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The Signaling Interaction of Promotion and
School Mediation: Theory and Evidence

Susumu Cato

(University of Tokyo)

Hiroshi Ishida

(University of Tokyo)

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Susumu Cato
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The Signaling Interaction of Promotion and School Mediation: Theory and Evidence

Abstract

This paper examines the long-term effects of school mediation on career progressions in the Japanese labor market through both theoretical modeling and empirical investigation. We extend Waldman's (1984) asymmetric employer learning model to analyze how school mediation influences career trajectories. Our model predicts that school mediation has enduring effects beyond initial job placement, particularly improving promotion chances and wage dynamics over a ten-year horizon. We test these predictions using the Japanese Life Course Panel Surveys. The findings support our theoretical framework, albeit with important gender distinctions. The empirical results for male workers align closely with the model's predictions regarding both promotion probabilities and wage trajectories. However, the findings for female workers reveal a more nuanced picture: while women hired through school mediation earn higher average incomes, they do not experience the same promotional advantages predicted by the model. One possible explanation is that employers might apply different promotion criteria for men and women, potentially influenced by concerns about women's higher likelihood of leaving the firm after marriage or childbirth.

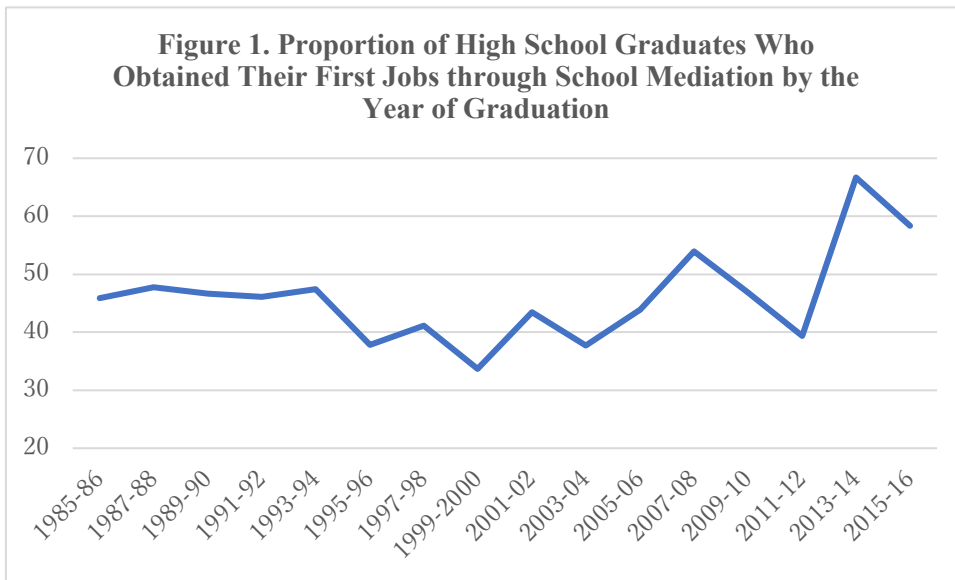
1. Introduction

The Japanese labor market possesses several distinctive characteristics, most notably its systematic approach to transitioning students from education to employment. A distinctive feature is the institutionalized linkage between schools, which develop human capital, and workplaces, which utilize it. Japanese high schools, in particular, serve as active intermediaries between their students and potential employers. This school-mediated system (*gakko-suisen seido*) operates through a structured process: companies submit job applications directly to high schools, which then organize and manage these opportunities. Students, rather than applying independently, pursue employment through their schools' established channels. This institutional arrangement effectively transforms schools into sophisticated job-matching platforms (Kariya and Rosenbaum, 1987, 1995; Kariya, 1991).

Established during Japan's period of rapid economic growth following World War II (Kariya, Sugayama, and Ishida, 2000), this system has demonstrated remarkable resilience and effectiveness. Although a decline in the system's use was observed in the 1990s (Honda, 2005), this trend did not persist. Figure 1 shows the proportion of high school graduates who obtained their first jobs through school mediation by their year of graduation.¹ This proportion includes only those who obtained employment after graduation. Despite technological advances and changing economic conditions, the proportion of high school graduates who use this system has not declined since the 2000s, showing its continued relevance in modern Japan's labor market.²

¹ The figure is derived from the Japanese Life Course Panel Surveys, which provide the data used for our empirical analysis. For detailed information about the surveys, please refer to the data description below.

² We note that while the proportion of high school graduates using this system has not declined in recent periods, the overall number of high school graduates entering the workforce has been decreasing, reflecting broader demographic and educational trends in Japan.



Research has identified several advantages of this school-mediated system for both employers and workers. Workers hired through school mediation tend to have lower turnover rates (Rosenbaum and Kariya, 1989), which reduces costly vacancy and recruitment processes for companies. For workers, the system provides significant advantages: it increases access to regular employment with relatively higher wages and improves chances of placement with larger firms (Ishida, 2023; Ogawa, 2021). The system’s effectiveness may stem from high school teachers’ unique position to assess students’ personalities and non-cognitive skills throughout their education. The school-mediated system operates through two distinct but potentially overlapping mechanisms: first, teachers leverage their knowledge of both students’ characteristics and company attributes to achieve optimal matching quality; second, teachers can identify and select students with higher levels of human capital based on their direct observations during the educational process.

However, the long-term implications of school mediation remain a subject of debate. While initial employment outcomes show clear differences, the theory of employer learning suggests that companies/employers gradually realize workers’ true abilities over time (Farber and Gibbons, 1996; Gibbons and Waldman, 1999; Altonji and Pierret, 2001). If the primary function of school mediation is improving the matching quality between workers and firms, initial wage differences might diminish as all workers eventually find well-matched positions. On the contrary, if the system effectively identifies and places students with higher human capital levels, these

differences might persist. Currently, there is no consensus on which of these mechanisms predominates.

In this paper, we use a signaling model to examine career differences between school graduates in organizations. In particular, we extend an asymmetric employer learning model established by Waldman (1984). His model has several distinguishable features. First, workers are assumed to have their innate abilities which cannot be observable to any employers at the beginning. Such abilities are realized after workers spend a certain amount of time under the employers. This means that employers learn about worker's abilities. In Waldman's model, this learning process is not symmetric. That is, only the employers who hire the workers can observe their abilities. On the other hand, the firms for which the workers do not work do not observe their abilities, while these firms observe the levels of human capital. Second, there are two types of tasks: simple tasks and advanced (or administrative) tasks. The employer decides which job to assign, but a switch from the former to the latter can be considered a promotion. A novel contribution of Waldman is to show the signaling effects of this promotion. Since advanced (or administrative) tasks are assumed to be dependent on innate abilities, the promotion can work as a signal of high abilities. This effect causes inefficiency of task assignment in organizations because the current employers might have an incentive to avoid offering a promotion to a high-ability worker even if it is efficient to assign the advanced task to this worker.

In this paper, we incorporate the possibility of school mediation into Waldman's model. In our model, high school graduates enter the labor market and obtain jobs with or without school mediation. We assume that there are two types of human capital and that, on average, workers with school mediation tend to have higher human capital levels than those without. These modifications to the model lead us to develop three testable hypotheses about the long-run differences between workers with and without school mediation: first, those with school mediation tend to be promoted earlier; second, wages of those with school mediation tend to be higher than those without, even after obtaining ten years of experience; and third, there is no significant difference between the two types of workers with regard to the turnover rate.

Subsequently, we offer empirical evidence by using the Japanese Life Course Panel Surveys (JLPS) to discuss the relevance of our hypotheses. Essentially, we observe that our hypotheses are not inconsistent with the empirical evidence. Specifically, the results for promotion probability and wages for male workers were found to be quite consistent with the results obtained by the three theoretical hypotheses. In contrast, this is not the case for female workers. In the case of female

workers, school mediation does not make a significant difference in promotion probability, although female workers with school mediation tend to have higher incomes throughout their careers, on average.

There are several series of related works. The first includes works on employer learning. As alluded to above, our model is an extension of Waldman's (1984) model, which explains the signaling effect of promotion; see also Waldman (2012) for a concise survey. Similarly to our approach, DeVaro and Waldman (2012) extend Waldman's model to incorporate the effect of schooling on promotion. More precisely, they introduce "schooling levels," which are publicly observed by all firms, while the innate ability is privately observable. By exploiting this model, DeVaro and Waldman (2012) offer very similar testable implications. Indeed, the schooling year in their model has a close role to school mediation in our model. However, a significant difference is that the level of schooling directly contributes to workers' productivity, while school mediation affects the average and variance of productivity. In a sense, school mediation indirectly contributes to workers' productivity. In our model, there are variations in the levels of human capital among workers hired through school mediation, focusing on the average career outcomes they are likely to achieve. Thus, the structure of the distribution, including concepts like second-order stochastic dominance, alongside the average, will be central to the analysis. There is no such problem in the DeVaro-Waldman model; they examine the direct effect of human capital on promotion and wage dynamics. In practice, an individual's level of human capital, even if observable to employers, cannot be fully observed by analysts outside the model. Consequently, it often becomes necessary to analyze this using categorical variables, such as the presence or absence of school mediation, which underscores the significance of our approach.

Another work that is close to ours is Owan's (2004) work, which incorporates workers' abilities or match qualities explicitly in his model with the signaling effect of promotion. Owan (2004) shows that the turnover rate is lower under late promotion policies, which explains the case for traditional Japanese organizations; see also Morita (2001, 2005), Ishida, Spilerman, and Su (1997), and Ishida, Su, and Spilerman (2002) for attempts to explain the difference between the Japanese and US organizations.

There is the other series of works, which conduct empirical works on school mediation. Indeed, there is a vast literature on this topic in the field of sociology. First, pioneering works by Rosenbaum and Kariya (1989) claim that there is an "informational linkage" between schools and employers because of school mediation; see also Kariya (1991) and Rosenbaum, Kariya, Settersten, and Maier (1990). That is,

they suggest that schools and employers exchange information to mitigate the work-entry problems of high-school graduates. Because of this linkage, Japan enjoys lower turnover rates of young workers. Ishida (2014) carefully examines the impact of school mediation on turnover rates, concluding that its effect in reducing turnover has gradually increased over time, becoming particularly pronounced after the 1990s. The view that school mediation still plays a major role in the labor market today was reinforced by Ishida (2023) and Ogawa (2021). Most of these studies address how school mediation makes a difference in the “adjustment period” immediately following entry into the workforce. On the other hand, we examine the relationship between school mediation and long-term outcomes, such as promotion.

The rest of this paper is organized as follows: Section 2 reviews the historical background and related works. Section 3 offers a basic model of signaling and presents our theoretical results. Section 4 shows our empirical evidence from the Japanese Life Course Panel Surveys. Section 5 concludes this paper.

2. Institutional Features of School-mediated System

Japan’s school-mediated job-matching system for high school graduates dates back to the immediate post-World War II period, predating the era of rapid economic growth (Kariya, Sugayama, and Ishida, 2000; Sugayama, 2011). Its primary purpose was to ensure a smooth transition from school to the labor market, particularly for graduates relocating from rural to urban areas after completing their education. While its role has evolved over time, the system remains essential, and its use by workers has not diminished, as noted earlier.

Japan’s school-mediated system has several distinct features. First, the process is highly regulated by the national government and follows a uniform schedule and application procedure nationwide for high school graduates seeking employment after their graduation in March each year. Starting on June 1, firms intending to hire high school students must submit job recruitment forms—detailing job nature, working conditions, and benefits—through the Public Employment Security Office, a government agency that assists workers in finding jobs. These forms are then distributed to high schools beginning July 1. After an internal selection process within schools, application materials and school recommendations are sent to employers starting September 5. Employers may then begin their selection process, including aptitude tests and interviews, from September 16. Following the selection process, firms are required

to notify high schools of the results and job offers immediately or within approximately ten days.

Second, the school-mediated system prohibits students from applying directly to firms. Instead, they must obtain a recommendation from their school. Students select their preferred companies from the job opportunities available at their school and can only apply to one company during the initial application round in September, following the “one-student-one-company” allocation rule. If students receive job offers from their first-choice employers, they are expected to accept them. If not, they enter subsequent rounds of the job matching process, during which they are introduced to other companies through school recommendations and participate in interviews until they secure job offers.

Third, schools are granted the authority to conduct internal selections. Since students can only apply to firms through school recommendations, schools regulate the application process by ensuring that no student receives multiple offers, adhering to the “one-student-one-company” allocation rule. This creates competition among students for desirable employment opportunities. To ensure fairness, schools typically use merit-based criteria to determine which student is recommended for each company. Grades and attendance records are the primary factors, with higher-performing students—both in terms of cognitive skills (grades) and non-cognitive skills like diligence (attendance)—ranking higher on the list. This meritocratic selection sends a clear message that serious engagement in school leads to better job opportunities. However, Hori (2016), based on a 2010 survey, suggests that merit-based selection has become less common. By the 2000s, approximately 40% of schools reportedly did not conduct pre-selection of students.

Fourth, the school-mediated system fosters strong connections between schools and companies. Some employers prefer hiring students from specific high schools, leading to repeated exchanges of recommendations and hiring between particular employers and schools. Once a relationship is established, employers develop trust in the schools’ recommendations and actively recruit students each year. In turn, schools strive to recommend students who meet the employers’ requirements. This long-term relationship benefits both parties, ensuring a stable supply of qualified candidates for employers and reliable employment opportunities for schools.

3. Theoretical Analysis

We use a simple two-period model ($t = 1, 2$), which is an extension of Waldman's (1984) model of signaling. In our model, when a worker is hired by a firm, the productivity (or performance) of the worker is dependent on his/her *innate ability*, *general human capital*, *task-specific human capital*, and *firm-specific human capital* accumulated within the firm. In a market, there are potentially a number of firms that try to hire workers who work for two periods.³ Here, all workers are assumed to be new high-school graduates. Each worker provides one unit of labor each period and offers it to the firm for which they work. Some workers are hired with school mediation, while others are not.

Each worker's innate ability is unknown at the beginning, and it is revealed asymmetrically to firms after period one. The employer who hires a worker can learn this worker's innate ability at the end of period one, but the other firms (outside employers) cannot observe it. That is, "asymmetric learning" holds for the innate ability. On the other hand, all employers can observe the levels of all types of human capital (thus, there is no room for learning). General human capital and task-specific human capital are accumulated in the high school period, while firm-specific human capital is accumulated within the firm after entering the job. General human capital and firm-specific human capital positively affect productivity no matter what kind of work the worker is engaged in, while task-specific human capital affects their productivity when they are assigned advanced and complicated tasks (admin tasks). Notably, firm-specific human capital is useful when workers work for the firm where they accumulate firm-specific human capital.

Now, we explain the aforementioned elements of the model more formally. Some characteristics are dependent on whether he/she is hired with school mediation. Let z be a variable for the hiring process, where $z = \emptyset$ means "he/she is *not* hired with school mediation" and $z = \sigma$ means "he/she is hired with school mediation." School mediation affects the mean and variance of human capital.

General human capital includes broad knowledge that is useful in any task. Its level of worker i is denoted by g_i , which is a non-negative number. On the other hand, task-specific human capital is not firm-specific, but it is effective only in an advanced task.⁴ Its level of worker i is denoted by h_i , which is a non-negative number. Let h^* be the highest possible value of task-specific human capital. We impose the following assumption.

³ For simplicity, we assume that one firm only employs one worker.

⁴ See Gibbons and Waldman (2004) for the concept of task-specific human capital.

Assumption 1. (i) \bar{g}_σ is higher than \bar{g}_\emptyset and \bar{h}_z is higher than \bar{h}_\emptyset , where $\bar{g}_\sigma = E[g_i|\sigma]$ and $\bar{h}_\sigma = E[h_i|\sigma]$. (ii) h_i for workers with school mediation has second-order stochastic dominance over that for workers without it.

The first clause (i) requires that workers with school mediation have higher general human capital and higher task-specific human capital levels on average. This is a natural assumption under the consideration that high schools select students who have higher human capital skills. Under the school-mediated system in Japan, high schools have long-term relationships with firms. Hence, it is reasonable to assume that high schools have an incentive to recommend students who achieve higher human capital levels. The second clause (ii) essentially requires that the variance of the distribution of h_i is smaller with school mediation. This implies that the selection by schools reduces risks.

Firm-specific human capital is accumulated after the workers enter their jobs. Its level is denoted by $s \in (0,1)$. Since firm-specific human capital is not associated with school education, it is independent of school mediation. Indeed, we assume that each worker constantly accumulates a certain level of firm-specific human capital.

Finally, we explain the worker i 's innate ability a_i ; this value is assumed to be a continuous variable. For simplicity, a_i is uniformly distributed over $[a_L, a_H]$, where a_H is higher than a_L , which is a non-negative value. Note that the average innate ability is given as follows:

$$\bar{a} = \frac{a_H + a_L}{2}$$

The ability is not firm-specific and, thus, directly affects the productivity in any firm. We assume that a_i is not observed at the beginning, and it is revealed to the firm that hires worker i in the first period.

Following Waldman's classical model, we assume that there are two tasks, α and β ; task α is a simple task, while task β is an advanced, complicated task (admin task). By our assumption, every worker starts from task α (see Assumption 2 below). The productivity under task α is independent of the innate ability, but it is affected by general human capital g_i . If the worker is hired by firm j at the beginning of period 1, the worker produces $y + g_i$ under task α at period 1. We assume that firm-specific human capital is accumulated during the first period. In period 2, this worker produces $(1 + s)y + g_i$ with task α if s/he stays in the first-period firm, where $s \in (0,1)$ represents the firm-specific human capital; when this worker leaves the first-period firm and is hired by another firm k , s/he produces $y + g_i$ because firm-specific human capital is useless in firm k .

Under task β , the worker produces $(1 + h_i)a_i + g_i$ at period 1. In period 2, the accumulation of firm-specific human capital is added to the term of productivity if the worker stays in the first-period firm. That is, the worker produces $(1 + s)(1 + h_i)a_i + g_i$ under task β at period 2. If the worker moves to another firm, $(1 + h_i)a_i$ is produced under task β in period 2. Notably, both g_i and h_i are known to all agents.

We impose the following assumption.

Assumption 2. $(1 + h^*)\bar{a} < y$.

Under this assumption, it is optimal to assign task α (simple task) to all workers for the firm as long as the innate ability is unknown. This is because, for any workers, the expected outcome $(1 + h_i)\bar{a} + g_i$ when task β is assigned is lower than that when task α is assigned (even if s/he has the highest possible human-capital level). Hence, task β is assigned only in period 2 (all workers are not necessarily promoted). Thus, there is no switch from task β to task α . We say that a worker is *promoted* if his/her task is switched from task α to task β .

Workers' performance levels are summarized in the following table.

Table 1. Outcomes/performances of workers

	Task α	Task β
Period 1	$y + g_i$	$(1 + h_i)a_i + g_i$
Period 2 (stay)	$(1 + s)y + g_i$	$(1 + s)(1 + h_i)a_i + g_i$
Period 2 (move to a new firm)	$y + g_i$	$(1 + h_i)a_i + g_i$

Let us solve this model by backward induction because we are interested in the subgame perfect equilibrium. Consider the decision-making in period 2. By assumption, firm j knows the worker's ability in addition to the levels of human capital. If there is no possibility of turnover, it is optimal to promote the worker if and only if

$$(1 + s)y + g_i < (1 + s)(1 + h_i)a_i + g_i,$$

which is equivalent to the following: $y < (1 + h_i)a_i$. That is, if the innate ability and task-specific human capital are sufficiently high, then promoting the worker becomes optimal. Even after the promotion, the wage is $y + g_i$, which corresponds to the expected output outside of the first-period firm (this worker is never assigned to task β in a new firm because of Assumption 2). However, this cannot be an equilibrium. Under this promotion-wage strategy of firm j , other firms will know that any workers who are

asked to work on task α have an innate ability higher than $y/(1 + h_i)$. The other firms will try to hire workers with higher innate skills. Thus, it is better for firm j to change the promotion strategy to keep this worker, who has already accumulated firm-specific human capital. Knowing the level of innate ability is also a sort of asset for this firm because it gives the firm a comparative advantage. As a result, firm j sets a higher cut-off level for promotion to exploit information that is available for firm j but not for the other firms; this mechanism is shown by the classical work of Waldman (1984).

Now, we examine what can be the best cut-off for firm j . Let a^* be the cutoff value of the innate ability for workers' promotion. That is, a worker is promoted (task β) if $a_i \geq a^*$; otherwise, task α is assigned. Note that this promotion yields the following net gain in output:

$$(1 + s)(1 + h_i)a_i - (1 + s)y = (1 + s)[(1 + h_i)a_i - y].$$

On the other hand, there can be an increase in the wage. Notably, the worker in task α obtains $y + g_i$. The promotion of this worker is a signal that shows his/her ability is higher than this cutoff. Since the innate ability is uniformly distributed, the conditional expectation of innate ability for promoted workers is given as follows:

$$\frac{a_H + a^*}{2}.$$

All firms in the market share this expected innate ability. Therefore, firm j pays the following:

$$(1 + h_i)\frac{a_H + a^*}{2} + g_i$$

because the promoted worker will leave firm j and join the other firms if the wage is lower than this level. Hence, the net increase of the wage by promotion is given as follows:

$$(1 + h_i)\frac{a_H + a^*}{2} - y.$$

Given this, the promotion occurs if and only if the net gain in output is higher than the net increase in wages, that is,

$$(1 + s)[(1 + h_i)a_i - y] > (1 + h_i)\frac{a_H + a^*}{2} - y.$$

For the workers *at* the cutoff level, the following equation holds:

$$(1 + s)[(1 + h_i)a^* - y] = (1 + h_i)\frac{a_H + a^*}{2} - y.$$

By solving this, we can derive the promotion cutoff for workers with h_i :

$$a^*(h_i) = \frac{a_H(1 + h_i) + 2(2 + s)y}{(1 + h_i)(1 + 2s)} = \frac{a_H}{1 + 2s} + \frac{1}{(1 + h_i)} \times \frac{2(2 + s)y}{(1 + 2s)}.$$

This cutoff depends on variables that are affected by task-specific human capital, not by general human capital. It is easy to show that the following holds:

$$\frac{\partial a^*}{\partial h_i} = -\frac{2(2 + s)y}{(1 + h_i)^2(1 + 2s)} < 0.$$

That is, the cut-off is decreasing in the level of task-specific human capital. Since task-specific human capital and innate ability are in a complementary relationship, a worker with relatively low innate ability can be promoted if this worker has a sufficiently high level of task-specific human capital. The promotion rate $P(a \geq a^*|z)$ for worker category z can be calculated as follows:

$$\begin{aligned} P(a \geq a^*|z) &= \int \left(\frac{a_H - a^*}{a_H - a_L} \right) dH_z \\ &= \frac{a_H}{a_H - a_L} - \frac{1}{a_H - a_L} \frac{2(2 + s)y}{(1 + 2s)} \int \frac{1}{(1 + h_i)} dH_z \end{aligned}$$

where H_z is a cumulative distribution function for task-specific human capital h_i for worker category z . From Assumption 2 (ii), the second-order stochastic dominance holds. Note that $f(h_i) = -1/(1 + h_i)$ is an increasing and strictly concave function. Therefore, we can apply the standard argument of the risk aversion. We can thus obtain the following result:

$$P(a \geq a^*(\sigma)|\sigma) > P(a \geq a^*(\emptyset)|\emptyset).$$

That is, the promotion rate for workers with school mediation is higher than that for workers without school mediation.

We note that the promoted workers do not have an incentive to leave firm j since, after promotion, the wage level of the worker becomes higher than that offered by the other firms. That is, the following holds:

$$(1 + h_i) \frac{a_H + a^*}{2} + g_i > y + g_i$$

because

$$(1 + h_i) \frac{a_H + a^*}{2} - y = \frac{a_H(1 + h_i)(1 + s) + (1 - s)y}{1 + 2s} > 0.$$

Hence, firm j can make the worker want to stay in firm j . Moreover, it is noteworthy that the output is higher than their wage. Hence, firm j obtains a positive profit by hiring the promoted worker; keeping this worker is optimal for firm j . This positive profit comes from the accumulation of firm-specific human capital.

Now, we compare *average/expected wages* for workers with school mediation with those for wages for workers without it. Note that, with regard to the average second-period wage, it holds that

$$E[w_2|z] = P(a \geq a^*|z)E[w_2|z, \beta] + (1 - P(a \geq a^*|\alpha))E[w_2|z, \alpha],$$

where $E[w_2|z]$ represents the average second-period wage for workers with z , $E[w_2|z, \beta]$ represents the average second-period wage for the promoted workers with z , and $E[w_2|z, \alpha]$ represents the average second-period wage for the other workers with z . First, workers engaging in task α earn $y + g_i$ in any firm. Thus, the difference in wages for task α comes only from general human capital g_i . Since workers with school mediation tend to have higher g_i , their wages tend to be higher than those for workers without it. Next, consider workers engaging in task β . Their wage is $(1 + h_i)\frac{a_H + a^*}{2} + g_i$. As alluded to above, a^* is dependent on school mediation. The second-period wage after promotion is calculated as follows:

$$\begin{aligned} E[w_2|z, \beta] &= E\left[(1 + h_i)\frac{a_H + a^*(z)}{2} \middle| z\right] + \bar{g}_z \\ &= E\left[\frac{(3 + 4s)a_H(1 + h_i)}{2(1 + 2s)} + \frac{(2 + s)y}{1 + 2s} \middle| z\right] + \bar{g}_z. \end{aligned}$$

Hence, we obtain the following:

$$\begin{aligned} E[w_2|\sigma] - E[w_2|\emptyset] &= P_\emptyset(E[w_2|\sigma, \beta] - E[w_2|\emptyset, \beta]) + (P_\sigma - P_\emptyset)(E[w_2|\sigma, \beta] - E[w_2|\emptyset, \alpha]) \\ &\quad + (1 - P_\sigma)(E[w_2|\sigma, \alpha] - E[w_2|\emptyset, \alpha]) \end{aligned}$$

where $P_z = P(a \geq a^*|z)$. It is easy to check that

$$\begin{aligned} E[w_2|\sigma, \beta] - E[w_2|\emptyset, \beta] &> 0; \\ P_\sigma - P_\emptyset &> 0; \\ E[w_2|\sigma, \beta] - E[w_2|\emptyset, \alpha] &> 0; \\ E[w_2|\sigma, \alpha] - E[w_2|\emptyset, \alpha] &> 0. \end{aligned}$$

The first inequality states that promoted workers with school mediation earn higher wages, on average, than promoted workers without such mediation. The second inequality confirms that workers with school mediation experience higher promotion rates than those without mediation, as established in our previous analysis. The third inequality states that promoted workers with school mediation earn more than non-promoted workers without mediation. Finally, the fourth inequality shows that even among non-promoted workers, those with school mediation achieve higher average earnings than those without it. Therefore, we can conclude that $E[w_2|\sigma] > E[w_2|\emptyset]$. In summary, we conclude that the following testable implications are obtained:

- The promotion rate of workers with school mediation is higher than that of workers without it;
 - Wages of workers with school mediation are higher even after they spend 10 years.
- The following section offers empirical evidence for these two testable implications.

4. Evidence from the Japanese Life Course Panel Surveys

4.1 Data

We now describe the data we used in this paper. This paper utilizes the dataset from the Japanese Life Course Panel Surveys (JLPS), ongoing nationally representative panel surveys conducted by the Institute of Social Science at University of Tokyo. The first wave, conducted in 2007, included a youth sample (JLPS-Y) of 3,367 individuals aged 20 to 34 years and a middle-aged sample (JLPS-M) of 1,433 individuals aged 35 to 40 years. In 2011, a supplementary sample of 710 youth respondents and 253 middle-aged respondents was added during wave 5. Additionally, a refresh youth sample of 2,051 individuals aged 20 to 31 years was introduced in 2019 to offset the aging of the original samples. Our study analyzes data spanning from 2007 to 2021. We restrict our analysis to respondents who were high school graduates and did not pursue further education beyond high school.

We used the following question to determine whether the respondent utilized school mediation: “How did you get your job with your employer?” If the respondent indicated “referrals from teachers at the school from which you graduated (including school recommendations),” we classified the respondent as having used school mediation to obtain their first job. We used the question on management position at each wave to determine whether a promotion had occurred and the question on total individual income, using the midpoint of the income brackets to estimate annual raw income. The panel surveys also included questions on firm size, hours worked at each wave, and a self-reported high school grade (on a scale from 1 to 5).

4.2 The effect of school mediation on promotion and income

The first set of analyses focuses on the promotion chances and examines the difference in the time (in years) until the first promotion occurs between workers who entered the firm through school mediation and those who did not. To focus on promotion within the same company, we restrict our analysis to high school graduates who remained with their first employer. The first promotion typically involves a transition from a non-

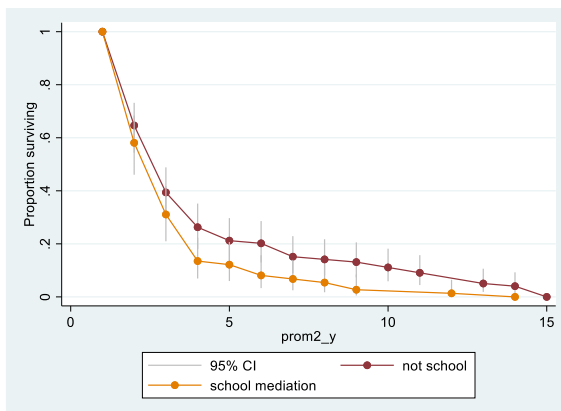
management to a lower management position (such as group leader or *hancho* in Japanese).

Figure 2 presents the results from a Kaplan-Meier survival analysis separately for men and women, illustrating the speed at which individuals transition from a non-management position to a lower management position. A faster transition out of non-management indicates a quicker promotion. For men, we observe that school mediation affects the survival curves, highlighting its impact on promotion chances. Individuals who entered the firm through school mediation transition out of non-management positions more quickly than those without school mediation. The log-rank test of the difference in the two survival curves is significant (likelihood-ratio test: chi-square=5,367, p=0.021). For women, the survival curves are virtually identical for individuals who entered the firm through school mediation and those who did not (chi-square=0.002, p=0.964). We conducted the same analysis for women in full-time positions, as some women held part-time roles, which typically do not offer promotion opportunities, and found the same result.

The results for men are consistent with our testable implications. Men who joined the firm through school recommendations are more likely to be promoted than those who entered without such referrals. This advantage may be due to their higher cognitive skills and productivity. However, for women, we did not observe a similar benefit from entering the firm through school mediation. This difference may stem from firms applying different criteria for women’s promotions, potentially influenced by concerns over their higher likelihood of leaving the firm after marriage or childbirth.

Figure 2. Kaplan-Meier Survival Analysis by Gender

Males



Females

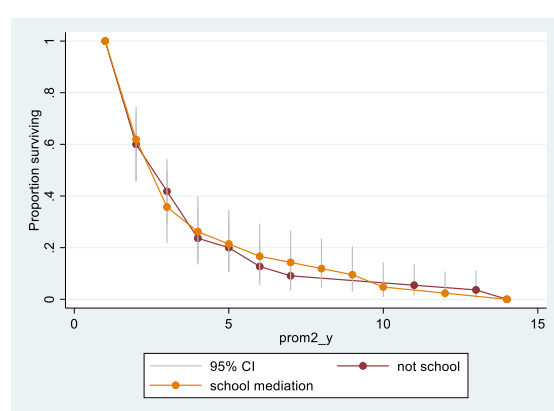


Table 2 shows the results of predicting the effect of school mediation on the log of income by gender.⁵ Similar to the analysis of promotion chances, we focus on high school graduates who stayed with their first employer. We run the random effects model (RE) and the fixed effects model (FE).⁶ The main effect of school mediation is observed only in the RE model, not in the FE model, as it remains constant over time and is determined prior to entry into the firm. The FE model, on the other hand, examines whether the trajectory of income growth differs based on school mediation.

For both men and women, individuals who entered the firm through school recommendations have a higher average income than those who entered without such recommendations. The advantage of school mediation is both substantial and statistically significant. However, the results of the FE model indicate that income trajectories do not differ between individuals with and without school recommendations. This suggests that the income advantage associated with school mediation remains consistent over the life course.

These results align with our testable implications for both male and female workers. On average, workers with school mediation earn approximately 10% more than those without it throughout their careers. This highlights the long-term impact of school mediation on workers' income trajectories.

Table 2. Random Effects (RE) and Fixed Effects (FE) Models Predicting the Log of Income by Gender

⁵ Cases with zero income are excluded from the analysis.

⁶ We control for high school grades to account for differences in cognitive skills, which may be associated with both school mediation and income.

	Males				Females			
	RE model		FE model		RE model		FE model	
	<i>Coef.</i>	<i>Std. Err.</i>	<i>Coef.</i>	<i>Std. Err.</i>	<i>Coef.</i>	<i>Std. Err.</i>	<i>Coef.</i>	<i>Std. Err.</i>
Independent variables								
School mediation	0.124 **	0.049			0.176 *	0.081		
Promotion	0.116 **	0.026	0.098 **	0.027	0.243 **	0.052	0.248 **	0.051
Age	0.091 **	0.020	0.097 **	0.032	0.024	0.027	0.004	0.043
Age squared	-0.001 *	0.000	-0.001 *	0.000	0.000	0.000	0.000	0.001
Hours worked	0.000	0.000	0.000	0.000	0.004 **	0.001	0.003 **	0.001
Firm size	0.157 **	0.038	0.090 *	0.045	0.163 *	0.057	0.070	0.072
Grade	0.051 *	0.017			0.029	0.035		
School mediation x age			-0.062	0.040			0.073	0.066
School mediation x age squared			0.001	0.000			-0.001	0.001
Constant	3.561 **	0.386	4.174 **	0.434	3.788 **	0.491	3.647 **	0.628
Number of observations		1,556				717		
Number of individuals		221				119		
Wald chi2 (RE) or F test (FE)	334.8		19.4		159.1		10.2	
**p < .01, *p < .05, +p < .10.								
Note: For Random Effects model, wave dummies are controlled.								
income zero excluded								
Fixed effects include only time-varying variables								

5. Concluding Remarks

This paper examines the long-term effects of school mediation on career progressions in the Japanese labor market through both theoretical modeling and empirical investigation. On the theoretical front, we extend Waldman's (1984) asymmetric employer learning model to analyze how school mediation influences career trajectories. Our model predicts that school mediation has enduring effects beyond initial job placement, particularly shaping promotion patterns and wage dynamics over a ten-year horizon. On the empirical side, we test these predictions using the Japanese Life Course Panel Surveys. The findings support our theoretical framework, albeit with important gender distinctions. The empirical results for male workers align closely with the model's predictions regarding both promotion probabilities and wage trajectories. Men who joined the firm through school recommendations are more likely to be promoted and achieve higher wage levels compared to those who entered without such recommendations. This advantage may stem from the superior cognitive skills and productivity of men who joined the firm through school recommendations, potentially leading to better performance and stronger career trajectories.

However, the findings for female workers reveal a more nuanced picture: while women hired through school mediation earn higher average incomes, they do not experience the same promotional advantages predicted by the model. One possible

explanation is that employers may provide similar financial returns to both men and women hired through school recommendations, acknowledging their higher cognitive skills, productivity, and better matching quality compared to those hired without recommendations. However, employers might apply different promotion criteria for men and women, potentially influenced by concerns about women's higher likelihood of leaving the firm after marriage or childbirth.

Several key directions for future research remain. Our theoretical and empirical analysis, while capturing the fundamental mechanisms of school mediation, does not address the heterogeneity among Japanese high schools. The Japanese educational system encompasses diverse types of institutions, such as specialized vocational schools (e.g., engineering, agricultural, commercial) and general academic high schools. Each type may have distinct relationships with employers and different approaches to school mediation. We were not able to disaggregate our analyses by school type due to the small sample size. However, understanding how these institutional differences affect long-term career outcomes could provide valuable insights into the broader implications of the school-mediated employment system. Moreover, the gender differences revealed in our empirical analysis suggest the need for further theoretical refinement and expanded empirical investigation. A more nuanced understanding of how school mediation interacts with gender-specific labor market dynamics could illuminate critical pathways for addressing inequalities in career progression and outcomes.

References

- Altonji, J. G., and Pierret, C. R. (2001). Employer learning and statistical discrimination. *The Quarterly Journal of Economics*, 116(1), 313–350.
- DeVaro, J., and Waldman, M. (2012). The signaling role of promotions: Further theory and empirical evidence. *Journal of Labor Economics*, 30(1), 91–147.
- Farber, H. S., and Gibbons, R. (1996). Learning and wage dynamics. *The Quarterly Journal of Economics*, 111(4), 1007–1047.
- Gibbons, R., and Waldman, M. (1999). A theory of wage and promotion dynamics inside firms. *The Quarterly Journal of Economics*, 114(4), 1321–1358.
- Gibbons, R., and Waldman, M. (2004). Task-specific human capital. *American Economic Review*, 94(2), 203–207.
- Honda, Y. (2005). *Wakamono to Shigoto* [Young people and employment in Japan: Beyond the school-mediated job search] Tokyo: University of Tokyo Press.
- Hori, Y. (2016). *Koko Shushoku Shido no Shakaigaku* [The Sociology of High School Employment Guidance]. Tokyo: Keiso Shobo.
- Ishida, H. (2023) School-to-work transition among high school students in Japan: school-mediated system and labor market outcomes. C. Yi and M. Tsai (eds.), *Journey to Adulthood: East Asian Perspectives*. London: Sage Publications, pp. 323–346.
- Ishida, H., Spilerman, S., and Su, K. H. (1997). Educational credentials and promotion chances in Japanese and American organizations. *American Sociological Review*, 62(6), 866–882.
- Ishida, H., Su, K. H., and Spilerman, S. (2002). Models of career advancement in organizations. *European Sociological Review*, 18(2), 179–198.
- Ishida, K. (2014) ‘Gakkokara Shokugyo eno Iko niokeru Seidoteki Renketsu Kouka no Saikento’ [Reconsidering the “Institutional linkage” effect in the school to work transition process in Japan: A trend analysis on the first job turnover], *Kyoiku Shakaigaku Kenkyu* [The Journal of Educational Sociology], 94, 325–344.
- Kariya, T. (1991). *Gakko Shokugyo Senbatsu no Shakaigaku* [Sociology of Schools, Occupation, and Selection]. Tokyo: University of Tokyo Press.
- Kariya, T., and Rosenbaum, J. E. (1987). Self-selection in Japanese junior high schools: A longitudinal study of students’ educational plans. *Sociology of Education*, 60, 168–180.
- Kariya, T., and Rosenbaum, J. E. (1995). Institutional linkages between education and work as quasi-internal labor markets. *Research in Social Stratification and Mobility*, 14, 101–136.
- Kariya, T., Sugayama, S. and Ishida, H. (2000). *Gakko, Shokuan to Rodoshijyo* [Schools, Public Employment Offices, and the Labor Market]. Tokyo: University of Tokyo Press.
- Morita, H. (2001). Choice of technology and labour market consequences: An explanation of US-Japanese differences. *The Economic Journal*, 111(468), 29–50.

- Morita, H. (2005). Multi-skilling, delegation and continuous process improvement: A comparative analysis of US–Japanese work organizations. *Economica*, 72(285), 69–93.
- Ogawa, K. (2021). Gakkou Keiyu no Shushoku no Kibo to Kouka no Suusei [Trends in the size and effect of school-mediated employment]. T. Nakamura, S. Miwa and H. Ishida (eds.), *Jinsei Shoki no Kaiso Kozo* [The Structure of Social Stratification in the Early-stage of Life] Tokyo: University of Tokyo Press, pp. 119–132.
- Owan, H. (2004). Promotion, turnover, earnings, and firm-sponsored training. *Journal of Labor Economics*, 22(4), 955–978.
- Rosenbaum, J. E., and Kariya, T. (1989). From high school to work: Market and institutional mechanisms in Japan. *American Journal of Sociology*, 94(6), 1334–1365.
- Rosenbaum, J. E., Kariya, T., Settersten, R. and Maier, T. (1990). Market and network theories of the transition from high school to work: Their application to industrialized societies. *Annual Review of Sociology*, 16(1), 263–299.
- Sugayama, S. (2011). “*Shusha Shakai*” no Tanjyo [The Birth of a Society Based on Entry Firm]. Nagoya: University of Nagoya Press.
- Waldman, M. (1984). Job assignments, signalling, and efficiency. *The RAND Journal of Economics*, 15(2), 255–267.
- Waldman, M. (2012). Theory and evidence in internal labor markets. In R. Gibbons and J. Roberts (eds.), *Handbook of Organizational Economics*. Princeton NJ: Princeton University Press, pp. 520–571.

東京大学社会科学研究所パネル調査プロジェクトについて

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本プロジェクトは、こうした問題をパネル調査の手法を用いることによって、実証的に解明することを研究課題とするものである。このため社会科学研究所では、若年パネル調査、壮年パネル調査、高卒パネル調査、中学生親子パネル調査の4つのパネル調査を実施している。

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