What keeps Japanese youth's employment rate high? The role of educational upgrading[1]

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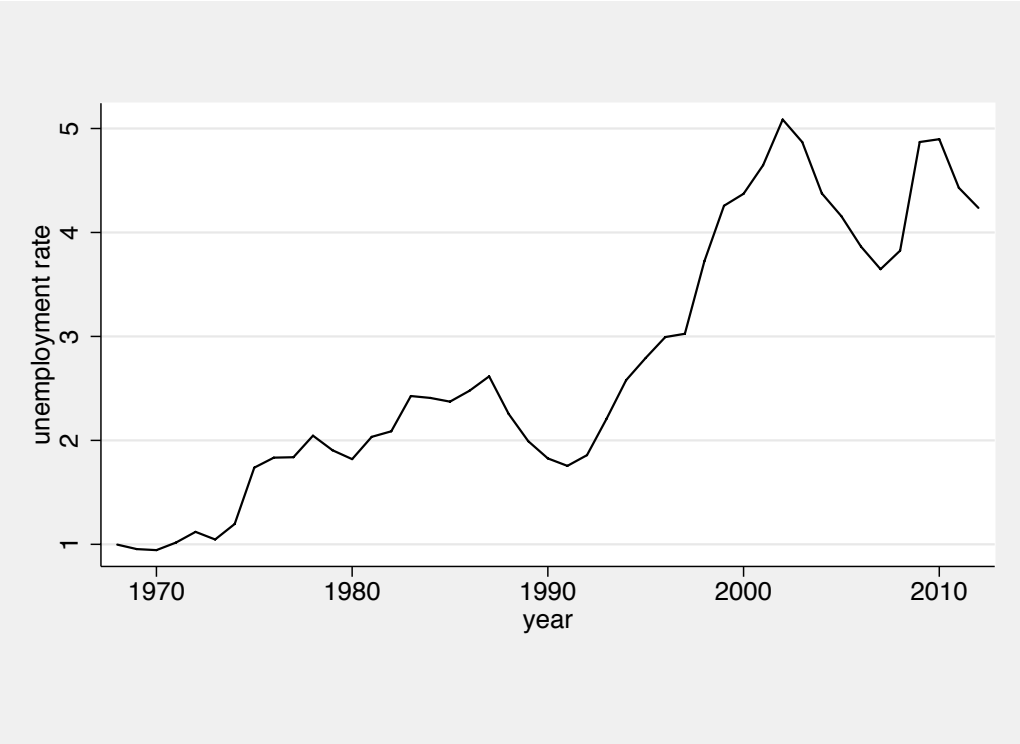
1 Introduction

Despite the apparent success of the economics policies led by Prime Minister Shinzo Abe since he has taken office in December 2012, harsh critics continue to be skeptical on the success of his policy package. Even his opponent reluctantly agree that his demand side policies including unprecedented expansionary monetary policy by Bank of Japan and the increase of fiscal spending might have filled the demand shortage and put the Japanese economy back on the right track. However, they are still skeptical whether the supply side reforms such as deregulations and the labor market reform could be effectively implemented. Among the proposed reforms, Prime Minister Abe emphasizes the importance of preparing youth for the rapid progress of global interdependence of economic activities and providing women career opportunities to accommodate future labor shortage because of rapidly aging population. Hence, a significant question to shape future policy is how well Japanese youth labor market accommodated environmental changes and identify the obstacles, if there is any.

Looking back the past three decades of Japanese youth labor market, its performances in recent years have been less than stellar. Many studies point out the deterioration of the youth labor market outcomes, particularly in terms of employment rate (e.g. Genda (2006) and Mitani (2008)). What is much less frequently pointed out, however, is that the employment rate of male youth continues to be the highest and the female youth employment rate become one of the highest from the lowest in the last three decades among major developed countries.

Sharing the same experience of rapid technological progress and deepening off-shoring with other developed countries, the employment-population rate of Japanese youth aged between 25 and 29 are high compared with the performances of these countries. In this paper, we demonstrate that educational advancement played a significant role to keep the relatively high employment rate among Japanese youth.

Figure 1: Japan's Unemployment Rate, 1968–2012 (Source: OECD)

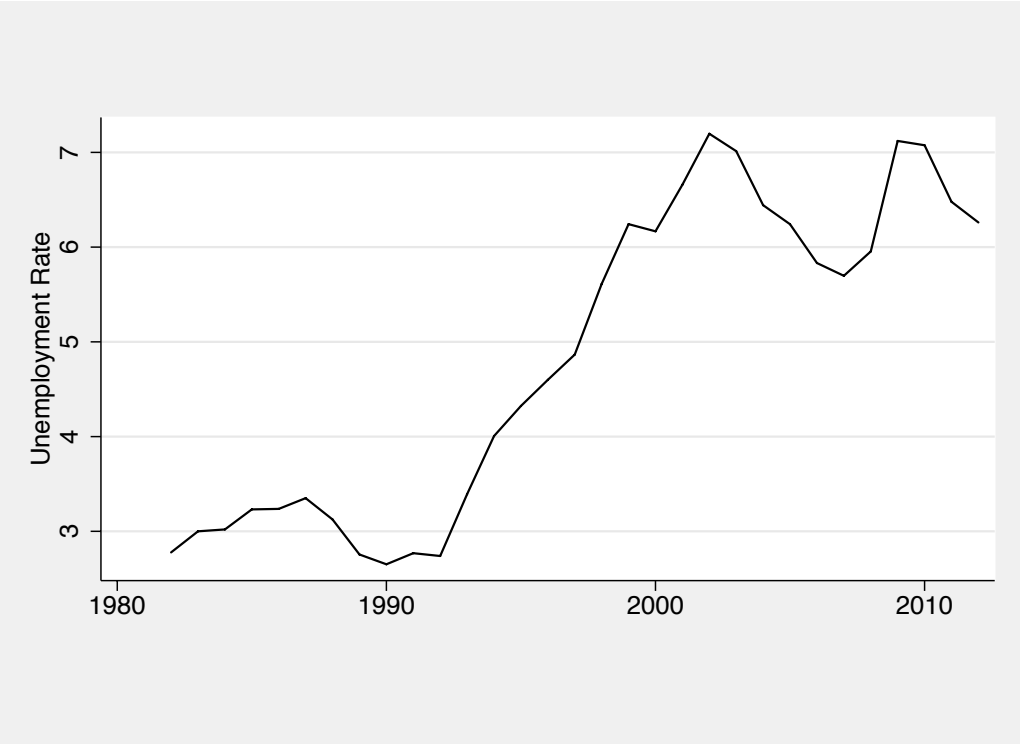


2 Japanese youth's employment rate in the international context

Japan's extremely low unemployment jumped up after the two oil crisis in 1974 and 1979 and decreased in the last 1980s when the economy boomed. It then increased steadily after the bubble burst in 1991 as illustrated in Figure 1. The source of the high and persistent unemployment rate has been the subject of intensive research. A number of attempts have been made to identify the causes of the high and persistent unemployment regime. Those include labor market segmentation (Abe and Ohta, 2001), worker flows (Kuroda, 2003, Ling and Miyamoto, 2012), cyclical behavior (Miyamoto, 2010), and regional patterns of low-skilled labor (Abe and Tamada, 2010).

Among various potential causes, youth labor market attracted much of attention. Figure 2 shows the unemployment rate for young workers (25–29 years old). The level depicted

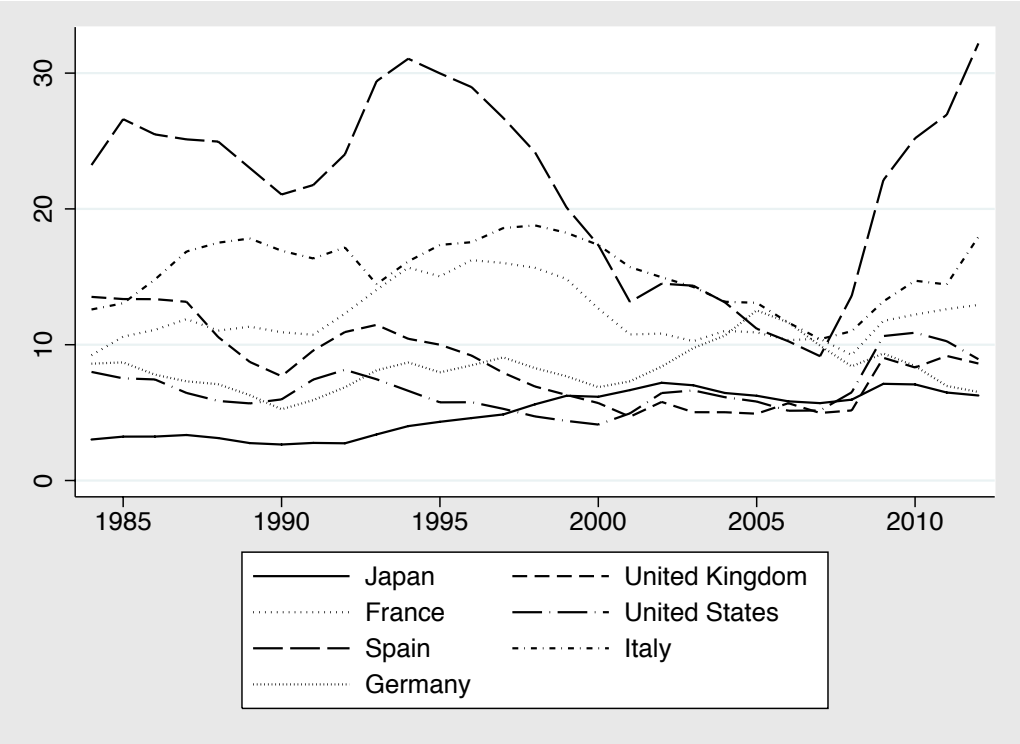
Figure 2: Japan's Unemployment Rate, Age 25–29, 1984–2012 (Source: OECD)



in Figure 2 in comparison to Figure 1 shows the seriousness of the youth labor market. A possible explanation for this is considered as the difficulty in market entry for young workers (Kondo, 2007 and Genda, Kondo, and Ohta, 2010).

While the situation looks bleak in inter-temporal comparison, international comparison provides quite a different perspective. Figure 3 shows the unemployment rate for 7 OECD countries. Japan's unemployment rate was exceptionally low until mid 1990s. Despite the steady increase from the 1990s until early 2000s, Japan's unemployment can still be considered as the lowest one among 7 countries mainly because of the Japanese unemployment rate's insensitivity to the financial shock in 2008. International comparison among the OECD countries from the 1960s to the 1990s was conducted by Nickell, Nunziata, and Ochel (2005). They point out that broad variation (about 55%) among the OECD countries can be explained by changes in labor market institutions and the remainder was due to the deep recession. Remember that Japan has experienced the great recession in the 1990s and the

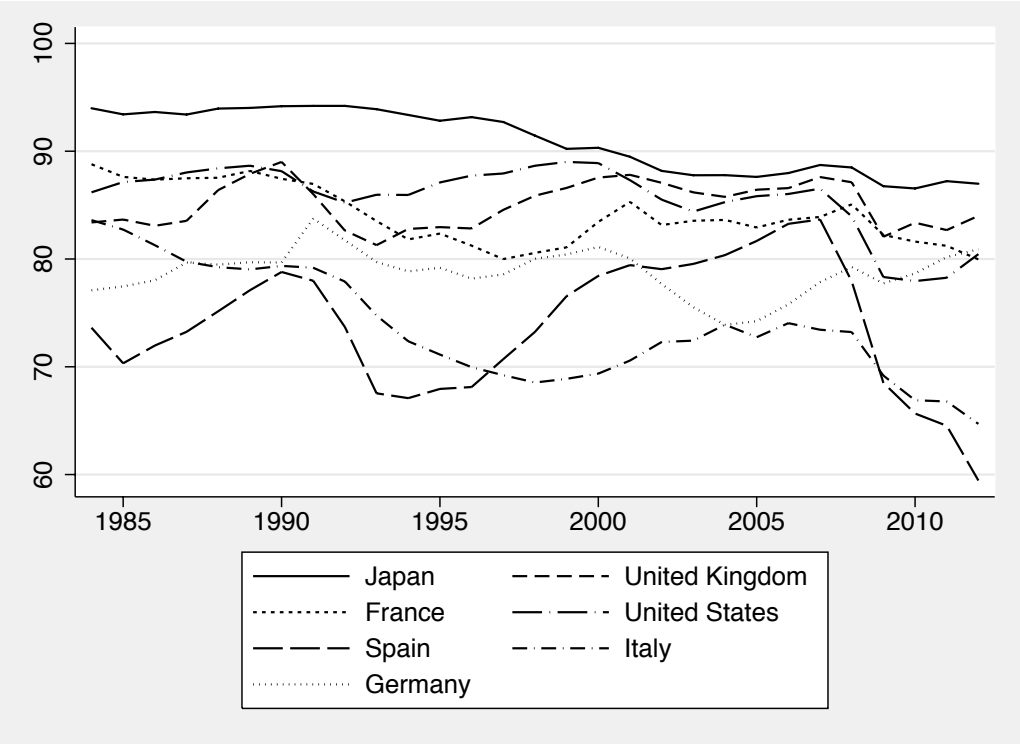
Figure 3: Unemployment Rate, Age 25–29, 1984–2012 (Source: OECD)



2000s. If the recession can explain the remaining 45%, Japan's unemployment should have been much higher than we have observed. Thus one of the main objectives of this paper is to investigate factors that contributed to maintain the low unemployment rate despite the great recession.

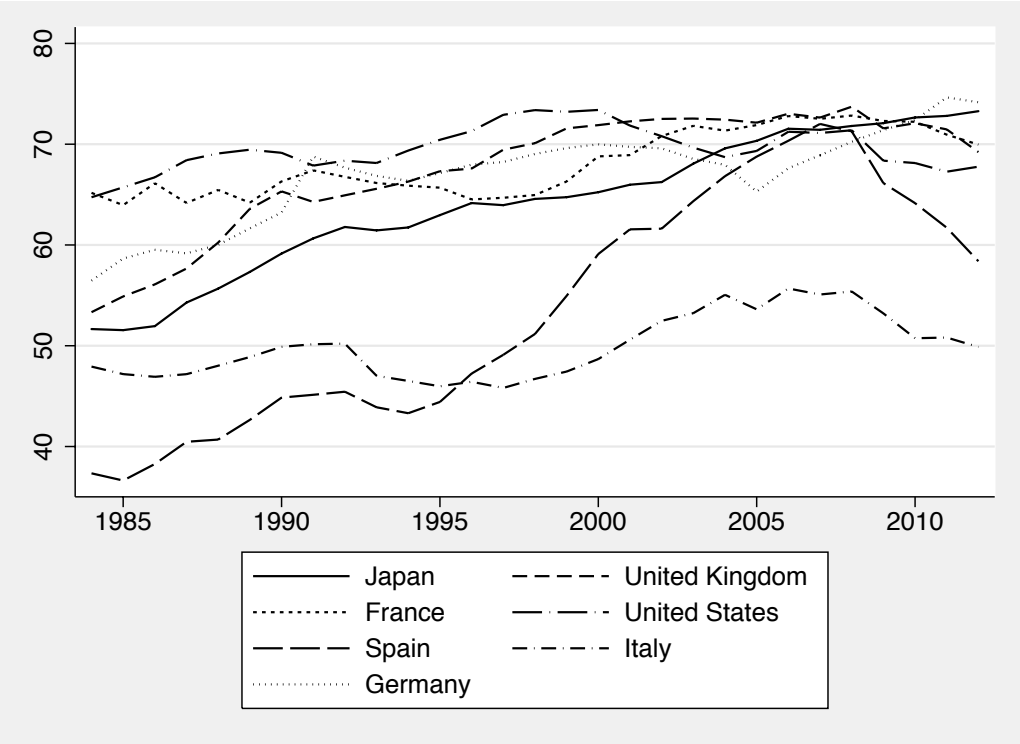
To understand what causes the unemployment rate movement, we pay attention to non-employment rather than unemployment itself since the inflow and outflow from unemployed to not-in-the-labor-force can play an important role in explaining the movements as discussed by Kuroda (2003). Figure 4 shows the employment/population ratio for young men for the same OECD countries as those in Figure 3. The movement of Japan's employment/population is closely related to that of the unemployment rate. We observe the very high employment/population ratio until the middle 1990s. It steadily declined from 93 % to around 87% until 2002 and then stayed there for a while until 2007 when it drops to 85% in 2007. Figure 5 shows the employment/population ratio for young women for the same

Figure 4: Employment/Population Ratio for Men, Age 25–29, 1984–2012 (Source: OECD)



OECD countries. Figure 5 exhibits a totally different trend. We observe almost monotone increase in the employment/population ratio for the entire period starting from around 50% and climbing over 70%. It may be broken into three periods, after 1986 until 1997, 1998 until 2007 and then after 2007. The growth rates of employment are always positive but gradually come down. Figures 4 and 5 shows that it is important to study the non-employment for men and women separately and we proceed accordingly.

Figure 5: Employment/Population Ratio for Women, Age 25–29, 1984–2012 (Source: OECD)



3 Structural change of Japanese economy between 1982 and 2007 and its effect on low-skilled labor force

3.1 Technological Progress

Effects of technological change, especially skill-biased technological changes (SBTC), on wages and demands for skilled and unskilled workers are studied theoretically and empirically by Bound and Johnson (1992), Berman, Bound, and Griliches (1994), Johnson (1997), Berman, Bound, and Machin (1998) and Machin and Van Reenen (1998) among others. These studies find increase in relative demands for skilled workers and rise in their relative wages. Machin and Van Reenen (1998) finds that a clear effect of SBTC for seven OECD countries including Japan. Sakurai (2001) investigate the influence of SBTC for manufacturing in Japan and reaches the same conclusion. Although they found strong evidence in manufacturing, the effect is also profound in service sectors as discussed in Levy and

Murnane (1996).

3.2 Globalization

Increased openness affects wages and demands for skilled and unskilled workers in several ways. Two major paths considered in the literatures are through international trade and foreign outsourcing. First, increase in international trade can cause reallocation in employment via Stolper-Samuleson effects. Sachs and Shatz (1994) and Krueger (1997) recognized the influence of international trade on wages for skilled workers. Borjas and Ramey (1995) pointed out that international competition is a major cause for the demand shifts for skilled workers. However, the contribution of increased trade to employment, at least in the U.S., are found to be small relative to SBTC by Berman, Bound, and Griliches (1994), Johnson (1997) and Berman, Bound, and Machin (1998). Sakurai (2004) finds that the effect of international trade is not large for Japanese labor market. Second, foreign outsourcing can affect labor market since importing unskilled-intensive (intermediate) goods lead to the shift of employment to skilled workers within industries. Feenstra and Hanson (1996, 1999) find substantial increase in wages and demands for skilled workers in the U.S. labor market. For Japan, an increase in relative demands for skilled workers are observed due to outsourcing to Asia by Ahn, Fukao, and Ito (2008).

4 Data

We use the Employment Status Survey (ESS) which is a quanqiannual household survey based on two-step stratified sampling method; the first step randomly selects about 32,000 census track from 8 strata and the second step randomly samples 440 thousands dwelling units. The survey asks the employment status and the educational background, along with the demographic information, of each member aged 15 or older. We construct the analysis sample by extracting sex, age, educational background and employment status of each

member from the micro data between 1982 and 2007. We restrict our analysis sample to those age between 25 and 29 with valid demographic variables and education/employment status. The sample size of each year ranges from 53 thousand in 2007 to 78 thousand in 1997 reflecting the small population of the cohort born around 1980 and the large population of the cohort born around 1970.[1]

The ESS records each household member's educational background by four categories until 2002; 1: junior high school (9 years of education), 2: high school (12 years of education), 3: junior college, technical college and vocational school (13-15 years of education), and 4: university or more (16+ years of education).

The first category includes junior high school. Completing 3 years junior high school, after completing 6 years primary school, has been compulsory since 1947. Therefore every individual in our analysis sample completed junior high school. Of those who only have junior high school education, about a half is likely to be high school drop out.[2]

The second category category, High school, admits junior high school graduates typically based on academic performances in the entrance examination and requires three years to complete. Its curriculum is either general or vocational but the majority of students attend general high schools.[3]

The third category, junior college, technical college and vocational school, nests a whole variety of educational institutions. Junior college admits high school graduates to typically 2 years curriculum on liberal arts, which is traditionally designed for women. The number of students attending junior college has been declining and instead the number of students attending 4 years colleges/universities are increasing among women. Technical college ad-

[1]The large cohort population born around 1970 is the children of baby boom generation.

[2]According to Basic Survey of Schools by Ministry of Education, Culture, Sports, Science and Technology, as of 2011, 98 percent of junior high school graduates proceed to high schools but about 2 percent of them drop out the high schools.

[3]According to Basic Survey of Schools by Ministry of Education, Culture, Sports, Science and Technology, as of 2010, 72 percent of high school students attend general course, 8 percent attend manufacturing course, 7 percent attend commercial course, 5 percent attend comprehensive course that offers a mixture of general and vocational courses, 3 percent attend agricultural course. Remaining minority attend courses such as home making, social work, nursery, fishery, informatics and miscellaneous courses.

mits junior high school graduates to 5 years curriculum typically on engineering subjects. Technical college rapidly expanded during the 1960s to accommodate the growing demand for engineers because of the rapid industrialization. Vocational school is a non traditional educational institution that admits high school graduates with a few exception offering 1 to 3 years curriculum on practical subjects such as nursing, architecture, computer engineering and others.

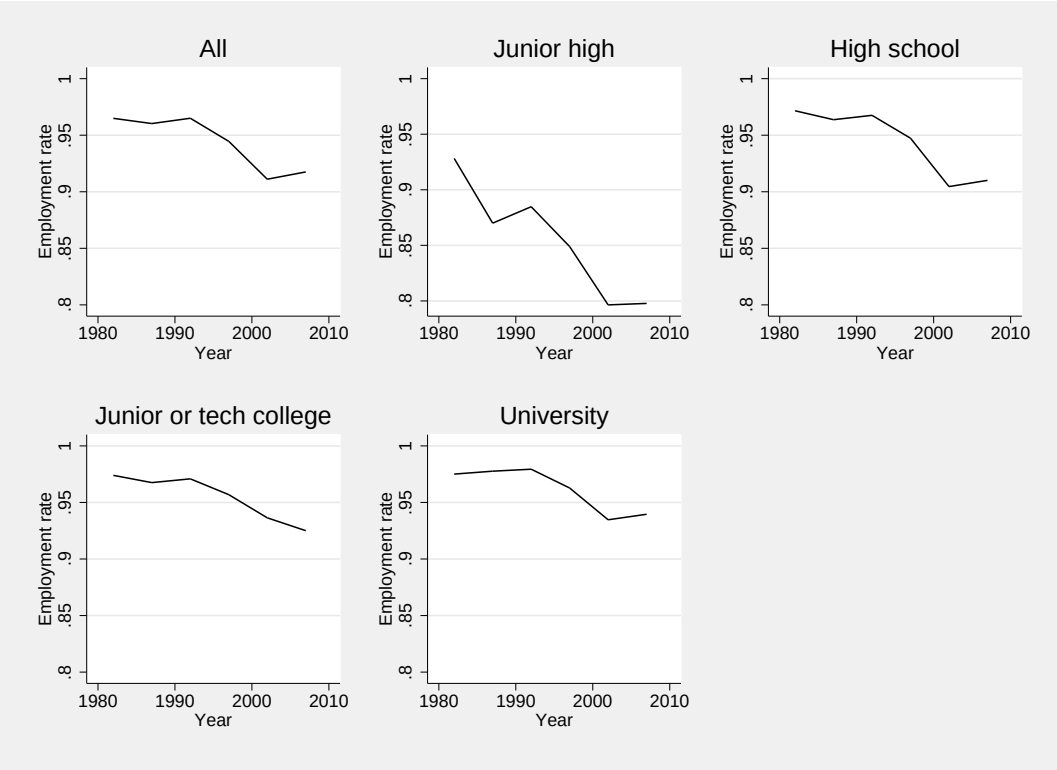
The fourth category includes university and graduate school. The university admits high school graduate and offers 4 years curriculum.[4] Each school is divided by academic discipline such as law, economics, literature, natural science, engineering and medical departments. Each department admits students based on the performance in the entrance examination. Graduate school admits 4 year university graduate and consists of 2 years master course and subsequent 3 years doctoral course.

The ministry of education of Japanese government regulates the curriculum up to high school and primary, junior high and high schools have to choose its textbooks among the books approved by the ministry. While the ministry does not regulate the curriculum of university, founding a university or an expansion of student capacity must be approved by the ministry. The screening process had been strict until the 1992 loosening of the criteria. The vocational school is an unique exception from the strict governmental regulations. The schools can be founded by simply registering it to local government; the establishment or the capacity expansion need not be approved by the government.

The 2007 survey significantly expands the questionnaire on educational background. The third category used until 2002 is divided into two distinct categories: junior and technical college and vocational school. The fourth category used until 2002 is divided into two: university and graduate school.

[4] 6 years curriculum for medicine, dentistry, veterinary medicine and pharmacy.

Figure 6: Male employment rate of age 25-29, 1982-2007

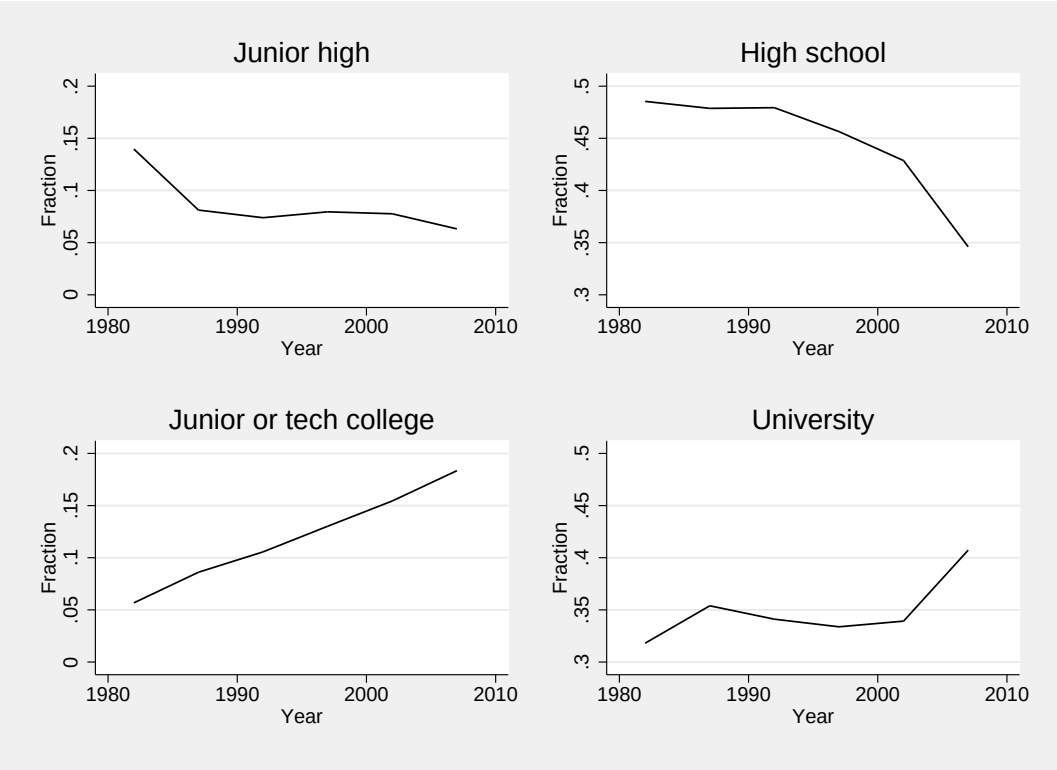


5 Educational upgrading and employment rate of Japanese youth

This section demonstrates that upgrading of educational background of Japanese youth contributed to keep their employment rate high in international context. The educational upgrading of male youth mitigated the employment rate decline and that of female youth promoted the employment rate increase.

To access the role of educational upgrading in mitigating the deterioration of the employment rate of young adult male, we first decompose the change of the employment rate of male aged between 25 and 29 by educational background. Figure 6 shows that the employment rates of all education groups fell in the last two and half decades.The deterioration was most pronounced among junior high school graduate; the employment rate significantly dropped from 93% in 1982 to 80% in 2007. The drop was least significant among university graduates

Figure 7: Male educational composition of age 25-29, 1982-2007



whose employment rate was 98% in 1982 and 94% in 2007. The more significant drop of employment rate among less educated youth is striking given the fact that the fraction of less educated among the whole youth population has significantly declined as reported in Figure 7 and it reflects the demand shrinkage for them so that their offered wage underwent their reservation wages. While one may argue that the increase of reservation wage explains the fall of employment rate among less educated, but Genda (2007) reports that the income effect, which is a major source of increasing reservation wage, has attenuated throughout the 1990s.

While the employment rate of less educated young male decreased between 1982 and 2007, the educational background of youth between 25 and 29 was upgraded. Figure 7 shows that the fraction of junior high school graduates decreased from 14 % to 7% between 1982 and 1987 and stayed around 7% since then. The fraction of high school graduates hovered around 47% between 1982 and 1992 and significantly dropped down to 35% in 2007.

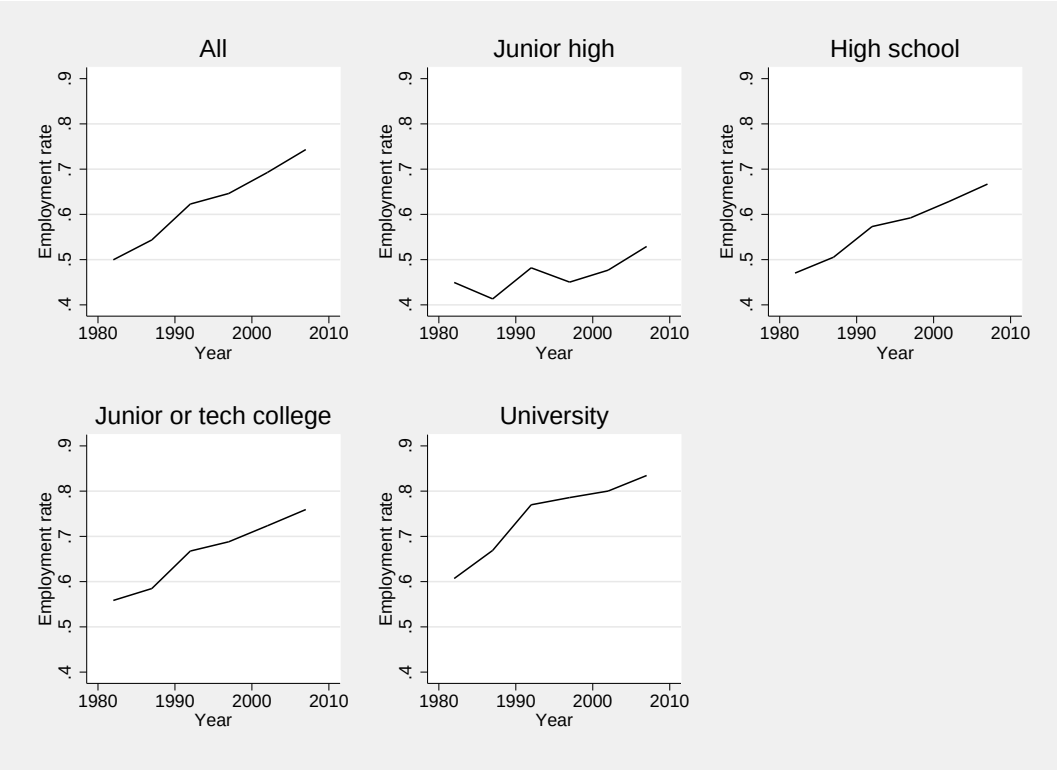
The sharp increase of junior/tech college or vocational school graduates largely compensated the decline of high school graduates. The fraction of this category monotonically increased from 6% in 1982 to 18% in 2007. The fraction of university graduates stayed around 35% until 2002 and surged up to 41% in 2007.

The stagnated fraction of college graduates may need some explanation. As explained in the previous section, the foundation or the expanding the capacity of university was heavily restricted until 1992 while the population size of 18 years old peaked in 1990 because of the second baby boomers. The combination of limited capacity and growing cohort size depressed the fraction of college graduates among youth aged between 25 and 29 until the early 2002. The deregulation and the shrinking cohort size loosened the capacity constraint, resulting in the soaring fraction of college graduates between 2002 and 2007 (See Kawaguchi and Mori (2014) for detail).

To summarize the findings for male youth, the fraction of high school graduates dropped significantly and junior/tech college or vocational school graduate soared almost by the same amount as found in Figure 7. This educational upgrading, however, is expected to have minor impact on the overall employment rate because the difference between the employment rates of high school graduates and that of junior/tech college or vocational school graduates is not very large as found in Figure 6. We will formally demonstrate this after describing the trends for female youth.

Figure 8 draws the employment rate of female youth by their educational background. The overall employment rate of female aged between 25 and 29 increased from 50% in 1982 to 75% in 2007. Except for junior high school graduates, the employment rate of each group increased by about 20 percentage points during the same period. Since the level of employment rate differs significantly across education groups, the educational upgrading plays a significant role for the overall increase in the employment rate. For example, the employment rate of university graduates is at least 10 percentage point higher than high school graduates in any arbitrary year between 1982 and 2007. Also the employment rate of

Figure 8: Female employment rate of age 25-29, 1982-2007



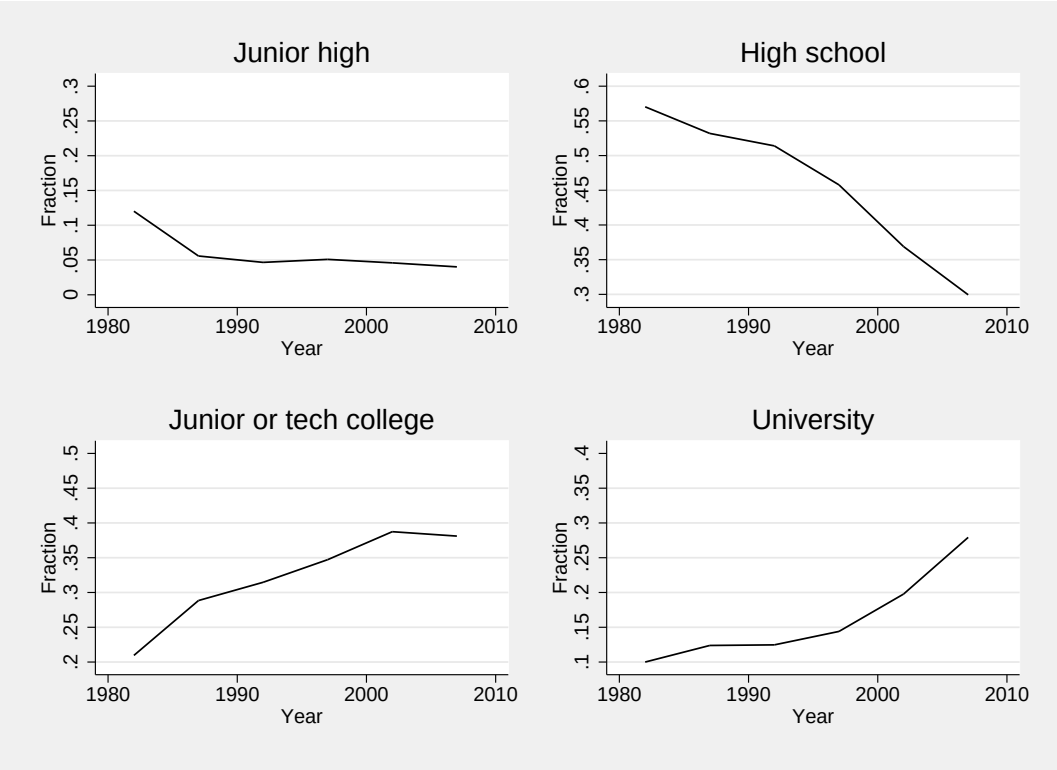
junior/tech college or vocational school graduates is at least 5 percentage points higher.

Figure 9 draws the composition of educational background of female youth. The fraction of junior high school graduates dropped from 12% in 1982 to 5% in 1987 and hovered around 5% since then. The fraction of high school graduates drastically decreased from 57% in 1982 to 30% in 2007. This significant drop is compensated by the increase of junior/technical college or vocational school graduates from 20% in 1982 to 38% in 2007. The fraction of university graduates also increased from 10% in 1982 to 28% in 2007. The steady increase of university graduates since 1992 makes a sharp contrast to the trends for male.

To summarize the findings for female, the significant educational upgrading evidenced by Figure 9 would have contributed to the increase of employment rate of them because the employment rate is significantly higher for more educated than less educated.

We now quantify the contribution of educational upgrading on the overall employment rate. To attain this goal, we calculate the counter factual employment rate if the educational

Figure 9: Female educational composition of age 25-29, 1982-2007



composition would have stayed at the 1982 composition. The counter factual employment rate is calculated as:

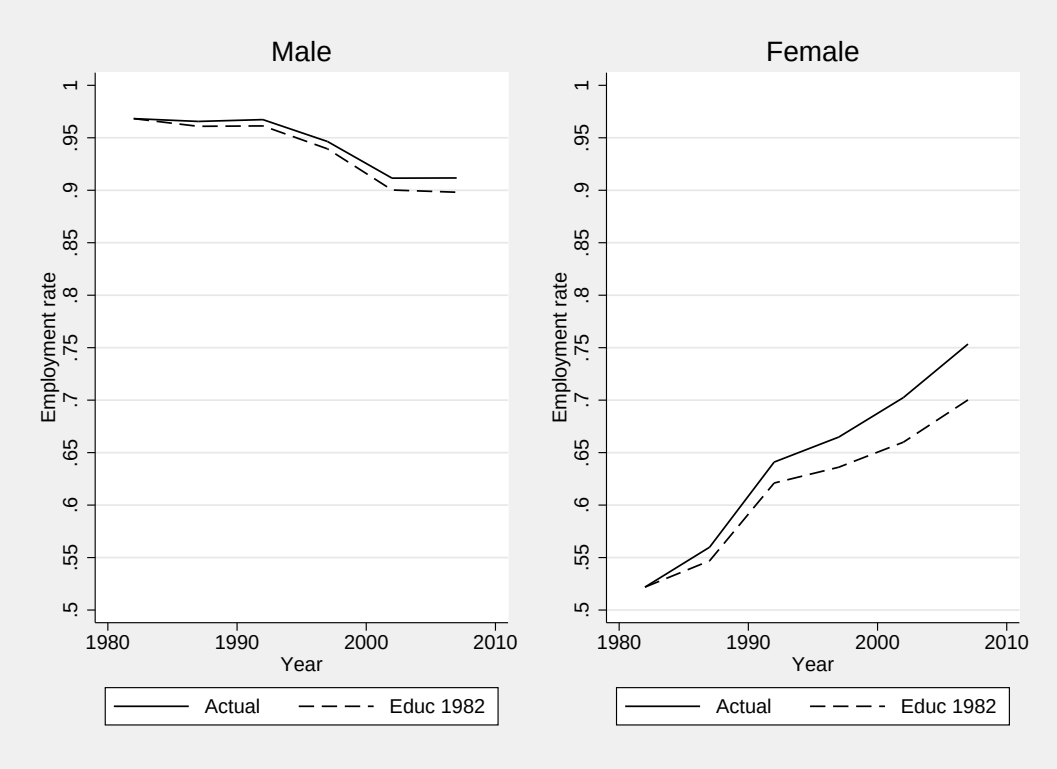
$$emp_t^{1982} = \bar{x}_{1982}\hat{\beta}_t, \tag{1}$$

where x is the vector of education dummy variables and $\bar{x}_{1982}$ is the mean vector of the education dummy variables in 1982. The estimated parameter $\hat{\beta}_t$ is obtained by regressing *emp* in year t on x in year t. This counter factual employment rate is compared to the actual employment rate denoted as

$$\hat{emp}_t^t = \bar{x}_t\hat{\beta}_t. \tag{2}$$

Figure 10 displays the results of this exercise for male and female. For men, without the educational upgrading, the employment rate would have decreased by 7 percentage points where as the actual drop was 6 percentage points. The contribution of educational upgrading on the male youth employment rate is quantitatively limited. On the contrary,

Figure 10: Counter factual evolution of employment rate of age 25-29, 1982-2007



Actual: $e\hat{m}p_t^t = \bar{x}^t\hat{\beta}_t$; Education 1982: $e\hat{m}p_t^{1982} = \bar{x}^{1982}\hat{\beta}_t$

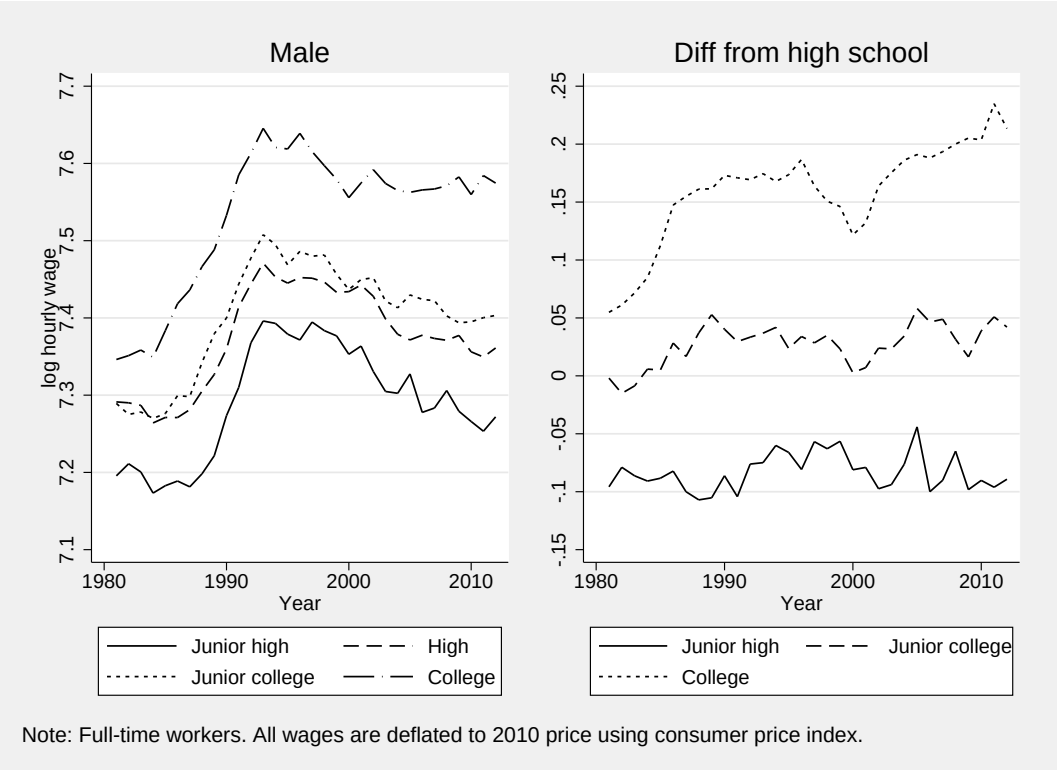
without educational upgrading, the female employment would have increased only by 17 percentage points compared with actual 22 percentage points. The difference between the actual growth and counter factual growth is about a quarter of the actual growth. Therefore, the educational upgrading of female plays quantitatively significant role to increase the employment rate of young female. Without educational upgrading, Japanese young female employment rate would have been among the middle of the OECD countries.

We documented a significant educational upgrading of Japanese youth for both sexes, but their educational upgrading may well be a result of supply increase of tertiary educated workers without demand increase for them. Examination of wage differentials by educational background is warranted to examine whether the quantity increase of tertiary educated workers is matched to the demand increase for them. If the speed of supply increase of tertiary educated workers surpassed the speed of demand increase for them, the return to tertiary education should have decreased.

We rely on Basic Survey of Wage Structure (BSWS) by Ministry of Health, Welfare and Labor to examine the time series of real hourly wage by educational background. BSWS is an annual survey of establishments randomly selected from establishments that hire more than 5 employees. The annual survey, asking the situation in June, includes about 1.5 to 1.7 million workers from 70 to 80 thousands establishments. Hourly wage for each worker is calculated as scheduled monthly wage plus one-twelfth of annual bonus in the last year, divided by scheduled monthly hours worked plus monthly overtime hours. Hourly wage is deflated by consumer price index to 2010 price.

Figure 11 illustrates mean log real hourly wage by educational background of male age between 25 and 29. Real wage increased rapidly between 1987 and 1993 reflecting the bubble economy. Afterward, real wage has been on declining trends until 2012 except for university graduates whose wage decline had stopped since 2000. These wage decline or stagnation reflect the macroeconomic stagnation of Japan during the period. Reflecting the differential wage trends between university graduates and high school graduates, the wage

Figure 11: Male log real wage of age 25-29 by education, 1981-2012

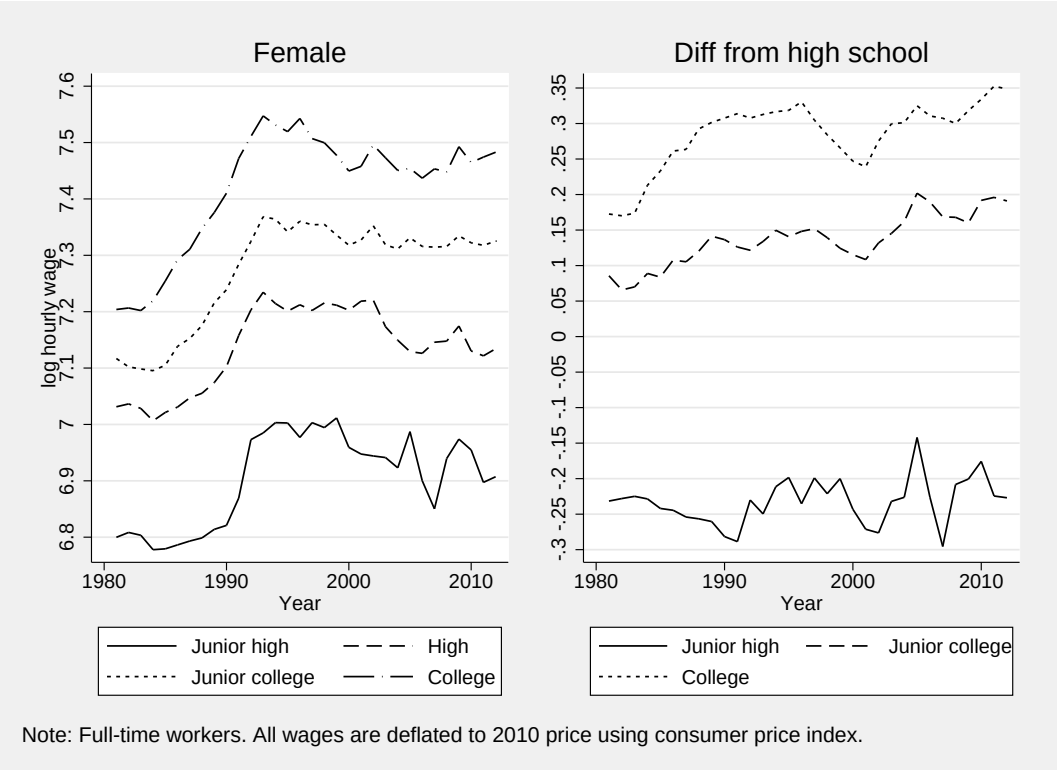


Note: Full-time workers. All wages are deflated to 2010 price using consumer price index.

differential between university and high school graduates had increased since 2000. The wage differential between junior / technical college graduates and high school graduates has been stable between 0 and 0.05 log points. It is notable that the return to tertiary education at least did not decrease regardless of the significant increase of tertiary educated workers. The increase of the return to university education and the stable return to junior / technical college education refute the claim that supply of tertiary educated workers increased without demand growth for them.

Figure 12 that illustrates mean log wage of female age between 25 and 29 indicates that mean log real wage increased until 1993 for all education groups. The wages has been almost stagnated afterward while the wage decline was not so severe as male workers. The wage differential between university graduates and high school graduates has been round 0.25-0.30 log points between 1990 and 2010. The wage differential between junior/technical college graduates and high school graduates has been around 0.15 log points between 1990 and

Figure 12: Female log real wage of age 25-29 by education, 1981-2012



Note: Full-time workers. All wages are deflated to 2010 price using consumer price index.

2010. Similar to the trends for male, the return to tertiary education has been stable in the last two decades while the quantity of tertiary educated workers has significantly increased in the same period. Significant increase of tertiary educated workers with stable return to tertiary education implies that both demand for and supply of tertiary educated workers have increased in the last two decades.

As a digression, it is worth mentioning the gender difference in the returns to education. Comparison of Figures 11 and 12 reveals that the return to higher education is higher for female workers than for male workers. There are arguably two major reasons for this. Firstly, as shown in the next section, there are significantly more male workers than female workers in construction and manufacturing sectors. Many less educated male workers work in construction and manufacturing sector as blue collar workers and earn higher wages so that higher wage compensates for worse working environment as the compensating wage differential theory predicts. Better employment opportunities for less educated male workers

tend to suppress the return to education. Secondly, among tertiary educated workers, male workers are more likely to be involved in long term implicit employment contract and face steeper experience-wage profile than female workers (Miyoshi (2008)). As a result, the return to education evaluated at ages between 25 and 29 tend to be smaller among male workers than among female workers.

6 Restructuring of industrial composition

We have argued that the increase of tertiary educated Japanese youth in the last two and half decades has been met by demand increase for them. How were the increased educated workers absorbed into different industries, whose composition is itself changing. The upper panel of Table 1 tabulates the industrial composition of male workers aged 25-29 for each year. Contrary to our prior belief, the fraction of workers in construction and manufacturing is rather stable. Around 13% of male aged 25-29 engage in construction industry and 25% in manufacturing industry. Major compositional changes were the decrease in retail and wholesale industries and the increase in service industry. More striking is the changes in the fraction of tertiary educated workers in each industry reported in the lower panel of Table 1. We confirmed that the return to tertiary education has not decreased during the analysis period at least. If young workers are mobile across industries and consequently the returns to education in each industry are identical, the increase of tertiary educated workers in each industry implies that the demand for tertiary educated workers in each industry increased.

The overall increase of tertiary educated workers can be attributed to the increase in the employment share in industry that originally hired more of tertiary educated workers and the increased of tertiary educated workers within each industry. The former effect is called as between (industry) effect and the latter is called as within (industry) effect. More specifically, the fraction of tertiary educated worker in year t, p_t is decomposed as $p_t = \sum_i p_{i,t}x_{i,t}$ where $p_{i,t}$ is the fraction of tertiary educated workers in industry i in year t and $x_{i,t}$ is the employment fraction of industry i in year t. Using this relationship, the

change in the fraction of tertiary educated workers is decomposed as:

$$p_{2007} - p_{1982} = \sum_i (p_{i,2007,} - p_{i,1982}) x_{i,1982} + \sum_i p_{i,2007}(x_{i,2007} - x_{i,1982}). \quad (3)$$

The first term corresponds to the within effect and the second term corresponds to the between effect. Among the 22.58 percentage points increase of tertiary educated workers, 21.76 percentage points is attributed to the within effect and the other 0.82 percentage points is attributed to the between effect. The results imply that the demand growth for tertiary educated workers combined with the supply increase of them in each industry is the main driver for the skill upgrading between 1982 and 2007.

The upper panel of Table 2 tabulates the industrial composition of female youth employment and the lower panel of the same table tabulates the fraction of tertiary educated workers in each industry. Contrary to the finding for male workers, the decrease in the fraction engaged in manufacturing, from 20% in 1982 to 13% in 2007, is apparent. Along with the findings for male workers, the fraction engaged in retail and whole sale industry decreased and those in service industry increased. The lower panel reveals that the fraction of tertiary educated workers increased in all industries. The decomposition analysis reveals that among the 34.73 percentage points increase of tertiary educated workers, the 30.85 percentage points is attributed to the within effect and the other 38.81 percentage points is attributed to the between effect.

The industrial analysis reveals that the demand for tertiary educated workers has universally increased across industries and the increased supply of tertiary educated workers are distributed across industries. Even in industries that were dominated by low skill workers in 1982, the skill demand has increased over the two and half decades. The contemporaneous increase of tertiary educated workers has matched the demand increase. Skill biased technological change (SBTC) is the most probable cause for the demand shift for skilled workers within an industry. The dominant role of within industry demand shift than between industry demand shift is consistent with the findings in many previous studies such as Katz and

Table 1: Industrial composition and the fraction of workers with tertiary education, male age 25-29

	1982	1987	1992	1997	2002	2007
Composition						
Primary	0.03	0.03	0.02	0.01	0.01	0.02
Construction	0.13	0.11	0.11	0.13	0.14	0.11
Manufacturing	0.24	0.25	0.27	0.25	0.23	0.24
Retail&Wholesale	0.22	0.22	0.19	0.20	0.17	0.16
Finance	0.04	0.04	0.05	0.04	0.03	0.03
Communication	0.08	0.08	0.09	0.09	0.13	0.13
Public Utility	0.01	0.01	0.01	0.01	0.01	0.01
Service	0.18	0.21	0.22	0.22	0.25	0.27
Government	0.07	0.05	0.04	0.04	0.04	0.05
Fraction of tertiary educated						
Primary	0.14	0.19	0.25	0.28	0.36	0.41
Construction	0.21	0.29	0.28	0.29	0.29	0.35
Manufacturing	0.33	0.41	0.40	0.45	0.43	0.50
Retail&Wholesale	0.39	0.42	0.45	0.48	0.57	0.66
Finance	0.67	0.74	0.79	0.82	0.82	0.88
Communication	0.19	0.19	0.22	0.28	0.55	0.64
Public Utility	0.27	0.33	0.41	0.51	0.41	0.49
Service	0.59	0.65	0.61	0.61	0.59	0.71
Government	0.47	0.54	0.58	0.60	0.60	0.80

Note: Upper panel reports the industrial composition of young workers that should add up to one for each year. Lower panel reports the fraction of tertiary educated workers in each industry and in each year. Primary sector includes agriculture, fishery, forestry and minings sectors.

Table 2: Industrial composition and the fraction of workers with tertiary education, female age 25-29

	1982	1987	1992	1997	2002	2007
Composition						
Primary	0.05	0.03	0.01	0.01	0.01	0.01
Construction	0.03	0.03	0.04	0.04	0.03	0.02
Manufacturing	0.20	0.19	0.19	0.18	0.14	0.13
Retail&Wholesale	0.25	0.24	0.24	0.24	0.21	0.21
Finance	0.06	0.08	0.08	0.07	0.06	0.05
Communication	0.02	0.02	0.03	0.04	0.07	0.07
Public Utility	0.00	0.00	0.00	0.00	0.00	0.00
Service	0.35	0.39	0.39	0.39	0.46	0.49
Government	0.03	0.02	0.02	0.03	0.03	0.02
Fraction of tertiary educated						
Primary	0.09	0.16	0.19	0.25	0.36	0.44
Construction	0.27	0.35	0.41	0.46	0.57	0.60
Manufacturing	0.17	0.30	0.34	0.43	0.46	0.52
Retail&Wholesale	0.24	0.33	0.36	0.41	0.55	0.60
Finance	0.29	0.43	0.50	0.61	0.75	0.79
Communication	0.37	0.46	0.49	0.56	0.70	0.74
Public Utility	0.32	0.32	0.47	0.65	0.70	0.72
Service	0.60	0.65	0.65	0.67	0.70	0.78
Government	0.41	0.62	0.64	0.69	0.78	0.84

Note: Upper panel reports the industrial composition of young workers that should add up to one for each year. Lower panel reports the fraction of tertiary educated workers in each industry and in each year. Primary sector includes agriculture, fishery, forestry and minings sectors.

Table 3: Distribution of detailed educational background, age 25-29, ESS, 2007

	Male	Female
Junior high school	0.05	0.03
High school	0.34	0.27
Vocational school	0.15	0.20
Junior/technical college	0.03	0.19
University	0.36	0.30
Graduate school	0.06	0.02

Note: Vocational school and junior/technical college are classified into a single category before 2007. University and graduate school are also classified into a single category before 2007.

Murphy (1992).

7 The roles of vocational school and graduate school

The analysis based on Employment Status Survey (ESS) and Basic Survey of Wage Structure (BSWS) reveal that Japanese economy has experienced the demand increase for skilled workers sharing the experience with many other developed countries and the supply increase of tertiary educated workers coincided with the demand increase. With this big picture in the background, we are interested in more detailed category within the tertiary education. The tertiary education includes junior college, technical college and vocational school (13-15 years of education) and university or more (16+ years of education). While the government statistics consistently allows us to distinguish those with 13-15 years of education from those with 16 or more years of education in the last two and half decades, it was 2007 when the ESS started to make fine distinctions within each education category.

From 2007, ESS prepared the following multiple choices for a respondent to describe his/her educational background: 1. Primary school or junior high school, 2. high school, 3. vocational school, 4. junior/technical college, 5. university, 6. graduate school. Table 3 tabulates the distribution of detailed category of educational background of Japanese youth in 2007. Among the people who were classified as graduates of vocational school or

Table 4: The determinants of log (hourly wage), age 25-29, ESS, 2007

	Male	Female
Junior high school	-0.102	-0.025
	(0.023)	(0.042)
Vocational school	-0.018	0.148
	(0.013)	(0.015)
Junior/technical college	0.046	0.184
	(0.024)	(0.015)
University	0.179	0.311
	(0.011)	(0.013)
Graduate school	0.382	0.469
	(0.023)	(0.041)
Age 26	0.050	0.033
	(0.014)	(0.015)
Age 27	0.110	0.060
	(0.014)	(0.015)
Age 28	0.135	0.088
	(0.014)	(0.015)
Age 29	0.180	0.133
	(0.014)	(0.017)
Constant	7.311	7.187
	(0.012)	(0.013)
N	22,386	18,804
R2	0.068	0.062

Note: High school graduate is set as the base category.

junior/technical college before 2007, 83% (=3/18) of male and 51% (=20/39) of female are indeed vocational school graduates. The analysis of the vocational school education on labor market outcomes is limited to a few studies based on smaller sample such as Nagao (2008) and Hamanaka (2009), but these high fraction of vocational school graduates warrant more studies on the role of vocational school education in the labor market.

It is also worth noting that the fraction of workers with graduate degrees are not negligible particularly among male. As high as 14% (=6/42) of male workers who were formally classified as university graduates are with graduate degree and 6% (=2/32) of female are with graduate degrees. As already pointed out by Morikawa (2012), detailed study on the function of graduate education in the labor market is needed.

We estimate the Mincerian wage function with detailed educational category variables as a first cut of the analysis. Hourly wage rate is calculated from the annual earnings divided by the annual hours worked; both the annual earnings and the annual hours worked are constructed from responses in intervals. The regression results reported in Table 4 indicate that there is virtually zero difference in wage between males with vocational school education and high school education, but there is about 15% difference for female. It is also notable that the return to junior/technical college education is higher for female than for male. Post-high school non-university education is closely related to vocation training for licensed occupations, particularly occupations in health industry, for the case of female (Hamanaka (2009)). The close relationship between education and occupation for female may well explain the gender difference in the returns to post-high school non-university education. Is is also quite notable that the return to post-graduate education is quite high for both genders.

We next estimate the determinant of being employed using the same specification and the results are reported in Table 5. For both genders, the higher the educational attainment, the higher the employment rate. While vocational school education did not increase log wage in a statistically significant way, it increases the employment rate by 1.6 percentage points compared with high school graduates. Being junior high school graduates reduces the employment rates by more than 10 percentage points for both sexes. University and post-graduate education increases the employment rate and its effect is profound among female.

8 Conclusion

This paper overviews the change of youth employment since the early 1980s. Japan has kept relatively high employment rate among youth aged between 25 and 29 compared with other developed countries, while both the employment rate and wage rate deteriorated. We demonstrate that the educational upgrading of youth in Japan has helped adopting to the

Table 5: The determinants of employment, age 25-29, ESS, 2007

	Male	Female
Junior high school	-0.107	-0.140
	(0.012)	(0.020)
Vocational school	0.016	0.108
	(0.006)	(0.010)
Junior/technical college	0.080	0.080
	(0.014)	(0.010)
University	0.025	0.160
	(0.005)	(0.009)
Graduate school	0.069	0.254
	(0.006)	(0.019)
Age 26	0.008	-0.028
	(0.008)	(0.010)
Age 27	0.030	-0.054
	(0.007)	(0.011)
Age 28	0.027	-0.082
	(0.007)	(0.011)
Age 29	0.037	-0.100
	(0.007)	(0.011)
N	25,805	26,695

Note: Average marginal effects of the probit estimates are reported. High school graduate is set as the base category.

demand increase for skilled workers perhaps caused by skill biased technological change and deepening international dependence of economic activities.

Given the prime minister Shinzo Abe points to continuous innovation and deepening international dependence of economy through the participation to the Trans-Pacific Partnership (TPP) as a part of the policy package of the third arrow of Abenomics, continuous skill upgrading of Japanese youth is indispensable. Expanding the opportunities for tertiary education for wider range of youth while keeping the quality of education high is a big challenge posed on us, however, because the quality control of tertiary education is a complicated issue.

That the market for higher education is different from the ordinary goods market is recognized in the literature. Externality of education to society is recognized widely. (Friedman (1962) for example.) Since each individual experiences higher education usually at most once, it is classified as an "experince good" rather than a "search good." (Nelson (1970)) Better information provision, therefore, may be good for consumers and may lead to a set of more effective producers. (citecave1994) Also, Rothschild and White (1995) argued that higher education is the premier example of many services which provide outputs that depend on other customers inputs. In addition, market of higher education has been viewed as a prime example of market with asymmetric information. (Akerlof (1970)) The principal-agent view is developed in the insurance market context by Spence and Zeckhauser (1971) but has been used in higher education context as well. Some have argued that the problem of higher education is not so much as informational asymmetry but imperfect information. (Stiglitz (2000)) Both government and consumers may have imperfect information about the true quality of academic programs. In addition faculty members may not possess full information either. (Dill and Soo (2004)) Higher education regulational issues need to be discussed squarely facing the imperfect informational issue. Moreover, James (1986) points to multiple objectives by professors, teaching and research, which complicates the mechanism to provide incentives to them.

Regulation policies on tertiary education should be carefully crafted considering the delicate issues already pointed out in the literature. Successful control on tertiary education should provide the basis for the success of Abenomics.

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