost always successful jobs in the Japanese bureaucracy.

<< Table 6 here >>

This table also demonstrates that we observe frequent large promotions and real demotions for the set of jobs with job values between 0.2 and 0.8. This means that the government aggressively selects officials from those in jobs with values between 0.2



and 0.8. In particular, frequent real demotions may attract special attention. Those assigned to jobs with values between 0.6 and 0.8 can expect promotion with a probability of about 18 percent in the next 6 months. However, they can also be demoted to low-value jobs with a probability of about 10 percent in the next 6 months. It is thus likely that officials in jobs with values between 0.2 and 0.8 face intense competition.

## 5 Existence of Fast Tracks

### 5.1 Empirical Strategy

In Section 3, we revealed that the speed of promotion to a higher hierarchical rank is roughly the same for all officials. However, we also obtained suggestive evidence that the government may select promising officials much earlier during their careers. The following more closely investigates the existence of fast tracks by conducting regression analysis with both hierarchical and value ranks.

For this purpose, we first estimate the probability of promotion to a higher rank using the following ordered probit model<sup>9</sup>:

$$Y_{it}^* = \beta_0 + \beta_1 TP_{it} + \beta_2 D_{it} + \beta_3 (TP_{it} \times D_{it}) + \beta_4 TC_{it} + \beta_5 TC_{it}^2 + \beta_6 T_{it} + \beta_7 T_{it}^2 + \mathbf{X}_{it}\gamma + \varepsilon_{it}, \quad (3)$$

$$Y_{it} = \begin{cases} 1 & \text{if } Y_{it}^* \leq a_1, \\ 2 & \text{if } a_1 < Y_{it}^* \leq a_2, \\ 3 & \text{if } a_2 < Y_{it}^* \leq a_3, \\ 4 & \text{if } a_3 < Y_{it}^*, \end{cases}$$

where  $Y^*$  is a latent variable;  $TP$  is tenure in the previous rank;  $D$  is a dummy indicating that an official is assigned to the current rank by demotion from the previous rank;  $TC$  is tenure in the current rank;  $T$  is total tenure in the ministry;  $\mathbf{X}$  is a vector of other control variables;  $\varepsilon$  is a normally distributed error term.  $Y$  is an outcome variable that

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<sup>9</sup>This specification is a modified version of that in Ariga et al. (1999).

takes four kinds of values.  $Y_{it} = 4$  if an official  $i$  in period  $t$  is promoted to a higher rank in the next period  $t + 1$ ;  $Y_{it} = 3$  if an official remains in the same rank in the next period;  $Y_{it} = 2$  if an official is demoted to a lower rank in the next period;  $Y_{it} = 1$  if an official retires in the next period after holding some job other than top executive. The parameter  $a_j$  ( $j = 1, 2, 3$ ) is the threshold for each outcome. As control variables  $\mathbf{X}$ , we use dummies indicating the current rank, half-year dummies, education, and the ministry an official joined.

The education variable is a dummy variable that takes a value of one if an official graduated in law at the University of Tokyo and zero otherwise. These officials are relatively homogeneous in terms of academic skill because they passed an employment examination that places a heavy weight on academic skill. They also typically entered the MOC or the MOT with no full-time job experience immediately after graduating from university. About 80 percent of the officials in our data set graduated from the University of Tokyo, 80 percent of which are law graduates. Graduates of the University of Tokyo have long occupied a prestigious position in the elite group of officials in the Japanese central government as well as in the judiciary, as pointed out by Kawaguchi and Ma (2008).

We are mainly interested in the estimate of the coefficient  $\beta_1$ , which is the association between the duration in the previous rank and the future probability of promotion, for the key variable  $TP$ . If there are fast tracks, then the estimate of  $\beta_1$  should be negative. This parameter corresponds to the definition of fast tracks by Baker, Gibbs, and Holmstrom (1994). We estimate  $\beta_1$  using the hierarchical and value ranks, and then compare the effects.<sup>10</sup>

For this estimation, we utilize the sample of complete job histories for middle- or high-rank managers between 2003 and 2015. Because there are no missing observations once officials reach middle rank in this sample, there is no sample selection bias. While problems due to self-selection may cause difficulty in the estimates of causal effects,

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<sup>10</sup>Similar to the calculation of job values, once an official is promoted to top executive, we omit any following data because no more variation in the rank can be observed.

because the definition of a fast track does not require any information on causality, the negative value of  $\beta_1$  can be safely interpreted as evidence for it.

Although we examine the presence of fast tracks based on the commonly used definition in the above framework, there is an alternative stream of literature that examines when the difference in the speed of promotion first appears (e.g., Rosenbaum (1984), and Uehara (2007)). They consider that there is a fast track when a lasting difference appears at an earlier stage of an employee’s career.

Investigating the fast track suggested by this literature, we execute the following linear model to estimate the association between the early careers of officials and their ranks in a later period:

$$R_{it} = \alpha_0 + \alpha_1 EC_i + \alpha_2 S_i + \alpha_3 T_{it} + \mathbf{Z}_{it}\delta + \varepsilon_{it}, \quad (4)$$

where  $R$  is the current rank;  $EC$  is the hierarchical ranks or job values experienced in the early career;  $S$  is a variable indicating that an official graduated from a prestigious university;  $\mathbf{Z}$  is a vector of other control variables. The educational background  $S$  is the same variable as the model (3) and as control variables  $\mathbf{Z}$ , we use half-year dummies and the ministry an official joined. To construct variables  $EC$ , we use a dummy variable indicating whether an official belongs in some rank at 5, 10, 15, or 20 years of tenure for estimation with the hierarchical ranks, and the job value at the same years of tenure for estimation with the value ranks. If there are early screening procedures, then we expect that  $EC$  has a positive association with the current rank.

One of the difficulties in conducting this regression analysis is that our data on the early career is not randomly sampled and possibly contains several sampling biases. Note that our main data source, the *Directory of MLIT officials*, contains all officials in Rank 5 inside the ministry each year, but does not include some officials in Ranks 3 or 4 each year. We thus need to rely on recall data to obtain early career information about when officials were assigned to jobs in Ranks 1 or 2 and the number of jobs in Ranks 3 or 4. More importantly, we face missing observations in the recall data.

To mitigate possible sampling bias, we utilize the sample of job histories with recall data for those entering the ministry during the period 1974–1988, which covers 88.3

percent of all officials in the same cohort. Although we still need to interpret the regression result with caution, we believe that we can still extract meaningful information from this data set. Because this is the best available early career data for the MLIT, we report the regression results as supplementary evidence for the existence of fast tracks.

## 5.2 Results

The results of model (3) are in Table 7. These show that tenure in the previous value rank is significantly and negatively associated with the probability of promotion, while the association of tenure in the previous hierarchical rank on the probability of promotion is positive and not statistically significant. This means that when an official is assigned to the current rank through promotion from the previous rank, that official is promoted to higher-value jobs with a greater probability if the speed of promotion from the previous value rank to the current value rank is faster, while promotion to a higher hierarchical rank is independent of, if any, a decrease in the speed of promotion from the previous hierarchical rank to the current hierarchical rank. These results are robust. As shown in columns (2) and (4) of Table 7, even when we restrict the sample to those entering the service of the ministries for the years between 1974 and 1988, both the magnitude and significance of the tenure coefficients in the previous rank do not change. These results suggest the existence of implicit fast tracks unable to be observed by the formal hierarchical rank.

<< Table 7 here >>

The results of model (4) for the hierarchical and value ranks are in columns (1) to (8) of Table 8. When using the hierarchical ranks, neither graduating from a prestigious university nor early promotion to a higher rank is significantly associated with the current rank. If anything, being Rank 4 by 15 years of tenure is negatively associated with the current rank. When we use the job value, however, graduating from a prestigious university is significantly positively associated with the current job value. As far as we can take graduating from a prestigious university as a proxy of unobserved ability,

the positive association with the current job value suggests that more able officials are selected to a position with higher job values, but not with a higher hierarchical rank.

However, the coefficients of early promotion to higher ranks remain insignificant even if we use job values. One possible explanation is that graduation from a prestigious university is highly correlated with job values in the early career; therefore, the correlation between job values in the early career and current job values disappear once we control for graduation from the prestigious university dummy variable. To investigate this possibility, we conduct the same regression after omitting the prestigious university dummy. Columns (9) to (16) of Table 8 provide the results. The coefficients for the experience of higher-valued jobs at 5 years of tenure now exhibit significantly positive signs. This supports our previous inference that we cannot find a correlation between job values in the early career and the current position because we control for prestigious university.

As a complementary analysis, we also estimate the relationship between graduating from a prestigious university and rank in an early stage of career. The result is shown in Table 9. As shown, graduating in Law at the University of Tokyo has no significant association with the earlier hierarchical rank, while it is positively associated with the value rank at 5 and 15 years of tenure. This provides evidence to support our argument that attending a prestigious university is highly correlated with early career job values. These findings suggest that promising candidates are likely to be assigned to successful jobs before they attain 15 years of tenure.

In sum, the evidence consistently indicates the possibility of implicit early selection through job transfer. This informal early selection cannot be observed using hierarchical ranks. That is, officials who are assigned to the promising jobs within the same hierarchical rank at the earlier stage of their careers have a high probability of being assigned to successful jobs for top executives.

<< Table 8 here >>

<< Table 9 here >>

## 6 Conclusion

This paper develops a method to assign each job a value that evaluates the likelihood and speed of promotion from each job to top executive and applies this method to investigate the career paths of officials in the Japanese public sector. We find that outwardly similar jobs within a hierarchical rank yield large differences in the probability of being promoted to top executive. We also detect frequent real demotions and the presence of implicit fast tracks for elite officials, matters unable to be detected through use of hierarchical rank.

Our findings are consistent with some of the anecdotal evidence. Based on his institutional analysis of Japanese public administration, Omori (2006) argues that the ranges of regular salaries, which are prescribed by national law, depend only on the hierarchical rank and that officials are promoted to a higher hierarchical rank when they spend a specific number of years at the current rank. This is consistent with the results shown in Section 3.2. However, Omori (2006) also argues that there is a secret order of jobs within the same job title. For instance, it is said that managers of personnel divisions, budgets and accounts divisions, and general affairs divisions in the Minister’s Secretariat at hierarchical rank 5 have better prospects of being promoted to top executive than other division managers. It is noteworthy that the job values of these three types of division managers are extremely high.

Kishi (2015) also points out the role of the heterogeneity of jobs in future career prospects, which is based on many interviews with active and retired officials, mainly from the Ministry of Finance. These face three gateways to the top executive in their careers: mid-30’s, mid-40’s, and mid-50’s. At each gateway, successful jobs are assigned to the most promising officials. How well qualified an official is for top executive depends mainly on their reputation with both insiders and outsiders of the ministry. This suggests informal early selection through lateral transfers within the same hierarchical rank, which is supported by our analysis.

Because it seems a reasonable conjecture that organizations utilize movements within the seemingly same hierarchical rank for several purposes, it would be possible that the

great heterogeneity of jobs within the apparently same hierarchical rank can be found in other institutions. Because the method provided in this paper can be applicable for any organization that has a clear career goal of promotion, it would be useful for systematically uncovering a silent feature of career movements. Hopefully, it can help provide further important evidence about internal labor markets.

## 7 Appendix

### 7.1 Assignment of Hierarchical Ranks

This section discusses the detailed procedures for the assignment of hierarchical ranks. Firstly, we select the 19 major titles from the 178 different titles in the internal bureaus of the MLIT and the four ministries antecedent to the MLIT.<sup>11</sup> The major titles are the 18 titles that account for at least 0.5 percent of the observations with job titles, as well as the top title to which one of the 18 titles are moved. These major titles cover 87.4 percent of the total observations with internal job titles.

Using the sample of job histories with recall data, we construct the transition matrix to present moves between jobs with the major titles in the internal bureaus. Table A.1 shows the matrix. Because the names of the lowest-rank titles are blank in our data set, the titles that should be categorized at Rank 1 do not appear in the transition matrix. The earliest jobs are, however, moved only to Title A within the major titles, and no one enters this title from the other titles. Thus, it is natural to categorize Title A as Rank 2. The moves from Title A are then to Titles B, C, and D in the internal bureaus, save transfers at the same title (A) and transfers to external organizations, so these three titles are categorized as Rank 3. Iterating this process, the major titles can be classified into the seven ranks. And we assign Rank 1 to the first job for each official by taking advantage of the fact that there is a single port of entry for new graduates in

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<sup>11</sup>We first focus on the job titles in the internal bureaus of MLIT. This is because there are a great variety of external organizations in the data set and because the rank of one title in an internal bureau is likely to be different from that of the same title in an external organization.

the ministry.

<< Table A.1 here >>

Next we assign appropriate ranks to the jobs with titles other than the major ones based on the transition patterns between titles. As discussed, it is common to exchange officials between the central government and other organizations. Hence, we need to assign a rank to a job in other organizations. One difficulty is that the same title appears not only in the internal bureaus of the MLIT but also in the external organizations. As it is likely that the same title in different external organizations has a different role, we allow that a job title in one external organization can be at different rank from the same title in another external organization. We assign a unique title if an official's title is blank or an official is studying abroad. In the end, we have 1,236 different titles except for the major ones to assign hierarchical ranks.

There is a caveat. Because we have many minor titles not only in the internal bureaus but also in an external organization, we must extrapolate the ranks of some minor titles using a procedure not prescribed in Baker, Gibbs, and Holmstrom (1994). Suppose that an official is appointed to a position  $X$  that has an unknown rank  $x$ . Suppose that s/he has spent  $t_1$  years to be appointed to the position since s/he had been appointed to a different position that has Rank  $n$ . Suppose also that s/he is appointed to a new position that has Rank  $m$  in  $t_2$  years later. The estimated rank  $x$  of the position  $X$  is the weighted average of the two known ranks:

$$x = \frac{t_2 n + t_1 m}{t_1 + t_2}.$$

This measure reflects the relative distance between the two positions with known ranks: if  $t_1 < t_2$ , then the rank of the position  $X$  should be relatively closer to Rank  $n$ . Because we can observe several officials who were appointed to some position  $X$ , we assign the closest integer to the average of  $x$  over all officials belonging to position  $X$  as the hierarchical rank of this position.

There are some officials belonging to position  $X$  but we are unable to calculate their weighted average because we are unable to locate the two positions with known



rank needed for this calculation. To assign the rank to these positions, we conduct the following iteration. We first estimate the hierarchical rank of minor titles that we can calculate using the weighted average for all officials belonging to only major titles. Because this increases the number of positions that can be utilized to calculate the weighted average for some officials, we iterate this procedure until there is no job that we can assign a rank using this procedure. In the second round, we conduct the same procedure for the minor titles that we can calculate a weighted average for the 90 percent of officials. We repeat this iteration by changing the criterion from 90 percent to 80, 70, and then 66 percent. This iteration allows us to assign a rank to 86.4 percent of titles.

Even when iterating this procedure, we cannot estimate the ranks of some titles if they move to retirement or if there is no title to which they are moved in the next period. For each official we set  $x = \text{rank of the job in the previous period} + 0.5$  in the former case and  $x = \text{rank of the job in the previous period}$  in the latter case. Then we assign the closest integer to the average of  $x$  across officials to the rest of the titles.

As a result of the process stated in this subsection, all job titles are successfully categorized into eight hierarchical ranks, which are consistent with the ranks of standard job titles prescribed by the cabinet ordinance. We consider that jobs at Ranks 7 and 8 in the internal bureaus of all ministries can be regarded as top executives. This is because Director-General, Title Q in Table A.1, at Rank 7 has the ultimate authority and responsibility for each policy field under the jurisdiction of each bureau that is the primary department of the central offices in the ministry.

## 7.2 Comparison Between Samples

In Section 3.1, we discuss the patterns of promotion and demotion based on the transition matrix between the hierarchical ranks using the sample of complete job histories for middle- or high-rank managers. In Section 4, we discuss the distribution and transition of job values using the same sample. In this section, we reveal the robustness of the result even when using the sample of job histories with recall data.

Table A.2 details the transition matrix between the hierarchical ranks using the sample of job histories with recall data. Figure A.1 shows the distribution of job values calculated using the same sample. The results are almost the same at Rank 4 or higher as those using the sample of complete job histories. But we need to be careful about the values for the jobs at Rank 3 or lower because the job history in the early career stage is partly omitted.

<< Table A.2 here >>

<< Figure A.1 here >>

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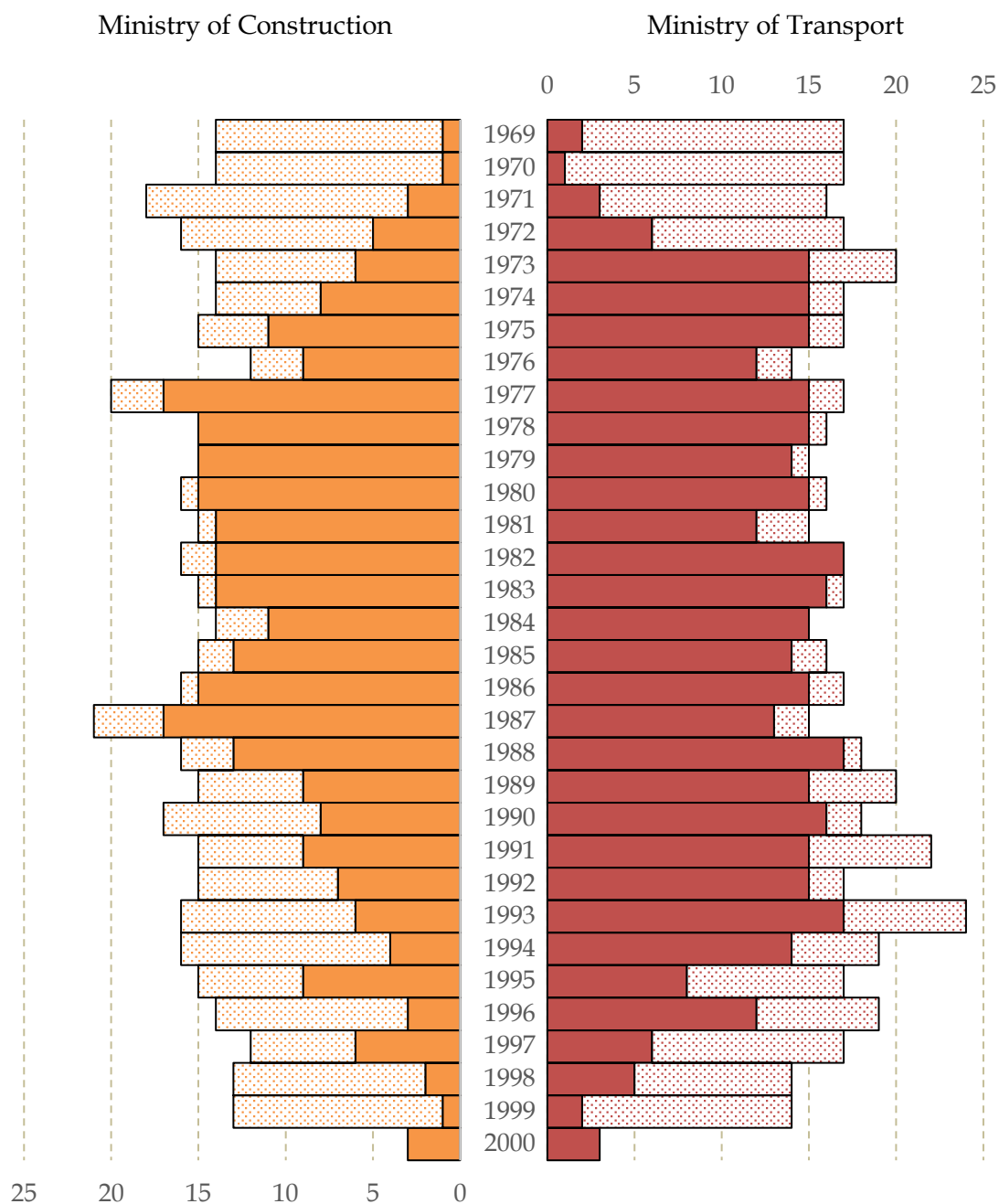
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Figure 1. Number of officials by year of entry



Notes: The darker shaded areas are officials included in the dataset and the lighter shaded areas are those not captured in the dataset.

Source: National Personnel Authority annual reports.

Table 1. Standard job titles

| Rank | Standard title            | (in Japanese)         |
|------|---------------------------|-----------------------|
| 8    | Vice-Minister             | ( <i>Jimu-Jikan</i> ) |
| 7    | Director-General          | ( <i>Kyokucho</i> )   |
| 6    | Director                  | ( <i>Bucho</i> )      |
| 5    | Section Manager           | ( <i>Kacho</i> )      |
| 4    | Office Manager            | ( <i>Sitsucho</i> )   |
| 3    | Assistant Section Manager | ( <i>Kacho-Hosa</i> ) |
| 2    | Chief Official            | ( <i>Kakaricho</i> )  |
| 1    | Official                  | ( <i>Kakariin</i> )   |

Source: “Cabinet Ordinance on Standard Job Titles”, March 6, 2009.



Table 2. Transition matrix for hierarchical ranks

| Current<br>rank | Next rank |      |      |      |      |      | Exit | Total |
|-----------------|-----------|------|------|------|------|------|------|-------|
|                 | 3         | 4    | 5    | 6    | 7    | Top  |      |       |
| 3               | 81.5      | 14.1 | 3.3  | -    | -    | -    | 1.1  | 100   |
| 4               | 0.3       | 88.6 | 11.0 | 0.0  | -    | -    | 0.1  | 100   |
| 5               | 0.1       | 0.7  | 93.1 | 5.4  | -    | 0.1  | 0.7  | 100   |
| 6               | 0.1       | -    | 1.0  | 84.3 | 0.4  | 6.1  | 8.2  | 100   |
| 7               | -         | -    | -    | 8.3  | 70.8 | 12.5 | 8.3  | 100   |
| Top executive   | -         | -    | -    | 1.4  | 0.3  | 84.4 | 13.9 | 100   |
| Total           | 0.9       | 24.9 | 48.5 | 16.4 | 0.3  | 6.4  | 2.6  | 100   |

Notes: This table provides the transition matrix for the hierarchical ranks using the complete job histories for middle or higher-ranked managers. - denotes zero transition probability. Moves within a box are stays, moves to the right promotions, and moves to the left demotions.

Table 3. Distribution of hierarchical ranks by tenure

| Hierarchical rank |  | Tenure |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|-------------------|--|--------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
|                   |  | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |  |
| Top executive     |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 7                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 6                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 5                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 4                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 3                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 2                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 1                 |  |        |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

Notes: This table details the percentage of officials at each hierarchical rank for given years of tenure using the sample of job histories with recall data for those entering the ministry between 1974 and 1980. The sample accounts for 87.2 percent of all officials from the same cohort and all have more than 35 years of tenure.

Table 4. Exit behavior of officials

## (A) The timing of retirement

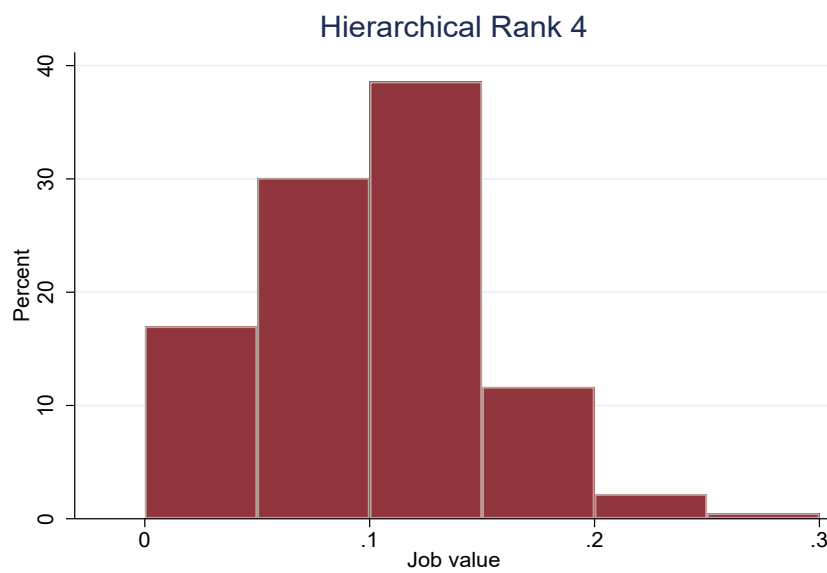
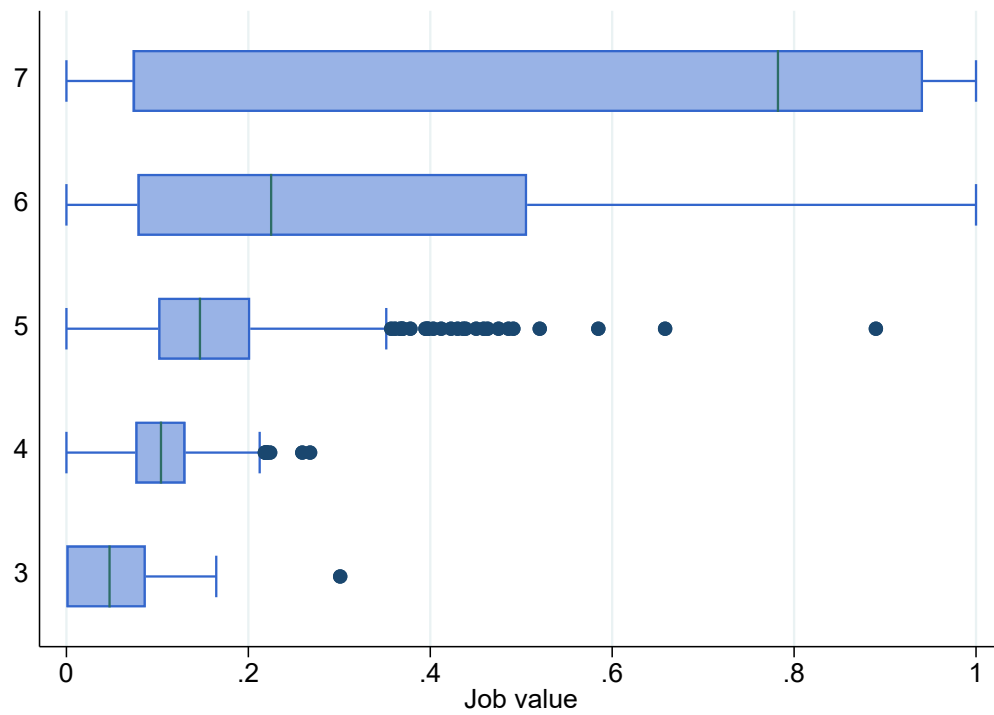
|                        |               | Tenure at retirement |    |    |    |    |    |    |    |    |     | Total |
|------------------------|---------------|----------------------|----|----|----|----|----|----|----|----|-----|-------|
|                        |               | 29-                  | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38+ |       |
| Last hierarchical rank | 4-            | 1                    | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0  | 0   | 3     |
|                        | 5             | 7                    | 1  | 9  | 5  | 0  | 2  | 5  | 1  | 0  | 1   | 31    |
|                        | 6             | 0                    | 7  | 23 | 24 | 11 | 28 | 20 | 12 | 6  | 0   | 131   |
|                        | 7             | 0                    | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 0   | 2     |
|                        | Top executive | 0                    | 0  | 2  | 2  | 13 | 16 | 10 | 15 | 13 | 17  | 88    |
| Total                  |               | 8                    | 8  | 34 | 31 | 25 | 47 | 36 | 29 | 19 | 18  | 255   |

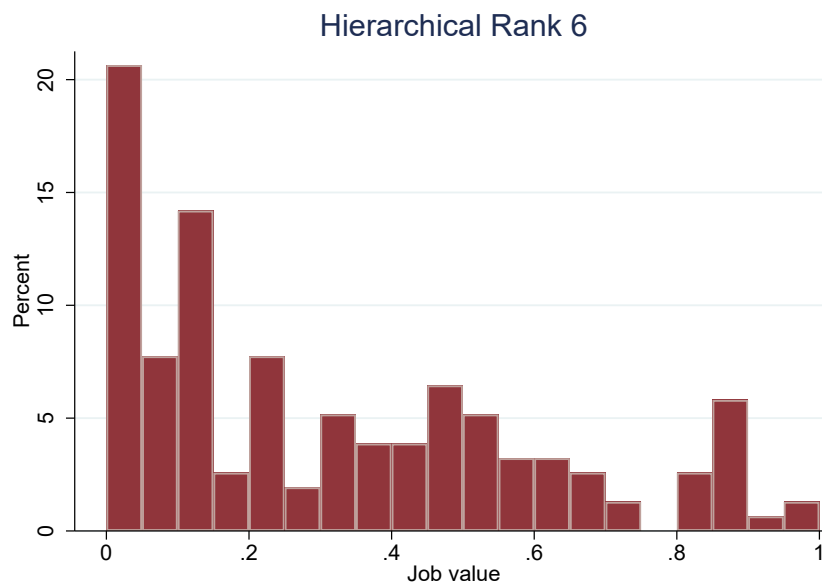
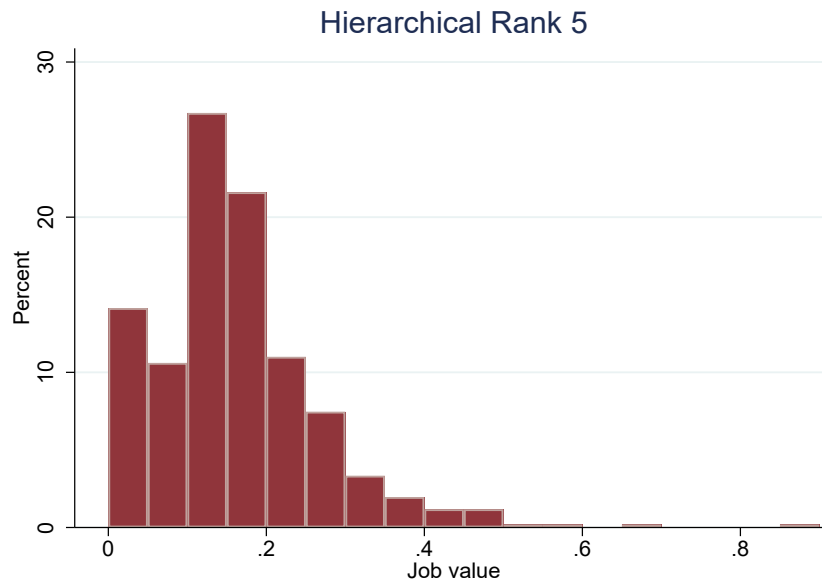
## (B) Retirement at Rank 6

|                               |    | Tenure at retirement |    |    |    |    |    |    |    | Total |
|-------------------------------|----|----------------------|----|----|----|----|----|----|----|-------|
|                               |    | 30                   | 31 | 32 | 33 | 34 | 35 | 36 | 37 |       |
| Tenure at promotion to Rank 6 | 25 | 0                    | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 1     |
|                               | 27 | 0                    | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 3     |
|                               | 28 | 0                    | 3  | 8  | 1  | 3  | 1  | 0  | 0  | 16    |
|                               | 29 | 7                    | 4  | 7  | 2  | 5  | 3  | 6  | 0  | 34    |
|                               | 30 | 0                    | 13 | 3  | 3  | 4  | 5  | 2  | 3  | 33    |
|                               | 31 | 0                    | 0  | 5  | 3  | 4  | 6  | 3  | 2  | 23    |
|                               | 32 | 0                    | 0  | 0  | 2  | 7  | 2  | 1  | 1  | 13    |
|                               | 33 | 0                    | 0  | 0  | 0  | 5  | 0  | 0  | 0  | 5     |
|                               | 34 | 0                    | 0  | 0  | 0  | 0  | 2  | 0  | 0  | 2     |
|                               | 35 | 0                    | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 1     |
| Total                         |    | 7                    | 23 | 24 | 11 | 28 | 20 | 12 | 6  | 131   |

Notes: Panel (A) details the number of officials who have retired at each hierarchical rank of their last job by tenure at retirement. Panel (B) shows the timing of retirement only for those who have retired at Rank 6 in relation to tenure at promotion to the rank. Both tables use the sample of complete job histories for middle or higher-ranked managers.

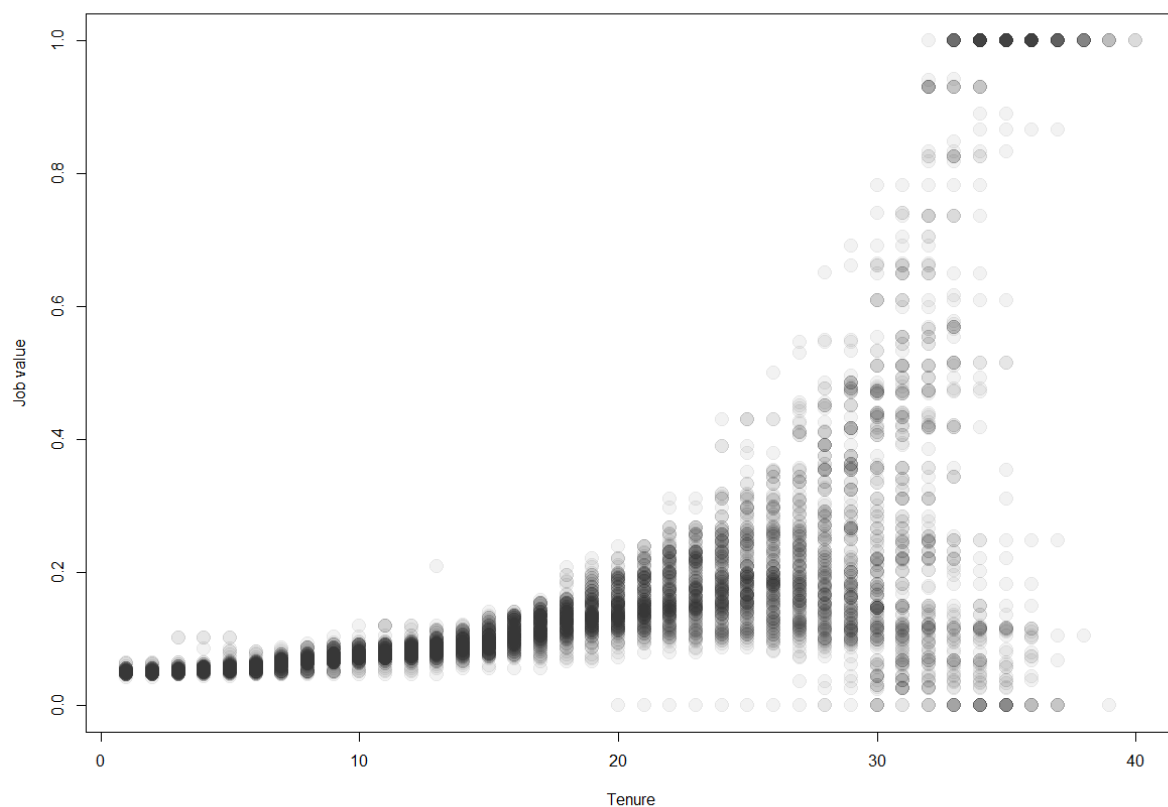
Figure 2. Distribution of job values within the same hierarchical rank





Notes: The boxplot and histograms detail the distribution of job values calculated using the sample of complete job histories for middle or higher-ranked managers by hierarchical rank.

Figure 3. Distribution of job values by tenure



Notes: This figure details the distribution of job values. Darker points identify that more officials belong to that job value. The job values use the sample of job histories with recall data for those entering the ministry between 1974 and 1980. The sample accounts for 87.2 percent of all officials from the same cohort and all have more than 35 years of tenure.



Table 6. Transition matrix between value ranks

|                               | Current<br>rank | Next rank |      |      |      |      |      | Exit | Total |
|-------------------------------|-----------------|-----------|------|------|------|------|------|------|-------|
|                               |                 | 1         | 2    | 3    | 4    | 5    | Top  |      |       |
| $0 \leq \text{Value} < 0.2$   | 1               | 93.5      | 4.0  | 0.3  | 0.0  | 0.0  | 0.1  | 2.1  | 100   |
| $0.2 \leq \text{Value} < 0.4$ | 2               | 8.4       | 82.8 | 5.5  | 1.1  | 0.5  | 0.5  | 1.3  | 100   |
| $0.4 \leq \text{Value} < 0.6$ | 3               | 4.7       | 5.3  | 75.9 | 4.3  | 4.1  | 4.1  | 1.5  | 100   |
| $0.6 \leq \text{Value} < 0.8$ | 4               | 3.1       | 1.2  | 5.0  | 72.7 | 7.5  | 10.6 | -    | 100   |
| $0.8 \leq \text{Value} < 1$   | 5               | -         | -    | 1.2  | 0.6  | 72.3 | 25.4 | 0.6  | 100   |
| Value = 1 Top executive       |                 | 0.7       | -    | -    | -    | 0.6  | 83.6 | 15.1 | 100   |
|                               | Total           | 65.0      | 18.1 | 5.4  | 1.6  | 1.7  | 5.6  | 2.6  | 100   |

Notes: This table details the transition matrix among the value ranks using the sample of complete job histories for middle or higher-ranked managers. The value ranks are classified into quintiles of job values. - denotes zero transition probability.



Table 7. The effect of duration in the previous rank on the future possibility of promotion

|                                              | Hierarchical rank     |                       | Value rank            |                       |
|----------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                                              | Full sample           | Subsample             | Full sample           | Subsample             |
|                                              | (1)                   | (2)                   | (3)                   | (4)                   |
| Tenure in the previous rank $TP$             | 0.0037<br>(0.014)     | 0.011<br>(0.015)      | -0.024**<br>(0.012)   | -0.025**<br>(0.013)   |
| Demotion dummy $D$                           | 0.33<br>(0.25)        | 0.27<br>(0.26)        | 0.54***<br>(0.16)     | 0.49***<br>(0.16)     |
| Interaction term $TP \times D$               | -0.047<br>(0.075)     | -0.043<br>(0.077)     | 0.072**<br>(0.034)    | 0.071**<br>(0.034)    |
| Tenure in the current rank $TC$              | -0.021<br>(0.041)     | -0.011<br>(0.043)     | 0.13***<br>(0.044)    | 0.13***<br>(0.046)    |
| Squared of tenure in the current rank $TC^2$ | 0.014***<br>(0.0044)  | 0.013***<br>(0.0045)  | -0.0083<br>(0.0063)   | -0.0081<br>(0.0064)   |
| Tenure in the ministry $T$                   | 0.60***<br>(0.098)    | 0.62***<br>(0.10)     | 0.83***<br>(0.11)     | 0.87***<br>(0.13)     |
| Squared of Tenure in the ministry $T^2$      | -0.011***<br>(0.0018) | -0.012***<br>(0.0018) | -0.016***<br>(0.0020) | -0.017***<br>(0.0023) |
| Observations                                 | 4802                  | 4300                  | 3146                  | 2943                  |
| Pseudo R-squared                             | 0.065                 | 0.061                 | 0.053                 | 0.053                 |

Notes: This table details the estimation results of the ordered probit model. Columns (1) and (3) provide the results using the sample of complete job histories for middle or higher-ranked managers between 2003 and 2015. Columns (2) and (4) show the results using the subsample of officials entering the ministries between 1974 and 1988, which covers 88.3 percent of all officials in the same cohort. All specifications include current rank and half-year dummies, education, and the ministry an official joined. Standard errors in parentheses are heteroscedasticity-robust and clustered at the individual level. \*, \*\*, and \*\*\* denote statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Table 8. Relationship between achievement in early career and current rank

|                                          | Current hierarchical rank |                     |                     |                     |                     |                     |                     |                     |
|------------------------------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                          | (1)                       | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 |
| Being Rank 2 at 5 years of tenure        | 0.0052<br>(0.027)         |                     |                     |                     | 0.025<br>(0.027)    |                     |                     |                     |
| Being Rank 3 at 10 years of tenure       |                           | -0.0091<br>(0.055)  |                     |                     |                     | -0.011<br>(0.053)   |                     |                     |
| Being Rank 4 at 15 years of tenure       |                           |                     | -0.056**<br>(0.026) |                     |                     |                     | -0.057**<br>(0.026) |                     |
| Being Rank 5 at 20 years of tenure       |                           |                     |                     | 0.11**<br>(0.047)   |                     |                     |                     | 0.090*<br>(0.048)   |
| Graduating in Law at University of Tokyo | 0.017<br>(0.024)          | 0.030<br>(0.026)    | 0.023<br>(0.024)    | 0.014<br>(0.024)    |                     |                     |                     |                     |
| Tenure                                   | 0.15***<br>(0.0043)       | 0.15***<br>(0.0043) | 0.15***<br>(0.0042) | 0.15***<br>(0.0038) | 0.15***<br>(0.0042) | 0.15***<br>(0.0043) | 0.15***<br>(0.0042) | 0.15***<br>(0.0038) |
| Observations                             | 7497                      | 6946                | 7295                | 7494                | 7788                | 7015                | 7385                | 7715                |
| Adjusted R-squared                       | 0.587                     | 0.584               | 0.589               | 0.589               | 0.584               | 0.585               | 0.589               | 0.592               |

|                                                     | Current value rank  |                     |                     |                     |                     |                     |                      |                      |                     |                     |                     |                     |                     |                      |                      |                      |
|-----------------------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|                                                     | (1)                 | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                  | (8)                  | (9)                 | (10)                | (11)                | (12)                | (13)                | (14)                 | (15)                 | (16)                 |
| Being in top 50% in job value at 5 years of tenure  | 0.095<br>(0.062)    |                     |                     |                     |                     |                     |                      |                      | 0.11*<br>(0.061)    |                     |                     |                     |                     |                      |                      |                      |
| Job value at 5 years of tenure                      |                     | 3.46<br>(4.07)      |                     |                     |                     |                     |                      |                      |                     | 4.66<br>(4.11)      |                     |                     |                     |                      |                      |                      |
| Being in top 50% in job value at 10 years of tenure |                     |                     | 0.0065<br>(0.060)   |                     |                     |                     |                      |                      |                     |                     | 0.011<br>(0.060)    |                     |                     |                      |                      |                      |
| Job value at 10 years of tenure                     |                     |                     |                     | 1.25<br>(3.40)      |                     |                     |                      |                      |                     |                     |                     | 1.13<br>(3.48)      |                     |                      |                      |                      |
| Being in top 50% in job value at 15 years of tenure |                     |                     |                     |                     | 0.018<br>(0.064)    |                     |                      |                      |                     |                     |                     |                     | 0.033<br>(0.064)    |                      |                      |                      |
| Job value at 15 years of tenure                     |                     |                     |                     |                     |                     | 3.14*<br>(1.82)     |                      |                      |                     |                     |                     |                     |                     | 3.79**<br>(1.76)     |                      |                      |
| Being in top 50% in job value at 20 years of tenure |                     |                     |                     |                     |                     |                     | 0.52***<br>(0.048)   |                      |                     |                     |                     |                     |                     |                      | 0.53***<br>(0.047)   |                      |
| Job value at 20 years of tenure                     |                     |                     |                     |                     |                     |                     |                      | 8.85***<br>(0.88)    |                     |                     |                     |                     |                     |                      |                      | 8.78***<br>(0.84)    |
| Graduating in Law at University of Tokyo            | 0.12*<br>(0.062)    | 0.13**<br>(0.062)   | 0.13**<br>(0.062)   | 0.13**<br>(0.062)   | 0.12*<br>(0.061)    | 0.11*<br>(0.061)    | 0.073<br>(0.055)     | 0.054<br>(0.055)     |                     |                     |                     |                     |                     |                      |                      |                      |
| Tenure                                              | 0.10***<br>(0.0096) | 0.10***<br>(0.0096) | 0.11***<br>(0.0094) | 0.11***<br>(0.0094) | 0.10***<br>(0.0094) | 0.10***<br>(0.0094) | 0.084***<br>(0.0083) | 0.076***<br>(0.0080) | 0.11***<br>(0.0095) | 0.10***<br>(0.0095) | 0.11***<br>(0.0093) | 0.11***<br>(0.0093) | 0.10***<br>(0.0093) | 0.100***<br>(0.0094) | 0.084***<br>(0.0081) | 0.076***<br>(0.0079) |
| Observations                                        | 6173                | 6173                | 7096                | 7096                | 7334                | 7334                | 7494                 | 7494                 | 6221                | 6221                | 7165                | 7165                | 7424                | 7424                 | 7715                 | 7715                 |
| Adjusted R-squared                                  | 0.184               | 0.183               | 0.171               | 0.171               | 0.164               | 0.167               | 0.232                | 0.249                | 0.180               | 0.177               | 0.167               | 0.167               | 0.159               | 0.163                | 0.232                | 0.249                |

Notes: This table details the estimation result of the linear model using the sample of job histories with recall data for officials entering the ministries between 1974 and 1988 and covers 88.3 percent of all officials in the same cohort. All specifications include half-year dummies and the ministry an official joined. Standard errors in parentheses are heteroscedasticity-robust and clustered at the individual level. \*, \*\*, and \*\*\* denote statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Table 9. Relationship between educational background and early career achievement

|                                          | Hierarchical rank               |                                  |                                  |                                  | Job value                        |                                   |                                   |                                   |
|------------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|                                          | Rank at<br>5 years<br>of tenure | Rank at<br>10 years<br>of tenure | Rank at<br>15 years<br>of tenure | Rank at<br>20 years<br>of tenure | Value at<br>5 years<br>of tenure | Value at<br>10 years<br>of tenure | Value at<br>15 years<br>of tenure | Value at<br>20 years<br>of tenure |
| Graduating in Law at University of Tokyo | 0.050<br>(0.048)                | 0.036<br>(0.031)                 | -0.032<br>(0.052)                | 0.020<br>(0.040)                 | 0.0013*<br>(0.00077)             | -0.00013<br>(0.0012)              | 0.0040**<br>(0.0017)              | 0.0059<br>(0.0036)                |
| Entering Ministry of Transport           | 0.57***<br>(0.047)              | 0.14***<br>(0.032)               | 0.18***<br>(0.048)               | 0.18***<br>(0.037)               | 0.0014<br>(0.00088)              | -0.0017<br>(0.0010)               | 0.0088***<br>(0.0017)             | 0.014***<br>(0.0035)              |
| Observations                             | 406                             | 376                              | 393                              | 405                              | 321                              | 383                               | 395                               | 405                               |
| Adjusted R-squared                       | 0.267                           | 0.056                            | 0.030                            | 0.048                            | 0.011                            | 0.003                             | 0.072                             | 0.038                             |

Notes: This table details the result of the linear model using the sample of job histories with recall data for officials entering the ministries between 1974 and 1988 and covers 88.3 percent of all officials in the same cohort. Heteroscedasticity-robust standard errors in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Table A.1. Transition matrix between major job titles

| Rank     | Title | 2    | 3    |      |      | 4    |      |      |      | 5    |      | 6    |      |      | 7    | 8    |      | Other | External | Exit | Total |
|----------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|----------|------|-------|
|          |       | A    | B    | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    | N    | O    | P    | Q     | R        | S    |       |
| 2        | A     | 78.3 | 1.2  | 1.7  | 0.6  | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -        | -    | -     |
| 3        | B     | -    | 80.0 | -    | 0.7  | 0.5  | 1.1  | 1.7  | 0.2  | 0.0  | 0.6  | 0.1  | -    | -    | -    | -    | -    | -     | -        | -    | -     |
|          | C     | -    | 5.1  | 70.2 | 10.4 | 0.3  | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -        | -    | -     |
|          | D     | -    | 1.6  | 0.5  | 81.1 | 0.5  | 0.1  | -    | 0.1  | 0.1  | 0.6  | 0.6  | -    | -    | -    | -    | -    | -     | -        | -    | -     |
|          | E     | -    | 0.2  | -    | 0.3  | 71.4 | -    | -    | 0.2  | -    | 1.1  | 0.4  | 5.2  | 0.5  | -    | -    | -    | -     | -        | -    | -     |
| 4        | F     | -    | 0.5  | -    | -    | 1.9  | 64.9 | -    | -    | 0.5  | 6.6  | -    | -    | -    | -    | -    | -    | -     | -        | -    | -     |
|          | G     | -    | -    | -    | -    | -    | 2.0  | 59.2 | -    | -    | 25.9 | 5.4  | -    | -    | -    | -    | -    | -     | -        | -    | -     |
|          | H     | -    | 2.4  | -    | -    | 1.2  | -    | -    | 65.9 | -    | -    | -    | 1.2  | -    | -    | -    | -    | -     | -        | -    | -     |
|          | I     | -    | -    | -    | -    | 9.2  | -    | -    | -    | 63.2 | 2.6  | 1.3  | -    | 1.3  | -    | -    | -    | -     | -        | -    | -     |
| 5        | J     | -    | -    | -    | -    | 8.5  | 0.1  | -    | 0.1  | 0.8  | 71.8 | 1.4  | 1.4  | 0.3  | -    | -    | -    | -     | -        | -    | -     |
|          | K     | -    | 0.8  | -    | 2.5  | 5.0  | -    | -    | -    | 1.7  | 14.2 | 56.7 | 5.0  | 1.7  | -    | -    | -    | -     | -        | -    | -     |
|          | L     | -    | -    | -    | -    | 0.4  | -    | -    | -    | -    | -    | 0.0  | 79.8 | 2.0  | 2.1  | 0.8  | 0.5  | -     | -        | -    | -     |
|          | M     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 0.3  | 24.9 | 61.3 | 1.0  | -    | -    | -     | -        | -    | -     |
| 6        | N     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 67.7 | 2.7  | 6.3  | 2.5   | -        | -    | -     |
|          | O     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 2.3  | 67.4 | 11.6 | 3.1   | -        | -    | -     |
|          | P     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 0.5  | 0.5  | 64.4 | 6.7   | -        | -    | -     |
|          | Q     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 72.7  | 5.0      | -    | -     |
| 8        | R     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 69.2     | 11.5 | -     |
|          | S     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -        | 50.0 | -     |
| Other    |       | 3.1  | 1.1  | 0.2  | 0.5  | 1.1  | 0.2  | 0.1  | 0.0  | 0.1  | 1.0  | 0.1  | 0.7  | 0.1  | 0.1  | 0.0  | 0.0  | 0.5   | 0.2      | -    | -     |
| External |       | 0.3  | 1.7  | 0.4  | 1.4  | 1.3  | 0.2  | 0.1  | 0.1  | 0.1  | 0.5  | 0.0  | 2.1  | 0.3  | 0.3  | 0.1  | 0.1  | 0.1   | 0.0      | -    | -     |
| Total    |       | 3.1  | 6.0  | 1.0  | 5.2  | 4.0  | 0.6  | 0.4  | 0.2  | 0.2  | 2.4  | 0.3  | 7.5  | 0.8  | 1.0  | 0.3  | 0.5  | 0.6   | 0.2      | 0.1  | 15.2  |
|          |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       | 49.8     | 0.7  | 100   |

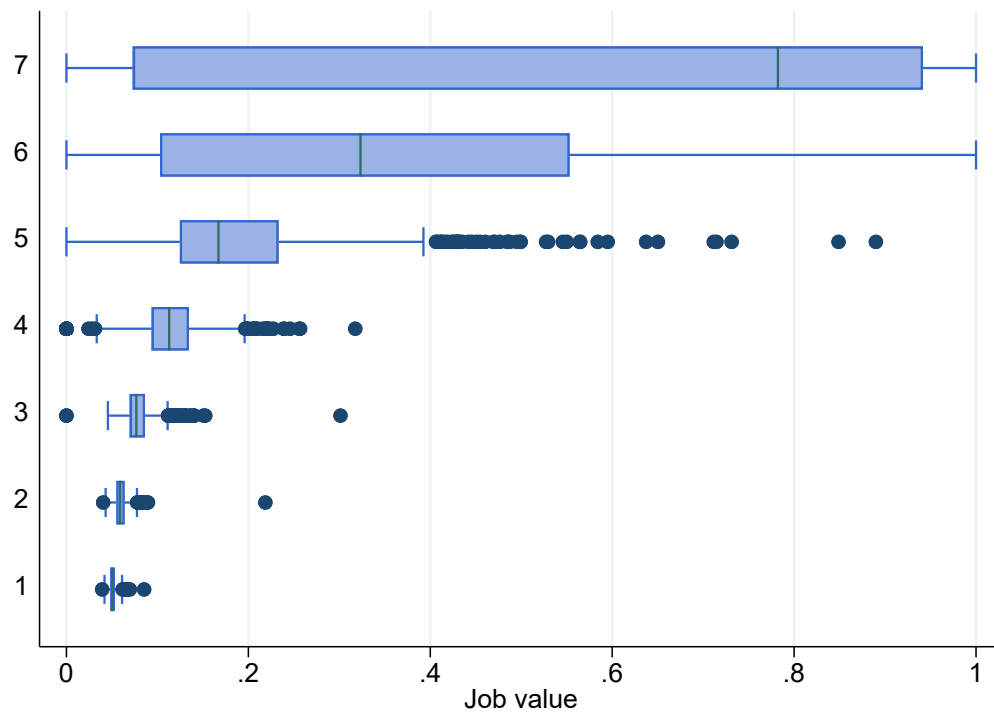
Notes: This table details the transition matrix among the major titles selected from the different titles in the internal bureaus of the ministry using the sample of job histories with recall data. "Other" are titles other than the major titles in the internal bureaus, and "External" are all titles in external organizations. - denotes zero transition probability. Moves within a box are stays, moves to the right (except Other and External) promotions, and moves to the left demotions.

Table A.2. Transition matrix between hierarchical ranks

| Current<br>rank | Next rank |      |      |      |      |      |      |      | Exit | Total |
|-----------------|-----------|------|------|------|------|------|------|------|------|-------|
|                 | 1         | 2    | 3    | 4    | 5    | 6    | 7    | Top  |      |       |
| 1               | 91.2      | 7.5  | 1.4  | 0.0  | -    | -    | -    | -    | -    | 100   |
| 2               | -         | 86.5 | 13.3 | 0.2  | -    | -    | -    | -    | -    | 100   |
| 3               | -         | 0.2  | 93.0 | 6.8  | 0.1  | -    | -    | -    | 0.0  | 100   |
| 4               | -         | -    | 0.7  | 91.5 | 7.7  | 0.1  | -    | -    | 0.0  | 100   |
| 5               | -         | -    | 0.1  | 1.0  | 94.0 | 4.5  | -    | 0.1  | 0.5  | 100   |
| 6               | -         | -    | 0.1  | -    | 1.0  | 85.2 | 0.3  | 6.3  | 7.1  | 100   |
| 7               | -         | -    | -    | -    | -    | 8.3  | 70.8 | 12.5 | 8.3  | 100   |
| Top executive   | -         | -    | -    | -    | -    | 1.3  | 0.3  | 85.5 | 12.9 | 100   |
| Total           | 14.8      | 9.3  | 25.7 | 21.8 | 20.5 | 5.2  | 0.1  | 1.9  | 0.7  | 100   |

Notes: This table details the transition matrix among the hierarchical ranks using the sample of job histories with recall data. - denotes zero transition probability. Moves within a box are stays, moves to the right promotions, and moves to the left demotions.

Figure A.1. Distribution of job values within the same hierarchical rank



Notes: The boxplot provides the distribution of job values calculated using the sample of job histories with recall data by hierarchical rank.