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Who Grew Rich?:
Determinants of Income Distribution and Intergenerational Mobility under Japan's Industrialization

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Abstract

Industrialization is a key to economic development and overall income growth. Industrialization, however, does not increase all people's income equally. Income inequality tends to expand in the early phase of economic development, as illustrated by the "Kuznets Curve." Furthermore, growing literature on social mobility suggest social mobility may be lower in the period. We aim to contribute with the newly constructed individual-level intergenerational data from early twentieth century Japan under industrialization. Our data include not only income tax data but also detailed data on biographical background. Using the data, we investigate the mechanisms of income distribution and its intergenerational mobility under early stage of economic development. Our results show that the new opportunities of working on business under the industrialization provided people chances to grow rich, although the existing old social order remained.

Key words: Income distribution, Inequality, Social mobility, Industrialization, Japan
JEL classification numbers: D31, N15, N85, O15, O53

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1. Introduction

Income distribution has been a major topic of economics in recent years, given the increasing income inequality around the world including advanced countries (Atkinson and Bourguignon 2015). In the field of economic history, income distribution has long been investigated. One of the major issues is implications of the Industrial Revolution in eighteenth and nineteenth centuries on the income inequality and the living standards (Hobsbawm 1968, 1975; Lindert and Williamson 1983, 1985, 1991; Lindert 1986, 1994, 2000; Hudson 1992; Allen 2009; Clark and Cummins 2014). The debate continues, but it seems that a broad consensus has been reached that at least in the period from the late eighteenth century to the early nineteenth century, income inequality increased, which can be interpreted as the rising phase of income inequality in the "Kuznets Curve" (Kuznets 1955).

In the literature on this issue, especially in the studies by Lindert and Williamson, who have been leading the quantitative historical research on income distribution, the main focus is on the distribution of wage and salary, not property income (Dumke 1991). On the other hand, Piketty (2014) has stressed the significance of property income and its impact on the historical dynamics of income inequality. Piketty (2014) includes controversial points (Hudson and Tribe eds. 2016), but his overall view has reminded us that it is essential to reconsider the implications of the Industrial Revolution, or industrialization more generally, from a broader perspective.

An important work related to this point is Cain and Hopkins (1993a, 1993b), which proposed a hypothesis that the traditional British elites group, "gentlemen," survived the Industrial Revolution and even the two World Wars, and they characterized the British Imperialism. Gentlemen in Britain were originally landed aristocrats, but from the nineteenth century they transformed absorbing major capitalists in the financial and trade sectors, to maintain their dominant position in economic, social and political respects. In this sense, the British society was immobile as well as unequal.

Duration of elite group beyond generations has been attracting interests in the historical studies of social mobility in recent years. Clark and Ishii (2013), Clark (2014) and Clark and Cummins (2015) developed a new methodology to measure the social mobility using the information of surnames. A series of studies by Clark and his coauthors indicated that social mobility was substantially lower than what had been believed, if they focus on the unobservable fundamental status. Meanwhile, there are studies in intergenerational social mobility based on data that link the information between generations. Long and Ferrie (2013) compared intergenerational occupational mobility between Britain and the U.S. since 1850 to find that U.S. was indeed a mobile society in the nineteenth century, but the mobility declined in the twentieth century. Dribe and Helgertz (2016) analyzed the Swedish data that link three generations from the nineteenth century to identify the influence of grandfathers on class and occupational status after controlling

for the influence of fathers.

Integrating the perspectives and insights of those literature, this paper investigates the structure and intergenerational mobility of elites in the process of industrialization, using the data from early twentieth century Japan. Japan was under the feudal system for more than 250 years until the Meiji Restoration in 1868. After the Meiji Restoration Japan introduced modern institutions and technologies from the West to start the modern economic growth and industrialization. Industrialization generated new economic elites, while there were old elites based on their status in the feudal society before the Meiji Restoration. We explore the dynamics of the old and new elites using unique individual-level data.

These data are from two series of who's who books, *Jinji-Koshin-Roku* and *Nihon- Shinshi-Roku*. *Jinji-Koshin-Roku* was edited by a credit bureau, Jinji Koshinjo, from 1903, while *Nihon Shinshi-Roku* was edited by a social club, and Kojunsha, from 1889. *Jinji-Koshin-Roku* contains detailed individual-level biographic information (e.g. educational background, family, and their social strata) as well as the basic personal data of name, birthday, and living area. We use 1915 and 1934 issues of *Jinji-Koshin-Roku*. 1915 is the year when Japan almost finished the first phase of industrialization mainly based on the textile industry, while 1934 is the year just before the Sino-Japanese War. As we describe in detail later, 1915 issue of *Jinji-Koshin-Roku*, and 1934 issue of *Jinji-Koshin-Roku* cover 13,917 and 26,190 persons, respectively. Also, 1934 issue contains income tax (the third class income tax), from which we can back out income of each person. As 1915 issue *Jinji-Koshin-Roku* does not have the income tax data, we obtain it for the person who are listed in 1915 issue of from 1915 issue of *Nihon-Shinshi-Roku*.

We are not the first to use this kind of sources for the research on income distribution. Yazawa (2004) collected the individual-level data for 5,000 wealthy persons from 1936 issue of *Nihon-Shinshi-Roku* to identify three groups with small overlaps, namely nobles, families with asset management firms, and lords of parliament, and argues that these groups were formed and maintained based on different institutions, such as the aristocracy, the tax system and the election system. He also points out that these three groups covered just 10% of the 5,000 observations, and that the other 90% included people of various occupations (pp. 96-98). Meanwhile, Yazawa et al.(2006) collected individual-level data of around 5,000 persons in the top income group in Tokyo Prefecture for each of 1910, 1917, 1924, 1930 and 1936 years from various issues of *Nihon-Shinshi-Roku* to examine the mobility of wealthy persons within a generation. They found that out of 5,016 persons in the top income group in 1910, 324 persons remained the "high income" group in 1936. They also estimated a hazard function on getting out of high income group. It was found that those who had such occupations as the primary industry, asset management, heavy industries, tended to remain in the high income group with high probability, and the status of aristocrat contributed to a person to remain in the high income group.

Yazawa (2004) and Yazawa et al (2006) shed a new light on the history of income distribution in Japan based on new data, but we consider that the potential of the data and the data sources have not been fully exploited. First, using the individual-level data from these sources, we can systematically analyze the effects of each person's occupational, educational and social backgrounds, and thereby explore the implications of industrialization and economic development on the socio-economic structure. As mentioned above, the data point 1915 is just after the early phase of industrialization in Japan, it provides a valuable opportunity to explore the economic and social impacts of early industrialization based on individual-level data. Second, we can have the data linking two generations, i.e. father and son, by connecting the information from 1915 issue of *Nihon-Shinshi-Roku*, 1915 issue of *Jinji-Koshin-Roku*, and 1934 issue of Jinji-Koshin-Roku. These linked data enable us not only to measure the intergenerational income mobility, but also to analyze the factors that affected the mobility.

2. Structural Changes in the Economy and Society in Modern Japan

Meiji Restoration

The Meiji Restoration 1868 transformed Japan from a feudal society, which was governed by Tokugawa Shogunate for more than 250 years, to a modern, more liberal, and industrialized society. The Meiji government allowed commoners to have a family name in 1870 and granted people the freedom to establish residence in any location they wanted, choose any occupation, and get married to anyone regardless of their social strata in 1871. Also, in 1870 the Meiji government established the Ministry of Industry (*Kobu Sho*) for promoting industrialization, which hired many foreign advisors to import Western technologies and thereby created modern industries and social infrastructures. Japan's industrialization and modernization from the late nineteenth century to the early century were achieved by acquisition of Western technologies, whereas the former regime, Tokugawa *Shogunate*, had a seclusion policy that restricted international trades, immigration of foreigners and emigration Japanese until 1866. Therefore, the people who had Western knowledge were in demand for achieving the change at that time.

At the same time, the government introduced modern educational system in 1872 and opened opportunities for all people to have education, if they could afford. Although aristocrats' children had some privileges to enter imperial universities, all people gained the chance to pass the entrance exam of imperial and private universities regardless of their social strata. Japan is known as an academic career-based society especially after WWII, but even before WWII many of bureaucrats graduated from the Imperial University of Tokyo, since introducing the entrance exam for bureaucrats in 1894.

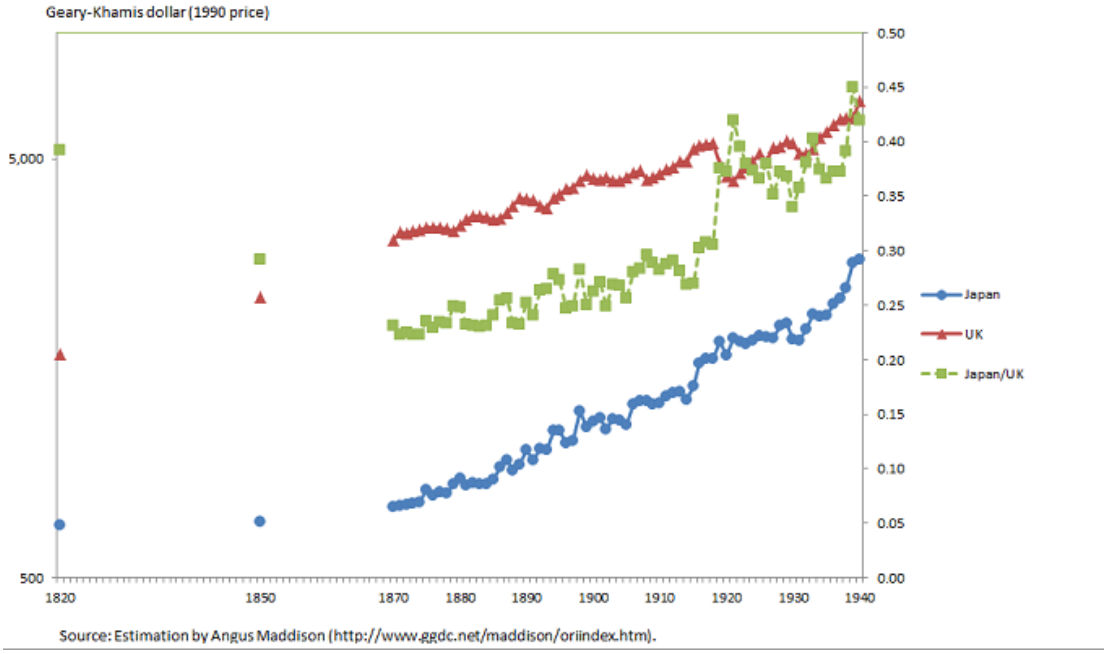
On the other hand, social strata in the former feudal society remained after the Meiji Restoration and divided people into three strata: *kazoku* (peerage), *shizoku* (samurai), and *heimin*

(commonage). People could not change their social strata unless they newly received a title from the government and/or were adopted by other families.[1]. And peerage was still granted their privileges for education, land preservation, and the House of Peers while samurai lost their privileges. We still do not know much about how the old factor, i.e. social strata, and the new factors such as freedom of choosing occupation and academic career alter their influence on people's wealth during the stages of industrialization, which we will examine in the section 3 but let us begin to analyze the macroeconomic change first.

Modern Economic Growth and Industrialization

Adoption of Western institutions and technologies after the Meiji Restoration accelerated the growth of the Japanese economy (Figure 1). According to Angus Maddison's estimation, while annual growth rate of per capita real GDP was 0.05% and 0.41% in the periods from 1820 to 1850 and from 1850 to 1870, it became 1.60% from 1870 to 1890, and the steady growth continued after that. Compared with per capita GDP of UK in 1830, the end of the Industrial Revolution, Japan's per capita GDP increased from 42% in 1870 to 82% in 1915, just before the World War II, and 120% in 1934. From a macro perspective, we can say that the Japanese economy reached the income level between our two data points.

Figure 1 Start of Modern Economic Growth

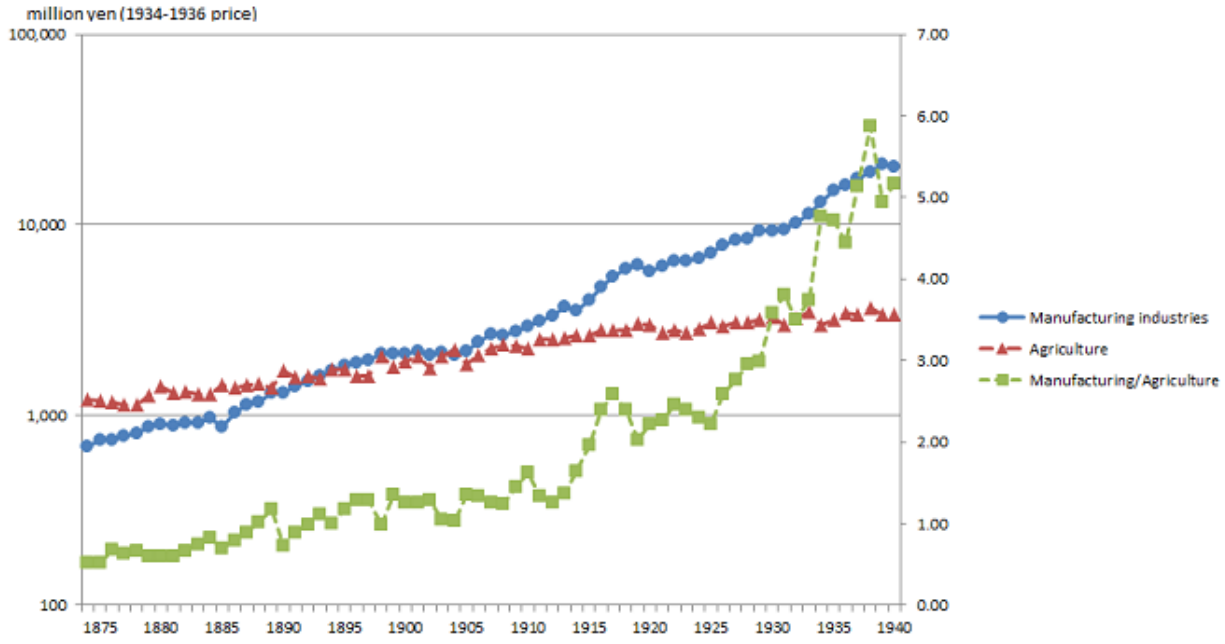


Source: Estimation by Angus Maddison (http://www.ggdc.net/maddison/oriindex.htm).

[1] Only one child of aristocrats inherited the title from their fathers. The children of some higher ranked aristocrats could receive a lower-ranked title but this was exception.

The industrial structure also changed in this period. Figure 2 illustrates the real production of agriculture and manufacturing industries at 1934-1936 price, and the ratio of production at current price. As shown in the Figure 2, while the agricultural production had a positive trend, manufacturing production increased much faster from the 1870s. Annual growth rate of the manufacturing production was as high as 4.3% from 1874 to 1915. As the result of the high growth, the manufacturing production was continuously larger than the agricultural production from 1899.

Figure 2 Progress of industrialization



Source; Umemura et al. (1966), pp.146-147,pp.152-153; Shinohara (1972), pp. 140-147.

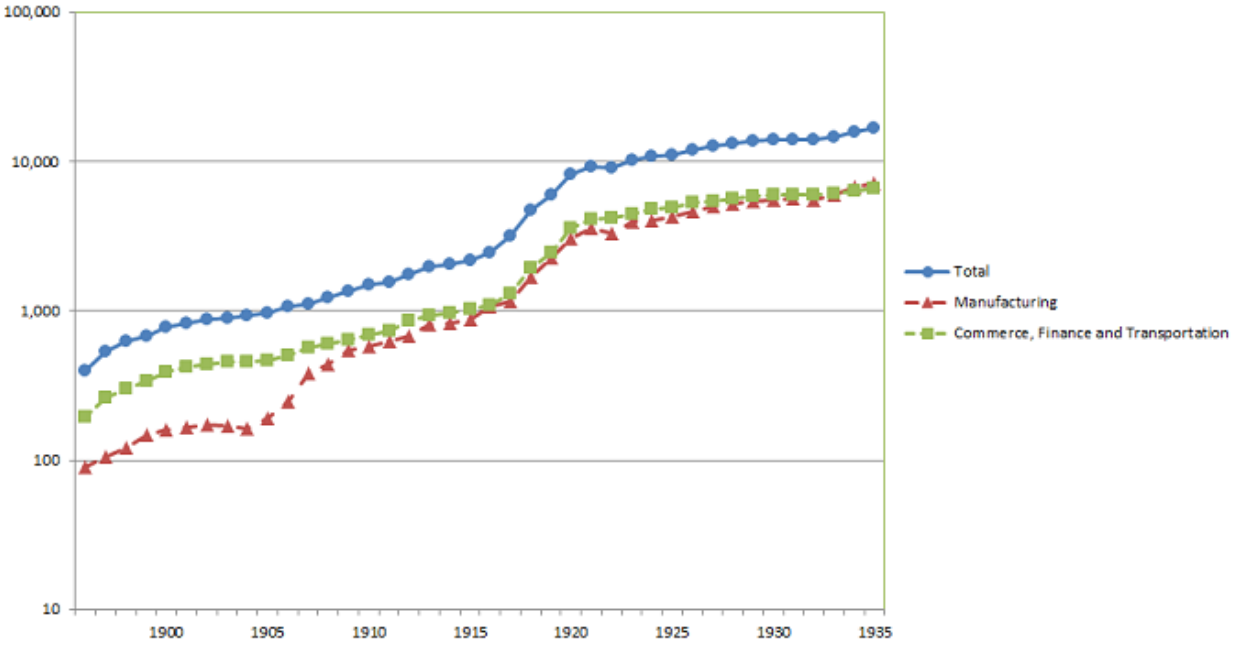
Increase in the manufacturing production was associated with a change in production organizations. In the 1900s more than half of manufacturing production was by individual producers and small cottage workshops, but after that factory system diffused rapidly. In 1919, just after the economic boom during the World War I, the ratio of factory production became 62%. Factories in 1919 included gigantic ones with more than 5,000 employees such as Kawasaki Dockyard Co., Kobe Plant of Mitsubishi Dockyard Co., Kobe Plant of Kanegafuchi Cotton Spinning Co., and Tsu Plant of Toyo Cotton Spinning Co. (Ministry of Agriculture and Commerce ed. 1921).

Many of these factories, especially large-sized factories were operated by corporations. Paid-in capital of corporations increased sharply from the late nineteenth century (Figure 3). Until the first half of the 1900s, capital of non-manufacturing corporations including railway companies,

marine shipping companies and banks, substantially exceeded that of manufacturing companies, but after that capital of manufacturing companies caught up.

As we have briefly overviewed, Japan experienced huge institutional and economic changes after the late nineteenth century. In the following sections, we examine the implications of these changes on the structure of elites and their intergenerational mobility.

Figure 3 Development of Corporations (Paid-in Capital)



Source: Asahi Shinbunsha (1930), pp.550-551; Statistics Bureau of the Cabinet

3. Anatomy of the Elites in the Early Twentieth Century

To examine structure and mobility of elites in the early twentieth century Japan, we obtain the income and biographical data of 1,076 men in 1934 and their fathers in 1915. The uniqueness of our dataset is to include the detailed biographical data linking fathers and sons. *Jinji -Koshin-Roku* is one of the most famous and reliable who's who records in Japan at that time. We first collect two volumes of the records published in 1915 (volume 4) and 1934 (volume 10) and find 2,156 father-son pairs using the information of the listed people's name, birthday, living area, and family names.

Next step is to collect these pairs' personal income tax data to estimate their income amount. The volume 4 of *Jinji-Koshin-Roku* does not include personal income tax data, while the volume 10 of *Jinji-Koshin-Roku* includes them, although not for all the listed persons. To complement the income data, therefore, we obtain the personal income tax data from another who's who record

named *Nihon-Shinshi-Roku* (volume 19) which includes people's name, living area, and personal income tax amount, but not much detailed biographical information (e.g. educational background, family, and their social strata). For those whose income tax data are not available in volume 10 of *Jinji-Koshin-Roku*, we supplemented them by volume 38 *Nihon-Shinshi-Roku*. Finally, the personal income tax data for 1,076 father-son pairs is acquired, which we analyze hereafter.

Referring the income tax laws in each year, we backed out their income from the personal income tax data (Note that we had to omit allowances and deduction, and thereby the estimated income amount would be below the actual one). The income median in our dataset is 6,300.0 yen in 1915 and 15,458.2 yen in 1934. Those who earned income more than these median values were only 0.07% and 0.11% of the total male adult population in Japan in 1915 and 1934, respectively.[2] This implies that our observations are the persons in the highest income group during this period.

We assume two possible scenarios: the first scenario is that the social strata under the feudal regime before the Meiji Restoration impeded economic mobility. To examine this impact, we obtain the data of each people's social stratum using *Jinji-Koshin-Roku*. The distribution of fathers and sons' social strata in our dataset (see table 1) clearly shows the difficulty to upgrade each social stratum. The actual proportion of peerage was 0.01% and the one of samurai was 4.2%, according to the national survey in 1918. (Bureau of Statistics, Cabinet Office 1920 p.260). Compared with it, therefore, our dataset clearly over-represents samurai and peerage classes, which suggests social strata had impacts on the society at that time formally or informally.

Table 1 Distribution of Fathers and Sons' Social Strata

		Son (1934)			Total
		Commonage	Samurai	Peerage	
Father (1915)	Commonage	740	4	9	753
	Samurai	47	137	5	189
	Peerage	13	5	116	134
Total		800	146	130	

The other scenario is that freedom of choosing occupation in 1871 and industrialization in the early twentieth century decreased the impact of social strata on people's income and instead increased economic mobility. In this scenario, we assume the choice of occupation had a larger impact on each person's income. To examine the impact of occupation, we extract the information of fathers and sons' occupation from *Jinji-Koshin-Roku*, and classify it into five categories:

[2] We estimate income distribution in each year using the government data of population and the distribution of personal income tax payees. (Tax Bureau, Ministry of Finance (1916, 1933); Census Bureau, Cabinet Office (1920, 1939)

bureaucracy, politics, professional work, land-own, and business. Bureaucracy category includes central government officials (including judges, prosecutors, governor, and ambassadors), local government officials, and military men. Politics category includes ministers, member of parliaments in the House of Peers and the House of Representatives, and local assembly members. Professional work includes lawyers, medical doctors, professors, accountants, and tax attorneys. We categorize those persons who are recorded as "land owner" (jinushi), "shisanka" (asset holder) and "tagaku nozeisha" (high tax payers) as land owner here. Many of the persons in our samples belonged to a single category but some had two or more occupations in different categories (see table 2), and thereby we record each category as a dummy variable. For example, if a person was recorded as a bureaucrat and a firm director, for him Bureaucracy dummy and Business dummy take value 1.

Table 2 Attribution of Fathers and Sons' Occupation

	Father (1915)				
	Bureaucracy	Politics	Professional	Land-own	Business
Bureaucracy					
Politics	31				
Professional	15	15			
Land-own	0	6	0		
Business	13	46	30	19	
Total	109	128	72	61	834
	Son (1934)				
	Bureaucracy	Politics	Professional	Land-own	Business
Bureaucracy					
Politics	13				
Professional	7	4			
Land-own	6	5	4		
Business	10	23	29	85	
Total	90	53	71	259	736

Social strata restricted people's choice of occupations before the Meiji Restoration (e.g. commoners had no chances to participate in politics before the regime change in principal.) Therefore, we check how the influence of social strata on the choice of occupation remained in advance. The distribution of occupation by social strata in table 3 indicates that commoners could

choose any occupation although many of the successful commoners that achieved to be listed on *Jinji-Koshin-Roku* were businessmen, which suggests building business success was a major career ladder for commoners.

Table 3

	Father (1915)				
	Bureaucracy	Politics	Professional	Land-own	Business
Commonage	12 (1.5%)	41 (5.0%)	32 (3.9%)	55 (6.7%)	684 (83.0%)
Samurai	36 (16.7%)	16 (7.4%)	32 (14.9%)	6 (2.8%)	125 (58.1%)
Peerage	61 (37.0%)	71 (43.0%)	8 (4.8%)	0 (0.0%)	25 (15.2%)
	Son (1934)				
	Bureaucracy	Politics	Professional	Land-own	Business
Commonage	28 (3.1%)	8 (0.9%)	39 (4.3%)	231 (25.3%)	609 (66.6%)
Samurai	22 (14.1%)	0 (0.0%)	24 (15.4%)	23 (14.7%)	87 (55.8%)
Peerage	40 (29.0%)	45 (32.6%)	8 (5.8%)	5 (3.6%)	40 (29.0%)

One step further, we examine which business sectors increased their presence in the elites during the period. From *Jinji-Koshin-Roku,* we have the information of the company which each person worked for. Then we classify those companies by industry sector. To do that, we additionally obtain the data of companies with industry classification. We use two company records: *Ginko-Kaisha-Yoroku* volume 19 published in 1915 and volume 38 published in 1934, and *Nihon-Zenkoku-Shokaisha-Yakuinroku* volume 23 published in 1915 and 42 published in 1934. Using these records, we first divide businesses into finance and non-finance sectors, then divide non-financial sector into manufacturing sector and non-manufacturing sector, and lastly divide manufacturing sector into light industry sector and heavy and chemical industry sector. The distribution by business sector is reported in table 4. Note that many people concurrently worked in different companies in different sectors, and hence the total number is not equal to the sum of each cell. Compared with fathers and their sons, this table indicates that the proportion of workers in the sectors of heavy and chemical industry sectors and non-finance-non-manufacture sectors (e.g. commerce) increased from 1915 to 1934.

Table 4

	Business				
		Finance	Non-Finance		
				Manufacture	Non-

							Manufacture
					Light Industry	Heavy & Chemical Industry	
Father(1915)	834	313 (37.5%)	726 (87.1%)	309 (37.1%)	266 (31.9%)	100 (12.0%)	439 (52.6%)
Son (1934)	736	168 (22.8%)	670 (91.0%)	274 (37.2%)	191 (26.0%)	136 (18.5%)	637 (86.5%)

In addition to the choice of occupation, we also analyze the impact of educational background to examine the impact of people's acquired skills, not innate traits, on income mobility during the period. Educational background data are extracted from the description of *Jinji-Koshin-Roku.* We make three dummy variables based on whether one earned PhD, earned BA and/or Master but not PhD, or graduated from a high school or higher-level school but not universities. Additionally, we make one more dummy variable based on oversea study experience. A look at table 5 that summarizes the distribution of educational background by social strata and occupation reveals that the educational level of the wealthy commoners greatly improved from 1915 to 1934 and the educational level of top businessmen as well. Another significant change during the period was an increase of the people who had oversea study experience among commonage and business world, which suggests that oversea study experience helped commoners to join the elite society. All variables are summarized in Table 6.

Table 5

	High school		Bachelor		PhD		Oversea Study	
	Father							
Commonage	37	(4.9%)	23	(3.1%)	23	(3.1%)	22	(2.9%)
Samurai	32	(16.9%)	23	(12.2%)	32	(16.9%)	30	(15.9%)
Peerage	13	(9.7%)	10	(7.5%)	10	(7.5%)	32	(23.9%)
	Son							
Commonage	135	(16.9%)	182	(22.8%)	24	(3.0%)	52	(6.5%)
Samurai	29	(19.9%)	74	(50.7%)	15	(10.3%)	25	(17.1%)
Peerage	29	(22.3%)	66	(50.8%)	5	(3.8%)	37	(28.5%)
	Father							
Bureaucracy	11	(10.1%)	13	(11.9%)	21	(19.3%)	28	(25.7%)
Politics	13	(10.2%)	9	(7.0%)	16	(12.5%)	33	(25.8%)

Professional	4	(5.6%)	10	(13.9%)	39	(54.2%)	31	(43.1%)
Land-own	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Business	64	(7.7%)	37	(4.4%)	22	(2.64%)	26	(3.1%)
	Son							
Bureaucracy	19	(21.1%)	55	(61.1%)	6	(6.7%)	20	(22.2%)
Politics	11	(20.8%)	27	(50.9%)	3	(5.7%)	17	(32.1%)
Professional	7	(9.9%)	18	(25.4%)	38	(53.5%)	27	(38.0%)
Land-own	30	(11.6%)	32	(12.4%)	2	(0.8%)	6	(2.3%)
Business	146	(19.8%)	217	(29.5%)	22	(3.0%)	62	(8.4%)

Table 6 Glossary and Definitions of Variables

Symbol	Variable	Definition
i	Father-son pair	Each pair of father-son
Y	Year dummy	Dummy variable of whether sons' data in 1934 (1) or their fathers' data in 1915 (0)
INC	Income	Logged value of income of father-son pair *i* in time T
FINC	Father's Income	Logged value of income of *i*'s father
AGE	Age	Age (Father's age in 1915 and son's age in 1934)
Social strata of father-son pair *i* in time t		
SC	Commonage	Dummy variable of commoner
SS	Samurai	Dummy variable of samurai
SP	Peerage	Dummy variable of peerage
Occupation category of father-son pair *i* in time T		
OBR	Bureaucracy	Dummy variable of public official
OPO	Politics	Dummy variable of politician
OPR	Professional work	Dummy variable of person in a professional position
OLA	Land-own	Dummy variable of land owner
OBU	Business	Dummy variable of businessman
EHS	High school graduates	Dummy variable of graduating from high school
EBA	Bachelor holder	Dummy variable of bachelor holder
EDP	PhD holder	Dummy variable of PhD holder
EOS	Oversea study experience	Dummy variable of having oversea study experience
Semi-category of business sector of father-son pair *i* in time *t*		
BF	Finance	Dummy variable of working in financial sector
BL	Light industry	Dummy variable of working in light industry sector

BHC	Heavy or chemistry industry	Dummy variable of working in heavy or chemistry industry sector
BO	Other business sectors	Dummy variable of working in other than the above business sectors (e.g. commerce, shipping, transportation, public utilities, land holding)

Before moving forward, we analyze the distribution of logged value of income by year, by year and social strata, and by year and occupation (see Figure 4, 5, and 6). We find that first income overall increased from 1915 to 1934; second, commonage increased its income more than the other social strata; and third, businessmen and landowners increased their income compared with the others. We also check whether the means of the logged income by social strata, occupation, and year were tested by a t-test for significant difference from zero.

Father				
	Mean	Commonage	Samurai	Peerage
Commonage	9546.5			
Samurai	5261.1	***		
Peerage	16579.9	***	**	
Son				
Commonage	33460.2			
Samurai	18241.6	***		
Peerage	49378.6	**	**	

Father						
	Mean	Bureaucracy	Politics	Professional	Land-own	Business
Bureaucracy	5578.7					
Politics	7868.9	**				
Professional	5705.4		*			
Land-own	16676.9	***	***	***		
Business	10689.5	**			*	
Son						
Bureaucracy	9136.4					
Politics	32033.9	***				
Professional	13590.4	**	**			
Land-own	40444.3	***		***		

Business	39825.1	***		**		

In 1915, both commonage and peerage's incomes were higher than samurai's one in 1915with 1% significance but we cannot find a significant difference between commonage and peerage. On the other hand, in 1934 commonage's income became higher than peerage and samurai's with 1 % significance but the difference between peerage and samurai became insignificant. Lastly, we examine the difference by occupation. In 1915, we find the following magnitude relations with 1 or 5% significance: bureaucracy < politics < business < land-own and professional-work < business. However, we have no significant difference between politics and professional work and between bureaucracy and professional work. In 1934, we find the following magnitude relations with 1 % significance: bureaucracy < politics < business < land-own and bureaucracy < professional work < business. However, there is no significant difference between professional work and politics.

Figure 4 Income Distribution by Year

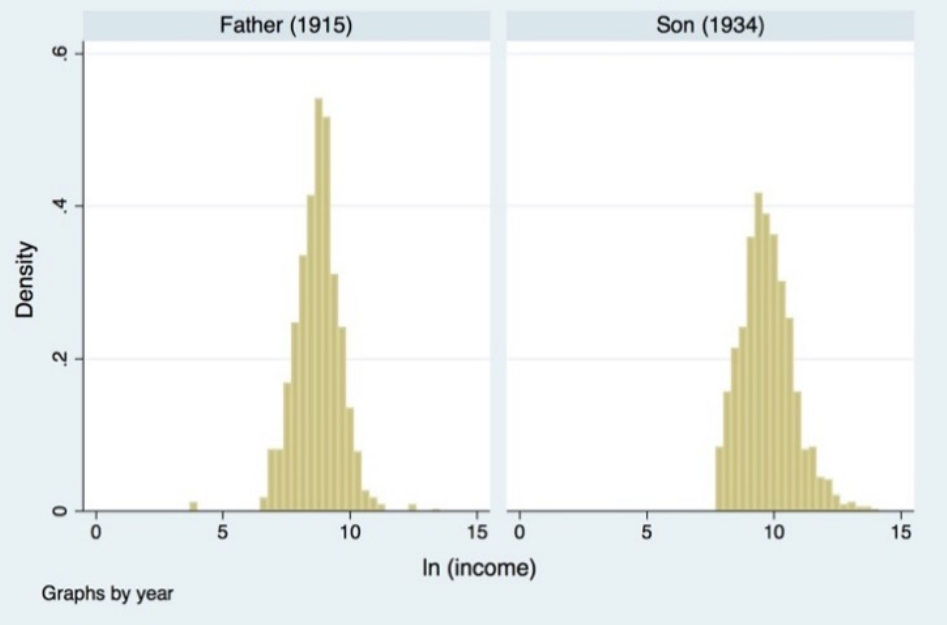


Figure 5 Income Distribution by Year and Social Strata

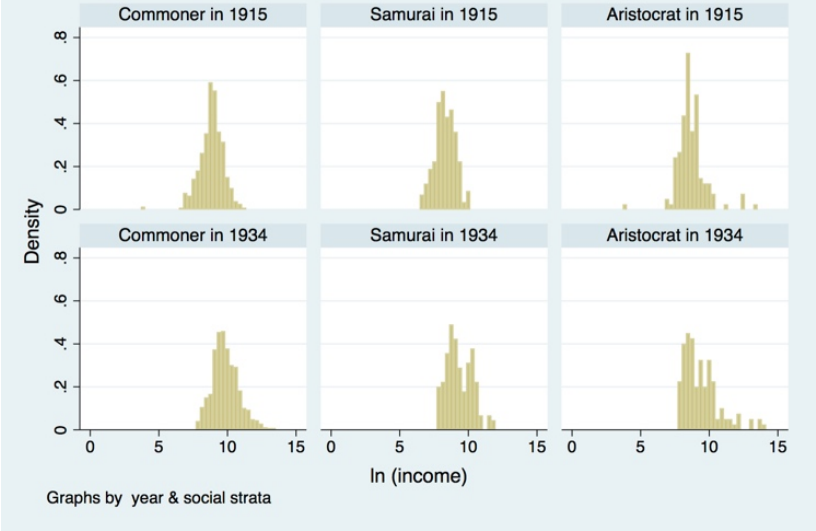
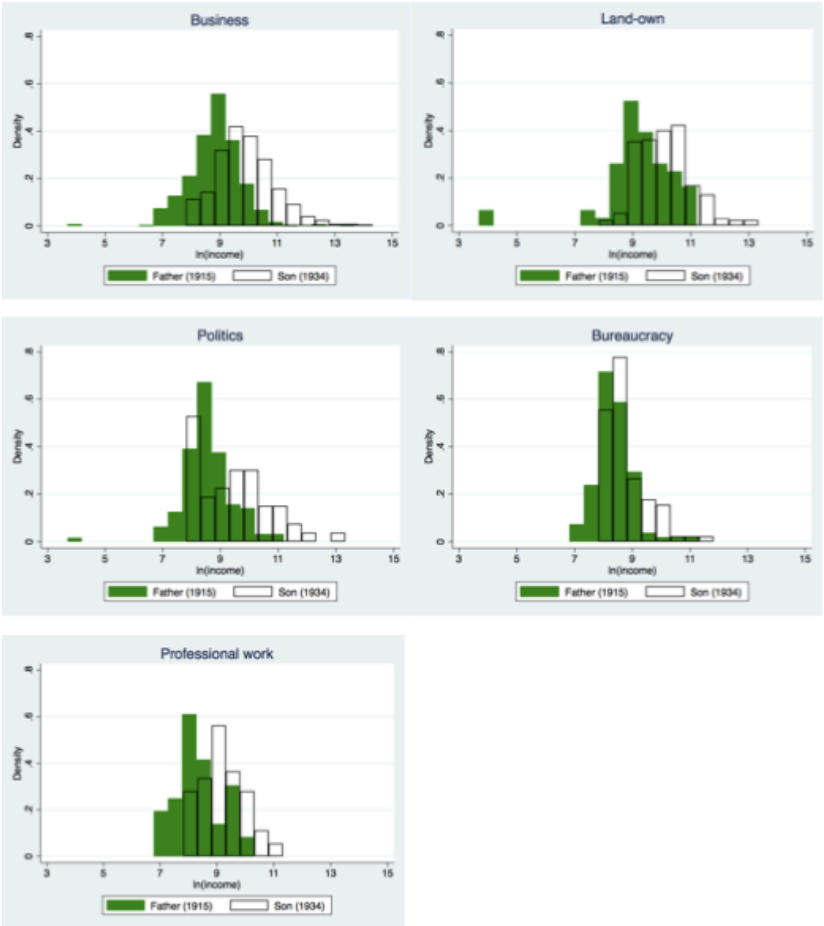


Figure6 Income Distribution by Year and Occupation



4. Industrialization and social mobility

Determinants of Income

We now investigate the determinants of income using regression analyses.

We first use our detailed data to see if there were differences among the listed persons by stages of industrialization. We compare the sons in 1915 with their fathers in 1934 along the dimensions of social strata, occupation, and educational background. Table 7 reports the estimated coefficients of the following equations for the 1915 and the 1934 data respectively and the merged one of both for which we add year dummy and its interaction terms with other independent variables:

(1) $INC = \alpha + \beta_{SS}\, SS + \beta_{SP}\, SP + \beta_{AGE}\, AGE + \varepsilon$

(2) $INC = \alpha + \beta_{SS}\, SS + \beta_{SP}\, SP + \beta_{AGE}\, AGE + \beta_{OBR}\, OBR + \beta_{OPO}\, OPO + \beta_{OPR}\, OPR + \beta_{OLA}\, OLA + \beta_{OBU}\, OBU + \varepsilon$

(3) $INC = \alpha + \beta_{SS}\, SS + \beta_{SP}\, SP + \beta_{AGE}\, AGE + \beta_{OBR}\, OBR + \beta_{OPO}\, OPO + \beta_{OPR}\, OPR + \beta_{OLA}\, OLA + \beta_{OBU}\, OBU + \beta_{EHS}\, EHS + \beta_{EBA}\, EBA + \beta_{EDP}\, EDP + \beta_{EOS}\, EOS + \varepsilon$

The estimated coefficients of equation (1) indicate that there were commoners whose income was as equal as or higher than peerage and samurai's already in 1915. In 1934, not only samurai but also peerage's income became lower than the wealthiest commoners. However, once controlling each occupation (see the estimated results of equation (2) in table 7), the income advantage of peerage over commonage in 1915 turned positive with 1% significant level. This result indicate that peerage had basic economic advantage to commoners but that this advantage was compensated by the impact of occupational choice. The basic positive impact of peerage disappeared in 1934 and it confirms that the impact of social strata on income weakened under industrialization. The two top occupations to earn high income were land-own and business. Moreover, the income earned by business significantly increased from 1915 to 1934 and its coefficient became almost as equal as the one of land-owning while the coefficients of land-owning changed little. This reflects that industrialization followed development of agriculture in Japan. In our dataset, 95.7% of the commoners in 1915 and 90.8% of them in 1934 were landowners or businessmen, which suggests that commoners, working in a business sector, found a path to climb the ladder. While private sector grew their income under industrialization, the income of government officials became relatively lower in 1934. Including control variables about educational background does not change the impact of social strata and occupational variables. Educational background, had no impact on income among wealthy people except oversea study experience.

Table 7

	(1)			(2)			(3)		
SS	-0.52***	-0.59***	-0.52***	-0.32***	-0.29***	-0.32***	-0.32***	-0.28***	-0.32***
	(0.0725)	(0.0825)	(0.0782)	(0.0747)	(0.0791)	(0.0778)	(0.0775)	(0.0816)	(0.0807)
SP	-0.14	-0.59***	-0.14	0.43***	0.07	0.43***	0.43***	0.05	0.43***
	(0.0841)	(0.0947)	(0.0907)	(0.1135)	(0.1104)	(0.1183)	(0.1148)	(0.1118)	(0.1195)
AGE	-0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(0.0027)	(0.0029)	(0.0029)	(0.0026)	(0.0027)	(0.0027)	(0.0026)	(0.0028)	(0.0027)
OBR				-0.01	-0.37***	-0.01	-0.01	-0.36***	-0.01
				(0.1088)	(0.1189)	(0.1133)	(0.1092)	(0.1202)	(0.1137)
OPO				-0.08	0.05	-0.08	-0.11	0.03	-0.11
				(0.0936)	(0.1484)	(0.0975)	(0.0943)	(0.1484)	(0.0981)
OPR				0.01	-0.06	0.01	-0.08	-0.10	-0.08
				(0.1113)	(0.1205)	(0.1159)	(0.1279)	(0.1575)	(0.1331)
OLA				0.86***	0.85***	0.86***	0.89***	0.86***	0.89***
				(0.1295)	(0.0862)	(0.1349)	(0.1300)	(0.0874)	(0.1354)
OBU				0.65***	0.82***	0.65***	0.69***	0.84***	0.69***
				(0.0963)	(0.0857)	(0.1003)	(0.0973)	(0.0858)	(0.1013)
EHS						-0.02	-0.02	-0.02	-0.02
						(0.1017)	(0.0807)	(0.0807)	(0.1058)
EBA						-0.12	-0.07	-0.07	-0.12
						(0.1250)	(0.0747)	(0.0747)	(0.1313)
EDP						0.02	-0.09	-0.09	0.02
						(0.1577)	(0.1983)	(0.1983)	(0.1301)
EOS						0.28**	0.31***	0.31***	0.28**
						(0.1270)	(0.1006)	(0.1006)	(0.1322)
Y			0.93***		0.69***				0.77***
			(0.1998)		(0.2239)				(0.2296)
SSxY			0.01		0.13				0.15
			(0.1167)		(0.1143)				(0.1178)
SPxY			-0.31**		-0.10				-0.12
			(0.1280)		(0.1616)				(0.1632)
AGExY			0.00		0.00				-0.00
			(0.0040)		(0.0038)				(0.0038)
OBRxY					-0.41***				-0.38**
					(0.1610)				(0.1623)
OPOxY					-0.01				0.00
					(0.1761)				(0.1764)
OPRxY					-0.04				0.02
					(0.1642)				(0.2022)
OLAxY					(0.06)				0.04
					(0.1581)				(0.1592)
OBUxY					0.24				0.22
					(0.1301)				(0.1310)
EHSxY									-0.02
									(0.1313)
EBAxY									0.01
									(0.1484)
EDPxY									-0.14
									(0.2518)
EOSxY									0.03
									(0.1639)
cons.	8.91**	9.83***	8.91***	8.25***	9.03***	8.25***	8.22***	9.06***	8.22***
	(0.1493)	(0.1246)	(0.1611)	(0.1731)	(0.1369)	(0.1803)	(0.1770)	(0.1410)	(0.1842)
N	1076	1076	2152	1076	1076	2152	1076	1076	2152
Period	1915	1934	1915 & 1934	1915	1934	1915 & 1934	1934	1934	1915 & 1934

Influence of Social Strata on the Choice of Occupation

It was found that occupational choice had a substantial impact on income. Given that we test whether one's social strata or educational background influenced the choice of occupation by estimating the following logit model on occupational choice. Table 8 reports the estimated coefficients for the 1915 and the 1934 data respectively and the data pooled the both years. In estimation we add year dummy for 1934 and its interactions with other independent variables:

(4) $\text{Ln}\,(p / (1-p)) = \alpha + \beta_{SS}\,SS + \beta_{SP}\,SP + \beta_{EHS}\,EHS + \beta_{EBA}\,EBA + \beta_{EDP}\,EDP + \beta_{EOS}\,EOS$

where p is the rate of choosing each occupation OBR, OPO, OPR, OLA, and OBU.

Table 8

	OBR (Bureaucracy)			OPO (Politics)			OPR (Professional)			OLA (Land-own)			OBU (Business)		
SS	2.34***	1.09***	2.34***	0.18	omitted	0.18	0.47	0.82**	0.47	-0.31	-0.16	-0.31	-1.36***	-0.93***	-1.36***
	620	(0.3126)	(0.3620)	(0.3302)		(0.3302)	(0.3433)	(0.3948)	(0.3433)	(0.4444)	(0.2599)	(0.4444)	(0.2214)	(0.2038)	(0.2214)
SP	3.89***	2.12***	3.89***	2.77***	3.77***	2.77***	-0.39	-0.32	-0.39	omitted	-1.83***	-1.83***	-3.73***	-2.17***	-3.73***
	(0.3469)	(0.2863)	(0.3469)	(0.2454)	(0.4196)	(0.2454)	(0.4978)	(0.5411)	(0.4978)		(0.4718)	(0.4718)	(0.2640)	(0.2249)	(0.2640)
EHS	0.14	1.36***	0.14	0.29	0.21	0.29	0.69	0.65	0.69	omitted	-1.04***	-1.04***	0.40	0.82***	0.40
	(0.3962)	(0.4148)	(0.3962)	(0.3890)	(0.4920)	(0.3890)	(0.5761)	(0.5377)	(0.5761)		(0.2238)	(0.2238)	(0.3535)	(0.2149)	(0.3535)
EBA	0.87**	1.84***	0.87**	0.00	0.35	0.00	2.09***	0.95**	2.09***	omitted	-1.44***	-1.44***	-0.25	0.59***	-0.25
	(0.4117)	(0.3715)	(0.4117)	(0.4779)	(0.4263)	(0.4779)	(0.4462)	(0.4649)	(0.4462)		(0.2193)	(0.2193)	(0.3753)	(0.1823)	(0.3753)
EDP	1.43***	1.70***	1.43***	0.35	0.76	0.35	3.85***	5.53***	3.85***	omitted	-2.19***	-2.19***	-1.62***	-0.29	-1.62***
	(0.4291)	(0.5854)	(0.4291)	(0.4795)	(0.8479)	(0.4795)	(0.4590)	(0.5843)	(0.4590)		(0.7461)	(0.7461)	(0.3865)	(0.3548)	(0.3865)
EOS	0.01	-0.07	0.01	1.07***	0.42	1.07***	0.35	1.00**	0.35	omitted	-0.81	-0.81	-0.76**	-0.27	-0.76**
	(0.3546)	(0.3122)	(0.3546)	(0.3863)	(0.3933)	(0.3863)	(0.4381)	(0.4069)	(0.4381)		(0.4492)	(0.4492)	(0.3613)	(0.2418)	(0.3613)
Y			-0.07			-1.85***			-0.39			2.00***			-1.49***
			(0.4496)			(0.4429)			(0.4378)			(0.1690)			(0.1678)
SSxY			-1.25***			empty			0.35			0.15			0.42
			(0.4784)						(0.5232)			(0.5148)			(0.3010)
SPxY			-1.78***			1.00**			0.06			omitted			1.56***
			(0.4498)			(0.4861)			(0.7353)						(0.3468)
EHSxY			1.22**			-0.09			-0.04			omitted			0.42
			(0.5736)			(0.6272)			(0.7881)						(0.4137)
EBAxY			0.97			-.35			-1.14			omitted			0.84**
			(0.5545)			(0.6404)			(0.6444)						(0.4173)
EDPxY			0.27			0.41			1.68**			omitted			1.33**
			(0.7258)			(0.9741)			(0.7430)						(0.5247)
EOSxY			-0.08			-0.65			0.65			omitted			0.49
			(0.4724)			(0.5513)			(0.5979)						(0.4347)
Cons.	-4.26***	-4.33***	-4.26***	-2.94***	-4.79***	-2.94***	-3.85***	-4.23***	-3.85***	-2.41***	-0.41***	-2.41***	2.43***	0.95***	2.29***
	(0.2972)	(0.3374)	(0.2972)	(0.1674)	(0.4101)	(0.1674)	(0.2465)	(0.3618)	(0.2465)	(0.1408)	(0.0935)	(0.1408)	(0.1350)	(0.0997)	(0.1263)
N	1076	1076	2152	1076	1076	2006	1076	1076	2152	765	1076	1841	1076	1076	2152
Period	1915	1934	1915&34	1915	1934	1915&34	1915	1934	1915&34	1915	1934	1915&34	1915	1934	1915&34

While peerage and samurai were likely to choose the jobs in the public sector and political office, commonage were likely to work in the business sector. We find this separation of the occupations by social strata both in 1915 and 1934 but this tendency weakened from 1915 to 1934. Educational background is only important for becoming bureaucrats and members of profession in 1915; however, the holders of bachelor and/or PhD gained advantage to join the business world in 1934, too. These findings clearly show that social strata, an innate factor, decreased the influence on the

choice of occupation and instead educational background, an acquired factor, increased the influence.

Intergenerational Income Mobility

As stated above, a distinctive feature of our dataset is it links fathers and sons. Exploiting this advantage, we analyze intergenerational income mobility. We add logged value of fathers' income to the equations 1-3 and estimate the coefficients (see table 9). Also, we report the estimated coefficients of the following equation to see the intergenerational impact by each social strata, occupation, and education:

(5) $INC = \alpha + \beta_{FINC}\, FINC + \beta_{SS}\, SS + \beta_{SP}\, SP + \beta_{OBR}\, OBR + \beta_{OPO}\, OPO + \beta_{OPR}\, OPR + \beta_{OLA}\, OLA + \beta_{OBU}\, OBU + \beta_{EHS}\, EHS + \beta_{EBA}\, EBA + \beta_{EDP}\, EDP + \beta_{EOS}\, EOS + \beta_{SS}\, SS + \beta_{FINCxSS}\, FINCxSS + \beta_{FINCxSP}\, FINCxSP + \beta_{FINCxOBR}\, FINCxOBR + \beta_{FINCxOPO}\, FINCxOPO + \beta_{FINCxOPR}\, FINCxOPR + \beta_{FINCxOLA}\, FINCxOLA + \beta_{FINCxOBU}\, FINCxOBU + \beta_{FINCxEHS}\, FINCxEHS + \beta_{FINCxEBA}\, FINCxEBA + \beta_{FINCxEDP}\, FINCxEDP + \beta_{FINCxEOS}\, FINCxEOS + \varepsilon$

Table 9.

	(1-A)		(2-A)		(3-A)		(5)	
FINC	0.33***	(0.0338)	0.24***	(0.0319)	0.24***	(0.0319)	0.19	(0.1589)
SS	-0.34***	(0.0905)	-0.09	(0.0857)	-0.09	(0.0027)	0.72	(1.0029)
SP	-0.40***	(0.0927)	0.29***	(0.1115)	0.26**	(0.0876)	-0.53	(0.8772)
AGE	0.00	(0.0028)	0.00	(0.0027)	-0.00	(0.1125)	-0.04	(0.0277)
OBR			-0.39***	(0.1158)	-0.37***	(0.1171)	2.33	(1.3797)
OPO			-0.08	(0.1484)	-0.10	(0.1482)	-0.67	(1.3538)
OPR			-0.03	(0.1177)	-0.09	(0.1539)	3.05	(1.7340)
OLA			0.81***	(0.0849)	0.82***	(0.0858)	1.25	(0.7719)
OBU			0.82***	(0.0844)	0.83***	(0.0845)	2.59***	(0.7962)
EHS					-0.02	(0.0787)	-0.53	(0.7665)
EBA					-0.07	(0.0724)	-0.88	(0.7583)
EDP					-0.05	(0.1932)	-3.58	(2.31)
EOS					0.33***	(0.0980)	1.29	(0.9821)
SSxFINC							-0.09	(0.1195)
SPxFINC							0.10	(0.1001)
AGExFINC							0.00	(0.0032)
OBRxFINC							-0.31	(0.1624)
OPOxFINC							0.06	(0.1549)
OPRxFINC							-0.36	(0.2028)
OLAxFINC							-0.05	(0.0871)
OBUxFINC							-0.20**	(00902)
EHSxFINC							0.06	(0.0871)
EBAxFINC							0.09	(0.0865)
EDPxFINC							0.41	(0.2739)
EOSxFINC							-0.11	(0.1094)
cons.	6.87***	(0.3290)	6.84***	(0.3082)	6.85	(0.3123)	7.32***	(1.4050)
N	1076		1076		1076		1076	

First, comparing the result of (1-A) with (2-A) in table 9, we find the estimated coefficient of father's income in the equation (2-A) is 0.33. This is the elasticity of son's income to father's income. Dribe and Helgertz (2016) report that the elasticity in Sweden from 1815-2011 is 0.18. As their data cover around 200 years, direct comparison is not easy, but intergenerational income mobility within elites in early twentieth century Japan was significantly lower than the estimated result of Dribe and Helgertz (2016). On the other hand, in case we add occupational variables, the coefficient on fathers' decreased to be 0.24. It indicates that father's income correlates with occupational choice. An interesting result is that in case we add the variables interacting father's income with occupation variable, the coefficient on OBUxFINC is negative and statistically significant. It suggests that going to business was a way to weaken the fetter of father's economic status.

5. Concluding Remarks

Our empirical results are unambiguous. Japan's industrialization did seem to have a positive impact on income mobility, and this increase in income mobility was supported by the business

sector. Both in 1915 and 1934 landowners and businessmen were likely to earn more money than other persons. However, the income of businessmen increased from 1915 to 1934, while landowners' did not. Furthermore, the income earned by working in the public sector became relatively lower than the ones earned by working in other sectors. By working for the business sector, people could raise their positions in the economic elite group. A closer look at each business sector reveals that financial sector grew most from 1915 to 1934, and to a lesser extent manufactural sectors, both light industry and heavy and chemical industry, developed during the period.

On the other hand, it is remarkable that innate traits still mattered. Overall, peerage kept wealthier than commonage although some wealthiest commoners earned income as equal as or more than the upper-class people did. Social strata influenced separation of the occupations. Moreover, fathers' income strongly influenced their sons' income. However, to a greater or lesser extent these tendencies weakened from 1915 to 1934 mainly due to development of the business sector. Many of commoners became wealthy by working as businessmen or land-owners. In the business world, the impact of fathers' income on their sons' weakened. Income mobility increased not in the public sector but in the private sector.

It should be noted that this is the mobility within the elites. What we found is that new economic elites, i.e. business people, emerged and increased their presence in the top of the income hierarchy, and that they contributed to enhance the intergenerational mobility of income. Lastly, we add some notes about education. We cannot find any significant impact of educational background on income as long as looking at the incomes of wealthy people in 1915 and 1934. The exception is oversea study experience. Government and companies were eager to hire the person that acquired western knowledge and paid high salaries to them both in 1915 and 1934. This reflects that the Japanese unique situation that Japan industrialized by acquisition of western technology. Although high education did not influence income, we find a sign that education might increase income mobility in later years: the bachelor and/or PhD holders had an advantage to become government officials and politicians in 1915 but widened their advantage to the business world in 1934. During the period, educational level of wealthy commoner greatly improved as well. Industrialization gradually started to increase the importance of education for career success even in the business world and among commonage.

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