Women's Higher Education in Japan: Family Background, Economic Factors, and the Equal Employment Opportunity Law

Linda Edwards and Margaret Pasquale

Working Paper No. 195

Working Paper Series
Center on Japanese Economy and Business
Columbia Business School
March 2002

Women's Higher Education in Japan: Family Background, Economic Factors, and the Equal Employment Opportunity Law

March 11, 2002

Linda N. Edwards*
Professor of Economics and Associate Provost
CUNY Graduate Center
365 Fifth Avenue
New York, NY 10016-4309
Phone: 212-817-7280 or 7283
Fax: 212-817-1613
Email: ledwards@gc.cuny.edu

Margaret K. Pasquale
Visiting Assistant Professor
Department of Economics
University of Cincinnati
PO Box 210371
Cincinnati, OH 45221-0371
Phone: 513-556-0791
Fax: 513-556-2669
Email: pasquamk@email.uc.edu

* Linda Edwards is Professor of Economics and Associate Provost at the Graduate Center of the City University of New York and Margaret Pasquale is Visiting Assistant Professor of Economics at the University of Cincinnati. We are grateful to the Institute on Household Economy in Japan (Kakei Keizai Kenkyujo) for granting us permission to use the Japan Panel Survey on Consumers dataset for the analysis in this paper, and to Yoshio Higuchi and Haruko Noguchi for helpful email discussions. We have received helpful comments from Robert Evans, Elizabeth Field-Hendrey, Shoshana Grossbard-Shechtman, Todd Idson, Hiroshi Ishida, Marcus Rebick, Kazuo Sato, Junji Shiba, members of the Japan Economic Seminar and seminars at the CUNY Graduate Center and Rutgers-Newark, and two anonymous referees.

Women's Higher Education in Japan: Family Background, Economic Factors, and the Equal Employment Opportunity Law

Linda N. Edwards and Margaret K. Pasquale

Abstract

Since the mid-1980s there has been a striking increase in the propensity of young Japanese women to attend four-year universities. During this same period, the Japanese Diet, in 1985, passed the Equal Employment Opportunity Law, which focused on improving women's access to career employment. This paper uses micro data from the Japanese Panel Survey on Consumers (JPSC) to investigate the importance of socioeconomic and demographic factors, as well as the EEO Law, in determining the higher education decisions of young women in Japan.

We find that one of the most important factors for determining whether or not a young woman attends university is whether or not her mother attended university. Other important factors we identify include whether or not her father attended university, whether or not the young woman attended juku in high school, family income, and attendance at private secondary school. Data limitations prevent drawing strong conclusions about the role of the passage of the EEO Law, but our results suggest that the passage of the law was associated with an increase in the propensity of young women to choose university over junior college. (Japanese Labor Markets, Higher Education, Equal Employment Opportunity Law, Women)

(J4 Particular Labor Markets, I2 Education)

I. Introduction

Among developed countries, Japan has been unusual in that women are much less likely than men to pursue university education. For example, in 1980, women accounted for 22.4 percent of those enrolled in four year universities, as compared to 50% in Canada and the United States, 47 % in Finland, 37 % in Sweden, 48% in France, and 42% in Italy (Nakata and Mosk (1987)). In recent years, however, this proportion has been growing, to 27.9% in 1990 and 35.6% in 1998. Coincident with this period of increase, in 1985, the Japanese Diet passed the Equal Employment Opportunity Law (hereafter EEO Law) that went into effect April 1, 1986.[1]

This paper has two objectives. The first and most important is to explore the determinants of young women's higher education choices in Japan, with a special emphasis on attendance at university. The second is to see if a preliminary finding in Edwards (1994) of an increased probability of attending university subsequent to the passage of the EEO Law is supported by a multivariate analysis. Our empirical analysis uses the first wave of a ten-year longitudinal survey, the Japan Panel Survey on Consumers (hereafter the JPSC), sponsored by the Institute on Household Economy (Kakei Keizai Kenkyujo).[2] The JPSC, a probability sample representative of the Japanese female population between the ages of 24 and 34 in 1993, is well suited to an analysis of educational choice because it contains a rich array of variables to characterize the young woman and her family background, variables such as family income, parental education, mother's work status, number of siblings, and attendance at "juku" ("cram" school). However, because women in only one of the eleven cohorts in the survey made their educational decisions subsequent to the promulgation of the EEO Law, our conclusions with regard to the role of this law in educational choices must, of necessity, be suggestive rather than determinative.

---

[1] This law prohibits gender discrimination with respect to vocational training, fringe benefits, retirement, and dismissal, and urges firms to try to equalize opportunity with regard to recruitment, hiring, job assignment, and promotion (see Edwards (1988)).

[2] Institute on Household Economy, *Japan Panel Survey on Consumers, Year 1 (Shohi Seikatsu ni Kansuru Paneru Chosa, Dai Ichinendo),* 1994.

To preview our findings, one of the most important factors for determining whether or not a young woman attends university is whether or not her mother attended university. Other important factors we identify include whether or not her father attended university, whether or not the young woman attended juku in high school, family income, and attendance at private school. In contrast, neither the expected returns to university nor opportunity costs appear to strongly influence university attendance. Finally, our results provide tentative support for the hypothesis that the passage of the EEO Law had an impact on the higher education decisions of young Japanese women, primarily by reducing their propensity to attend junior college and increasing their propensity to attend university.

II. Background

High school graduates in Japan typically have five options. They either directly enter the labor market, attend a two-year junior college, attend a technical or vocational college, attend a college preparatory school to improve their chances of getting into a university, or attend university (well below ten percent neither work nor continue further schooling).[3] The system is relatively rigid (compared to the United States), in that people typically do not return to school after working.[4] Nor has it been usual for women who study at junior or technical colleges to transfer to four-year universities (Ishida (1998)).[5]

To get a sense of how women and men have been represented among these options, we show below data from two years of the annual *Basic School Survey (Gakko Kihon Chosa Hokoku)*-- 1984, prior to the passage of the EEO Law, and 1996.

---

[3] See Ishida (1998) and Kaneko (1992) for a description of the system of higher education in Japan. Amano (1997) focuses on women in higher education in Japan.

[4] It is possible for students to enroll in institutions of higher education without a high school degree if they pass an examination, the "Daigaku-Kentei Shiken." This examination has been in existence since 1951, but very few students take it. In 1996, for example, fewer than .5 percent of all those beginning college had taken this test (telephone conversation with someone at the Japan Ministry of Education).

[5] Recently, there is some evidence that transferring from junior college to university is becoming less rare. The proportion of junior college graduates whom advance to further schooling, while still small, has been rising, from 3.4% in 1990 to 9.4% in 2000 (Ministry of Education, *Basic School Survey.)*.

Percentage of high school graduates who advance to	Women		Men	
	1984	1996	1984	1996
University	11.1%	21.1%	25.0%	29.5%
Junior college	21.1%	24.5%	1.4%	2.1%
Vocational or special training schools	20.3%	25.6%	30.1%	34.2%

(Sources: Japan Monbusho, various years)

While all forms of higher education experienced growth over the 1984-1996 period, both for young women and young men, the most striking change is for women's attendance at university. Their propensity to attend university after graduating from high school almost doubled over the period, from 11.1% to 21.1%, while that of young men increased by only 18 percent.

It is important to note that it is enrollment in university rather than junior college that provides access to "career" jobs for women with higher education. Junior colleges typically offer a limited range of subjects, and three-quarters of them "offer a single curriculum in non-vocational subjects, such as music, home economics, and English literature" (Ishida (1998)). It is universities, with their broader curricula, that traditionally provide the entry point for most professional careers. Further, Higuchi (forthcoming), Ishida (1998, 1993), and Tachibanaki (1996) all document the importance of educational background (both the level of schooling and the selectivity of the university) on the type of job that graduates obtain. University graduates are more likely to get promoted into higher-level management jobs (at the bucho, kacho, and kakaricho levels) and are more likely to be hired by the larger firms (in which compensation is higher than in smaller firms).

Consequently, in Table 1 we narrow our focus to enrollment in universities. This table contains total enrollment in four-year colleges and universities by sex for 1975, 1980, 1985,

1990, 1995, and 1999.[6] Panel A of the table shows the actual numbers of students in each year, while Panel B shows five-year changes (and a four-year change from 1995-1999).[7]

Throughout the entire period, women's enrollment increased at a faster rate than did men's. In the 1975-80 period, women's increase was 5.2 percentage points greater than that of men, and in the 1980-85 period, it was 8.6 percentage points greater (see last column in table). Consequently, the proportion of women among those enrolled slowly rose from 21.6% in 1975, to 22.4% in 1980, to 23.9% in 1985. The rise in women's enrollment, however, accelerated between 1985 and 1995, the period after the passage of the EEO Law. Women's enrollment increased by a whopping 33.9% between 1985 and 1990 and by 38.4% between 1990 and 1995, whereas for men the increases were only 8.6% and 9.0%, respectively. Put differently, between 1985 and 1995 women's share of enrollment grew from 23.9% to 32.9%, rising to 36.2% in 1999. It is clear from these data that the growth in women's investment in university education was greater after the passage of the EEO Law. Moreover, the much larger increase in enrollment for women than for men since 1985 implies that changes in general economic conditions (which would be expected to similarly affect both young men and young women) were not the cause.

This same phenomenon is illustrated in Figure 1. Here we show advancement rates to university education by gender from 1977 to 1993. The important difference between the data in Table 1 and those in Figure 1 is that the latter are based on a cohort analysis whereas the former include members of any cohort who are enrolled in university in a given year. More specifically, the advancement rates shown in Figure 1 are computed as the percentage of high school graduates in a given year that entered university within the following four years. That is, this advancement rate includes "ronin," young men or women who, having failed the entrance exam for the university of their choice, study for a year or two and reapply. This measure, therefore, is the most inclusive measure of the demand for university education.

---

[6] This table is similar to Table 1 in Edwards (1994), but contains data through 1999.

[7] The figures in this table require some care in interpretation because the 1966 cohort, which was of college age in 1985, is about a quarter smaller than cohorts in neighboring years (see Edwards (1994)).

The data in Figure 1 are striking. Over much of the period for which we have data, the advancement rate of young men has exhibited a negative trajectory, whereas that of young women has been predominantly positive. The difference between advancement rates of men and women has been steadily decreasing, from .325 for the 1977 cohort of high school graduates to .207 for the 1993 cohort. Most remarkable, these trends, while evident before 1985, were noticeably accentuated after 1985. What is clear from both Figure 1 and Table 1 is that women's university attendance, relative to that of men, has been growing dramatically over the past twenty years and that this trend accelerated after the passage of the EEO Law.

It is noteworthy that over the same period that women's participation in higher education has been growing, the costs of this education has been rising faster than the rate of inflation and faster than the growth in household income. Indeed, Higuchi documents the steady increase in the costs of both public and private universities, relative to family income, from 1975 to the late 1980's, with a leveling off in the early 1990's (Higuchi (forthcoming), Figure II) and points out that this increase is especially important in Japan because the costs of university education are born primarily by parents.

III. Theoretical Framework

There are two types of theoretical approaches typically used to model human capital investment decisions, depending upon the type of human capital being studied and who is perceived to be the decision-maker. One is the Becker/Lewis approach (1973), in which the parents are viewed as the decision-makers. In this type of model, both the quantity and "quality" of children enter the parents' utility function, where quality is taken to be a function of the children's human capital. Parents' choice concerning their desired family size and the desired amount of human capital for each child depends on: the parents' "full" income (their unearned income plus their potential earnings); the parents' preferences regarding family size, the human capital embodied in each child, and other types of consumption; and the price of human capital

relative to other family consumption goods. The financial returns to the child's human capital investment may or may not affect the parents' choice in this model, depending on whether a child's human capital is viewed as an end in itself or as a way to insure the child's (and/or parents') future consumption. This type of model can be adapted to allow for the possibility that parents prefer to invest more in male children than female children or that they treat children within a family differently for other reasons. For example, in a country like Japan, where it has been conventional in the past for parents to live with their oldest son's family, parents may prefer to invest more in the oldest son's human capital as compared to other children in the family (Brinton (1988), Ono (2000)).

A second approach, developed by Becker (1993) and others, weighs the cost and returns to an investment in human capital from the point of view of the individual actually acquiring the human capital. Here the potential investor considers the out of pocket and opportunity costs of a particular level of education and weighs these against the present value of the returns, typically taken to be the present value of the annual differences in earnings associated with the increased education. While the investor's parents' income and tastes regarding human capital would not at first glance seem to be relevant factors in this type of model, imperfections in the capital market for human capital investment may in fact make family income and parental tastes appropriate factors to include. An additional factor, the investor's academic ability, is also relevant. An individual's ability is usually considered to be positively related to his or her propensity to invest in human capital because it is assumed that more able people have a lower cost of acquiring a given amount of human capital (or that for a given investment, they can earn a higher wage).

Given the institutional arrangements in Japan described above (especially the facts that college typically follows lock-step after high school graduation and that most college expenditures must be funded by the parents), it is likely that both the parents and the young woman herself jointly make her higher education investment decisions. These considerations suggest that the following factors will be determinants of the young woman's educational choice:

family income, the number of children in the family,[8] whether she has a male sibling, the parents' taste for human capital, the young woman's ability, and measures of the costs and expected return to each type of educational investment. In addition, to the extent that higher education is desired to make young women more attractive in the marriage market, a measure of the "tightness" of the marriage market, such as the relevant sex ratio, will also be included.[9] The way in which the passage of the EEO Law is expected to impact young women's educational choices in the context of this model is by increasing the labor market returns that they can expect to reap after the passage of the law.

An important factor in the world of Japanese higher education (and in the United States and other countries as well) is the quality of the university that one attends. Ishida (1993, 1998), Higuchi (forthcoming), Nakata and Mosk (1987), Ono (1999), Tachibanaki (1996) and Rebick (1998a and 1998b) all emphasize the importance of the prestige of the university that one attends for determining the prestige and size of the company at which one is hired, and the consequent expected lifetime earnings.[10] Unfortunately, our data (described below) do not permit us to control for the quality of the university education.

The econometric specification of our model follows closely the random utility model used by Rouse (1994) in her study of young people's choice among employment and enrollment in two-year versus four-year colleges in the United States. In keeping with this empirical model, Japanese women high school graduates (and their families) are assumed to choose among three alternatives: (1) no further education or enrollment in a vocational or technical school; (2)

---

[8] The number of children in the family is in principle an endogenous variable in this type of model. Given the focus of this paper and the nature of our data, it is not feasible for us to adjust empirically for this potential endogenity.

[9] See Edwards (1994) and Goldin (1992).

[10] Rebick (1998a) does point out, however, that "the proportion of graduates in the lower-ranked faculties getting jobs in large companies is not negligible and it is possible to find prestigious firms that hire from even the lowest ranking faculties" (p. 7).

enrollment in a junior college; and (3) enrollment in a four-year university [11]. The choice involves comparing the utility she expects to receive in each of these three states and choosing the state that maximizes that utility. Individual *i*'s utility in each state *j*, Z_{ij} is represented by the following equation, in which X_i represents a matrix of relevant personal characteristics, such as family income and family size, R_j represents a matrix of alternative-specific characteristics, such as the rate of return associated with each type of education, and ε_{ij} represents a random error term:

$$(1) \qquad Z_{ij} = b_j X_i + d_j R_j + \varepsilon_{ij}.$$

A young woman chooses university education if the utility associated with that level of education exceeds the utility she can expect from the other two alternatives. In the context of this model, the probability that she will choose university education is

$$(2) \qquad \Pr(Z_{iU} > Z_{iJC} \text{ and } Z_{iU} > Z_{iHS}) =$$

$$\Pr((\varepsilon_{iJC} - \varepsilon_{iU}) < ((b_U X_i + d_U R_U) - (b_{JC} X_i + d_{JC} R_{JC})) \text{ and}$$

$$(\varepsilon_{iHS} - \varepsilon_{iU}) < ((b_U X_i + d_U R_U) - (b_{HS} X_i + d_{HS} R_{HS})))$$

where subscript *U* represents university, *JC* represents junior college, and *HS* represents vocational or high school.

This statistical specification is estimated using the "universal logit" model (Amemiya, 1985) similar to that used in Hutchens, Jakubson and Schwartz (1989) (hereafter HJS). In the universal logit model, the probability p_{ij} that the ith person chooses education type j is assumed to take the form

$$(3) \qquad \begin{aligned} p_{ij} &= \exp(g_{ij}) / \left[1 + \sum_l \exp(g_{il}) \right], j = 1,...k; \\ p_{io} &= 1 / \left[1 + \sum_l \exp(g_{il}) \right] \end{aligned}$$

[11] We combine those who end their education with high school and those who get some type of post-high school vocational training because our focus is on university education and junior college and there is insufficient variation in our data to separately analyze high school and vocational school graduates.

where the g_{ij} are functions of all the explanatory variables. By making an appropriate choice of the g_{ij}'s, the universal logit can approximate any arbitrary polychotomous mode, and does not require the assumption of the independence of irrelevant alternatives.[12] More specifically, if the g_{ij}'s are linear in the independent variables, with coefficients that vary with each alternative—as in equation (1)-- the result is a multinomial model that does not require an assumption of zero correlations across educational choices. (Amemiya, 1985, p.307).[13] In the context of our empirical work, the entire set of variables representing the determinants of educational choice enter the probability function for each education level and a different set of coefficients is estimated (on a common set of variables) for each level of education.

IV. Data

A. Description of sample and sampling procedure.

The data for this study come from a unique micro-level survey entitled the Japan Panel Survey on Consumers (JPSC), sponsored by the Institute on Household Economy (Kakei Keizai Kenkyujo) in Japan. The JPSC is well suited to our study because it provides rich retrospective information about each respondent's family background and educational history. The JPSC is a probability sample of 1,500 Japanese women, representative of the entire female population aged 24-34 in 1993. The sampling procedure follows that of most countries' population censuses, in

[12]The customary way to estimate a multinomial logit is to assume that the error terms in the probability equations are independently and identically distributed with the generalized extreme value distribution (McFadden, 1981). This procedure has the drawback of imposing the assumption of the independence of irrelevant alternatives (IIA), implying that the odds of choosing between any two options depend only on the characteristics of those two choices, and not on any of the other alternatives. This model may not be appropriate when some of the alternatives are similar, as may be the case with junior college and university. The universal logit model gets around this problem, but it too has a drawback (see HJS): it does not meet the condition of allowing one to combine existing estimates with information about a new alternative to make predictions about the probability of choosing that new alternative. In our research, however, this drawback is of little consequence because we do not need to make inferences about educational choices other than those already discussed in this paper.

13 The issue of correlated errors across education classes was a concern to us because we have reason to believe that non-zero correlations are likely in our context. For example, if student ability is not perfectly captured in the empirical measures we use, unmeasured ability will be captured in the error terms for each education class.

which the area of Japan was broken up into eight blocks according to the concentration of the population. Random samples were taken within each of the blocks. For each individual selected, three substitutes were randomly prepared in the event that the individual did not respond to the request to participate in the survey. Given this method, the response rate was 41.4%. In other words, 3,623 individuals were contacted before a total of 1,500 agreed to participate in the survey. This paper utilizes data from 1993, the first wave of this ten-year longitudinal survey.

B. Descriptive Statistics from the JPSC.

Descriptive statistics for the sample are shown in Table 2. The table includes means and standard deviations (where appropriate) for the entire sample as well as for the subsamples corresponding to the three levels of educational attainment that we study. [14] The last three columns of the table indicate whether the differences in means between specified education classes are statistically significant.

There are definite differences in the socioeconomic background of young women across education classes. The most striking differences are with regard to parents' education and income. Forty-one percent of the fathers of university graduates attended university, as compared to 23% for junior college graduates and 5% for graduates of vocational or high school. Also striking are the difference for mother's education: 11% of mothers of university graduates were themselves university graduates, as compared to 3% and 1% for graduates of junior college and vocational or high school, respectively. Annual family income is also strongly positively related to a daughter's educational attainment, from a low of 4,759,558 yen for the families of vocational

[14] Nine years of are compulsory in Japan education (typically through junior high school); however, most students (98% in 1996 according to *School Basic Survey (Gakko Kihon Chosa)*, 1996) continue beyond the compulsory level. In our sample, there are 32 women (2% of the sample) who ended their schooling with the completion of junior high school. Since we felt this group should be treated as a separate category from high school graduates and the number was small, we excluded these observations from our analysis. Also, there were 9 women (0.6% of the sample) who completed their schooling with a category "kosen". Because of the great range in schools attended for this category, we excluded these observations from our analysis as well. Note that respondents are instructed to respond as though they had graduated from a particular level of schooling even if they had not. This procedure is not likely to cause significant errors in measurement because failure and dropout rates are very low in Japan (Frost (1991)).

or high school graduates to 7,932,099 yen for the families of university graduates.[15] The proportion of women whose mothers never worked outside of the home before the respondent turned twenty is also greater for women who attended university or junior college: 43% for university graduates and 45% for junior college graduates, as compared to 33% for women whose highest level of educational attainment was either vocation or high school.

Other ways in which the young women in different education classes differ are with regard to their family structure and attendance at "juku," the private after-school sessions, ranging from tutorials to cram schools, which students attend in order to improve in their school performance or to prepare for the examinations required to enter higher levels of schooling. Young women with a junior college or university education have fewer siblings and are less likely to have a brother, as compared to women who completed only vocational or high school. With regard to juku, young women who attended university or junior college were more likely to have attended juku in junior high or high school than were women whose educational attainment was vocational or high school.

To get an impression of how the young women themselves view their educational decisions, we also report in Table 2 differences across education classes in the young women's responses to a series of questions concerning the reasons for their particular educational choice. Included among the possible reasons are "probability of acceptance" into the type of higher education, "correlation with career choice," to "obtain a broad education," "to put on my resume for the marriage market," and "parents' or teachers' advice." The most widely cited reason among all women in the sample is "correlation with career choice," with the proportion who give this response is significantly higher for women who attend junior college or university than for women with lower levels of educational attainment. The second most widely chosen reason for women who attended junior college or university was "to obtain a broad education," whereas for

[15] Mean family income is computed by assigning to each individual the midpoint of the income bracket she reported. In the case of the top income bracket, which is open-ended, in order to calculate its midpoint we assume that it has the same width as the next-to-highest income bracket.

women who completed only vocational or high school, the second most-cited choice was "probability of acceptance." Interestingly, one percent or fewer of women in all education classes cite "to put on my resume for the marriage market" as a reason. Overall, these responses suggest that for these young Japanese women, pursuing post-secondary education was seen as an investment in the future—a stepping-stone to a career and to an enriched life.

Also included in Table 2 is information about selected characteristics of the women at the time of the survey. While these do not directly relate to the educational choices that are the focus of this analysis, they reflect *ex post* differences that may be the result of the very educational choices we examine in this paper. For example, university-educated women were significantly less likely to be married than were women with lower levels of educational attainment (most likely because women who attend university tend to marry later than those who do not and at the time of the survey, 1993, the women were in the relatively young age range of 24 to 34). Of those who were married at the time of the survey, the proportion whose husbands had attended university is much higher for university-educated women (83%) than for junior college-educated women (60%) or for women with a vocational or high school education (22%). Interestingly, the proportion of women in the labor force does not differ significantly among the four education classes, whether single, married, or married with one or more children. Note that the average age of the women is the sample does not differ significantly across subgroups.

C. Variables

To estimate the probability that a young women enrolls in each level of higher education we need measures to represent family income, family size and sex composition, the family's taste for higher education, the young woman's ability, the costs and returns associated with each level of education, and the state of the marriage market. Ideally, these variables would be measured at the point in time at which the educational decision is being made. However, it is likely that the human capital investment decision is made and revised over a period of years, so that it is

difficult to designate a single time period in which to measure these variables. The demographic and socioeconomic characteristics of the young woman and her family are likely to have been relatively constant throughout her late childhood, so that we believe that these measures from the survey serve well. For variables that represent the costs and returns to education and the state of the marriage market, all of which may change from year to year, we use measures that correspond to the year in which the young woman is seventeen years old, one year before her high school graduation.[16] The exact measures are defined in Appendix Table 2 and are described below.

To measure family income, we use a set of dummy variables that indicate the income class of the family measured as of 1992, using the same income classes that are reported in the survey. We recognize the possibility that this measure-- reported for the survey year rather than for the years in which the young woman's educational decision was being made-- may overstate or understate the family's income at the time she was making her education decision (understatement is especially likely for the older cohorts in the sample whose fathers may have retired at the time of the survey). To the extent that this set of variables is measured with error, coefficients will be biased toward zero.

To further control for family income/wealth, we also include a dummy variable that indicates whether or not the young woman attended a private secondary school. Families who sent their children to private school are more likely both to have been wealthy-- and to have had a greater taste for education. We expect that this variable will be positively related to the probability that a young woman attended university or junior college. This effect would be especially pronounced in cases where the private secondary school is affiliated with a private junior college or university.

A second variable, which we include to pick up unmeasured income differences, is one we dub "homemaker mother." Homemaker mother is a dummy variable that indicates whether or

[16] This assumption is similar to that made by Nakata and Mosk (1987), who relate university application rates in Japan to a set of explanatory variables measured in the previous year. However, we must note that to some extent, students are already sorted by examinations taken in junior high school, examinations aimed at determining the type of high school they will attend (Dore (1987)).

not the mother had worked outside the home before the respondent was 20 years old (a value of one indicates that she never worked outside of the home during this time). If families with a homemaker mother are wealthier, this variable will be positively related to the probability that a young woman attends junior college or university. But there are other factors besides income reflected by the homemaker mother variable. Full-time homemakers can and do help prepare their children for higher education by helping them with schoolwork and exam preparation. This tutoring role provides another reason for a positive relationship between the homemaker mother variable and the probability that a young woman attends junior college or university. On the other hand, the homemaker mother variable may also reflect the family's views about the appropriateness of women's entering the labor market and the desirability of their attending university in order to pursue a career. If so, the relationship between this variable and the probability that the daughter gets a higher education will be positive for junior college but negative for university. Taken together, these considerations imply that it is not possible to predict the direction of the relationship between the homemaker mother variable and the probability of university attendance. In the case of junior college, a choice which is less likely to be motivated by a desire for a career, all three of the above forces will be reinforcing rather than offsetting, leading to a predicted positive relationship.

We include two measures of family structure. The first is the number of siblings the young woman has. We expect this variable to be negatively related to the likelihood that the young woman attends university. The second is whether or not she has any male siblings. There is a large literature that suggests that parents choose to invest more in the education of their male children than their female children (Schultz (1995)), and in the case of Japan, there is evidence that this pattern also holds (Ono (2000)). If so, we would expect that the likelihood that a young woman obtains post-secondary education would be lower if she has any male siblings than if she does not.

To capture both the family's taste for university education for their children and the young woman's academic ability we use the parents' educational attainment as proxy variables. Two dummy variables are included: one indicating whether or not the young woman's mother is a university graduate and one indicating whether or not her father is a university graduate.

As additional proxies for the young woman's ability we include three dummy variables that indicate whether or not the young woman attended "juku" during elementary, junior high, or high school, respectively. Juku attendance is likely to differentially signal the young woman's ability, depending upon at what age she attends. Attendance at juku during elementary school is likely to be associated with lower than average ability (when income is held constant, as it is in our model) and therefore be negatively associated with the probability of university or junior college education. Attendance at juku during middle school may not uniquely signal any particular level of ability because all students at this age are preparing for the important test that they must take to get into the high school of their choice. Attendance at juku during high school is aimed at preparing a student for university entrance exams and is likely to signal higher than average ability. In sum, we expect that attendance at juku during elementary school to be negatively associated with the probability of attending university or junior college and attendance at juku during high school to be positively associated with the probability of attending university or junior college.

Although we include these juku variables as "inputs" in the production of human capital, they may also be considered an "intermediate output" of an earlier human capital investment decision. If so, including them may cause the coefficients of variables that reflect family income and family tastes for education to understate the total effect of such variables on the young woman's educational choice. In addition, the set of juku variables may be endogenous if unmeasured factors that determine the family's demand for its daughter's higher education also affect the young woman's attendance at juku. For these reasons, we estimate our model both with and without the juku variables.

To take into account variations in the opportunity costs of higher education over the business cycle we include a measure of the availability of employment for high school graduates. This measure is the ratio of the number of vacancies to the number of applications for jobs for people aged 19 years or younger (in Japan it is not unusual or illegal to specify the desired employee age for an unfilled position). The variable is reported for October of the year and the school year ends in April, so we use the measure lagged one year. We expect that the higher the vacancy/application ratio, the easier it is for high school graduates to find employment and the higher the opportunity costs of education, with a consequent lower probability that young women undertake post-high school education.[17]

To estimate the expected return to higher education, we use data from the annual *Basic Survey on Wage Structure*. The *Basic Survey* does not distinguish earnings of graduates of vocational schooling from those of junior college graduates, so we estimate the expected returns for university education only. In essence, we are assuming that it is the expected returns to university education that matter; that is, higher expected returns to university education would act as a deterrent to junior college attendance and an incentive to university attendance. To the extent that junior college is not viewed as a career-enhancing type of higher education, omission of an expected returns measure for junior college will not pose a serious problem.

To estimate the expected returns to university education we compute the present value of the lifetime earnings of male high school graduates and of male university graduates. The difference in the present value of these two earning streams is our estimate of the expected returns to university education for the young women in the sample.[18] We use an estimate of the return to education for men rather than for women because past cohorts of women include relatively few who had long tenure in the labor market, especially with levels of education above

[17] The vacancy/applicant ratio we use is the national average for men and women, since we were not able to locate data by sex or region.

[18] See the appendix for a detailed description of how we obtained these present value estimates.

high school.[19] Thus, an estimate of expected returns that is based on the experiences of past cohorts of women would provide a poor reflection of the "payoff" to higher education looking forward. Our specification assumes that women's expected future earnings differential associated with university education is a constant proportion of the corresponding differential experienced by men as reported in the *Basic Survey on Wage Structure* in the year in which the young woman is 17 years old.[20]

The above measures of the costs and returns to education are not location specific, but rather refer to the entire country at a point in time. To hold constant other aspects of costs and returns that may vary by prefecture (such as the population density, distance to educational institutions, differences in costs of living, and so on) as well as cultural differences across Japan that may be associated with different attitudes towards women's higher education, we include in our equations a set of dummy variables for the 47 prefectures in Japan (43 plus Hokkaido and the metropolitan areas of Tokyo, Osaka, and Kyoto).[21] The prefecture dummy variables identify the prefecture in which the respondent lived longest during her childhood.

It has been argued that an important reason that women go to junior college or university is to improve their prospects in the marriage market, to make them more desirable mates for university-educated, and therefore higher income, men (see, for example, Edwards (1994), Goldin (1992) and Osawa (1987)). At the same time, some commentators note that attending university (as opposed to junior college) may make Japanese women less attractive in the marriage market because there would be fewer equally educated mates available. To allow for

---

[19] For example, Ono (1999), p. 11 notes that "Given the intermittent career mobility patterns of Japanese women, it is difficult to obtain reliable rate of return estimations for women."

[20] We are indebted to a referee for pointing out that the female earnings differential between graduates of junior college and university has been growing and that this growth may in part explain the increased attractiveness of university education. Because of the way in which earnings data are reported in the *Basic Survey on Wage Structure*, we are not able to incorporate this possibility in our empirical analysis.

[21] Rouse (1994), in an attempt to get at some of these same locational factors, includes a measure of the local unemployment rate, urbanization, miles to the nearest two-year college, miles to the nearest four-year college, and a set of dummy variables to identify the state of residence (she uses different sets of these variables in different specifications).

the possibility that the higher education decisions of young women and their families are affected by the state of the marriage market we include a measure of the male/female population ratio. In particular, we use the ratio of males aged 18-20 to females aged 16-18 in the year in which we assume the young woman and her family were making her higher education decision (age 17).[22] This variable can be viewed as an index of the scarcity value of women as marriage partners. The higher the value of this ratio, the stronger the position of women in the marriage market, and the less incentive they will have to make an education decision simply to improved their marriage prospects. Consequently, we expect this measure to be negatively associated with the probability that they will choose junior college. The relationship between the marriage market measure and the probability of choosing university could be negative or positive, depending on whether one sees this education as an advantage or a detriment in the marriage market.

Finally, to investigate our hypothesis that the passage of the EEO Law has had an impact on young women's higher education choices, and especially university enrollment decisions, we include a dummy variable that indicates whether or not the young woman and her family were making a higher education decision after the EEO Law was passed. The variable takes the value one if the respondent made her educational decision (which we assume to be at age 17) in or after the year in which the EEO Law was passed by the Diet (1985), and zero otherwise. This variable, rather than being entered as a shift term, is interacted with our variable that measures the expected returns to university education because we hypothesize that the way in which the EEO Law operates to encourage women to pursue university education is by altering their expectations with regard to the expected financial returns to this investment. Women may expect increased returns to education subsequent to the passage of the law for a variety of reasons: they may expect that the probability of being hired for "career" employment will be higher; or they may

[22] We chose this particular measure because there was a two-year difference in average age at marriage for men and women during the years that the young women in the sample were making their higher education decisions (The Japan Institute of Labor, *Japanese Working Life Profile,* various years). Of course, to the extent that the age difference between spouses changes or that a significant number of young men or women choose not to marry, this availability measure will provide only a rough index of the state of the marriage market.

expect that their probability of remaining in their jobs after marriage and child bearing will be higher; or they may expect the workplace to become more congenial for women as a result of the "signal" embedded in the passage of the law.

The particular specification we use is equivalent to hypothesizing that the passage of the EEO Law increased women's expectations about the returns to their education from k times the expected returns for men to a higher proportion k' (k'>k) times the men's expected returns. The coefficient of this interaction term, then, will be positive if the expected returns increase as a result of the passage of the EEO Law (that is, if k' exceeds k).[23] We expect the positive effects of this law on enrollment to be greater for university education than for junior college because the law appears to be aimed at allowing women to advance into management positions, which typically require a university education. A more customary specification, in which the EEO Law dummy variable is entered as a shift term only, assumes that the law operates simply by altering the log odds of choosing a specified level of education by a constant amount, independent of the values of all other variables.

IV. Results

The estimates of our universal logit model are shown in Table 3. As indicated earlier, we estimate two alternative specifications, one that includes the set of juku dummy variables and one that does not. The base case in all of these estimates is the vocational or high school choice, with the alternate choices being junior college and university. The coefficients of the dummy variables representing the Japanese prefectures are not included in these tables in order to keep them to a manageable size.

In addition to these logit coefficients, we present in Table 4 "partial effects" associated with a discrete change in each explanatory variable, as computed from the estimates in Table 3. These "partial effects" are analogous to partial derivatives (which would typically be computed

[23] The coefficient of the interaction term will be d (k'-k) where d represents the coefficient of the expected return variable.

for continuous variables) and represent the predicted change in the probability of choosing each level of education associated with a specified change in the value of each explanatory variable, holding constant all other explanatory variables.[24] Partial effects have the advantage of being more readily interpretable then the logit coefficients from which they are computed because they are direct measures of probabilities. Logit coefficients, on the other hand, represent the change in the log odds of choosing the specified level of education (versus vocational or high school) associated with a one-unit change in the explanatory variable, and the signs of logit coefficients are not necessarily the same as the signs of the corresponding computed partial effects.[25]

A. Logit Estimates

Our discussion of the logit estimates in Table 3 is limited to specification tests and a general impression of how well overall the model explains the higher education decisions of young women in Japan.

In the first specification test we ask if the three education choices we study are in fact distinct in the sense of having a different relationship with the explanatory variables. Using a log-likelihood test, we evaluate pooling (1) the junior college and vocational or high school choices and (2) the junior college and university choices. In both cases we rejected the

---

[24] We calculate the partial effect of a change in an explanatory variable as follows. First, for each observation in the sample we compute two predicted probabilities using two alternative values for the explanatory variable in question. (In the case of a dummy variable, the two alternative values are zero and one. In the case of other variables, such as the expected returns, the two alternative values are the lowest and highest values reported in the sample. In the latter cases, the two alternative sample values used are indicated in the left-hand column of Table 4.) We calculate the first predicted probability by using the individual's own characteristics for all explanatory variables except the one in question and the lower of the two alternative values for the variable for which we are computing the partial effect. The second predicted probability is computed in the same fashion except the higher of the alternative values is used for the variable for which we computing the partial effect. We then take the difference between the two predicted probabilities for each observation in the sample. The mean value of these differences across the entire sample is the partial effect that is reported in Table 4.

[25] To see why the signs of the logit coefficients and partial effects do not necessarily match, especially when the overall probability of being in the specified state is low, consider the following example. Having a mother who is a university graduate *increases* the odds of attending junior college as compared to completing one's education with vocational or high school, but is associated with a *decrease* in the probability of attending junior college. The intuition is that while having a mother who is a university graduate is associated with a decreased probability of attending junior college, this variable is associated with an even greater decrease in the probability of stopping with vocational or high school, so that the odds of going to junior college relative to stopping at vocational or high school increase when the mother has a university education.

hypothesis that the logit coefficients for the respective pairs of education choices are identical. This finding supports the view that the educational decisions examined here are viewed by young women and their families as distinctly different.

Next we investigate the nature of the differences between the two basic specifications of our model—those that alternatively include and exclude the set of three juku variables. We find that for the university choice, whether or not one includes this set of variables, the coefficient signs and magnitudes and the tests of significance for the remaining variables remain virtually unchanged. For the junior college choice, including the juku variables also does not materially affect the coefficient signs and magnitudes, but it does cause the coefficients of several variables to lose statistical significance. However, these differences do not translate into differences in estimated partial effects, as we shall see below. Therefore, to keep the discussion of results more concise, we focus most of the remaining discussion in this section on the specification that includes the set of juku variables.

Overall, the estimates in Table 3 provide strong support for our model of young women's higher educational choices in Japan. The chi-squared statistic for the set of equations is statistically significant, as are many of the individual variable coefficients. Both for university and junior college attendance, family income and father's attendance at university are significant variables. On the other hand, mother's attendance at university is positive and significantly related to her daughter's university attendance, but not to junior college attendance. Attending private secondary school and attending juku are significantly related to the odds of attending both university and junior college, as are the number of siblings and having a mother who was a full-time homemaker. In contrast to the factors listed above, the variables that represent the strength of the marriage market and the costs and returns to higher education are, for the most part, not statistically significant. The exception is in the case of the returns/EEOL interaction term for the junior college choice (when the juku variables are included the returns variable is not statistically

significant but the interaction term is, whereas when the juku variables are excluded the opposite pattern holds).

B. Partial Effects

The above discussion of logit coefficients identified which variables are statistically significant, but statistical significance does not necessarily translate into practical significance. That is, a variable may be statistically significant without actually having a very large impact on the behavior that is being studied. We turn, therefore, to the partial effects shown in Table 4 to determine which variables have the strongest impact on educational decisions.

To compute these partial effects we consider alternatives that make sense in the context of each variable. For indicator dummy variables (parents' education, having a brother, having a homemaker mother, and attending private secondary school), the comparison is made between having versus not having that characteristic. In the case of dummy variables that represent the various income classes, we compute the partial effect of moving between selected representative income classes. In the case of the juku variables, we consider several alternative patterns of juku attendance. In the case of variables that are aggregate measures that vary only by year (expected returns, male/female ratio, vacancy/application ratio), there is no natural interval over which to compute the partial effect. Our procedure is to compute the predicted change in probability associated with moving from the lowest to the highest value of each variable over the 11-year period covered by our data.

Focusing on the estimates that include the juku variables, shown in the first two columns of Table 4, we find that the most important variables for university choice, as judged by the magnitudes of the computed partial effects, are parents' education and the young woman's attendance at juku (notably in high school). Still important, but not to the same degree, are parents' income and the young woman's attendance at private secondary school. In our discussion below we first consider, for each variable, the partial effect of that variable on university attendance and then examine the differences in partial effects for university and junior college attendance.

Parents' university education is a very important determinant of whether or not a young woman attends university. Having a mother with a university education is associated with a 20-percentage point increase in the predicted probability that her daughter will attend university. The corresponding partial effect for father's university education 17 percentage points. In contrast, mother's attendance at university is associated with a three-percentage point *decline* in the probability that her daughter will attend junior college. Father's university education, however, remains important for junior college attendance, with a partial effect of 14 percentage points.

The difference in the partial effects of mother's and father's educational attainment indicate that these two variables are not simply proxy measures for the young women's genetic endowment of ability-- in which case both variables would have the similar partial effects-- but rather reflect taste factors as well. For example, the mother's education variable is likely to embody, in addition to the expected endowment effect, a "role model" effect. Put differently, families in which mothers have a university education may have a greater "taste" for women's university education or other career-oriented education than do other families.[26]

This "role-model" effect is also evident in a somewhat different way when one looks at the partial effects computed for the variable that indicates if the mother was a full-time homemaker. Consistent with our earlier prediction, the partial effect of this variable is less for university education that for junior college education. Daughters of full-time homemakers have a mere one percentage point increased probability of attending university, but they have a much larger, seven, percentage point greater probability of enrolling in junior college (which some have called "finishing school", aimed at preparing young women primarily to become homemakers).

The set of juku variables was included to capture differences in student ability. We hypothesized that attendance at juku during elementary school would signal lower than average

student ability and therefore have a negative relationship with university enrollment, and that attendance at juku during high school would signal higher than average student ability and a consequent positive relationship with university enrollment. On the other hand, if the juku variables were simply reflecting unmeasured income and/or tastes for education, we would expect the partial effects of all three juku variables to be positive for university and junior college.

The pattern of partial effects that we observe indicates that these variables do in fact reflect student ability. Attending juku in elementary school is associated with a reduced probability of attending either junior college or university, with the negative effect greater for university attendance. Attending juku in junior high is also associated with a reduced probability of attending university (5 percentage points), but an increased probability (7 percentage points) of attending junior college. Most striking, attending juku in high school is associated with a 16 percentage point increase in the probability of attending university and a 10 percentage point increase in the probability of attending junior college.

To get a sense of the maximal impact of ability as reflected by the set of juku variables, we compute the difference in the probability of each educational choice associated with the following two ability extremes: a young woman who attends juku in elementary and junior high school but not in high school versus one who attends juku only in high school. The predicted partial effects of this experiment are quite striking: a young woman who attends juku only in high school is 24 percentage points more likely to attend university than one who attended juku in elementary and junior high school but not in high school. The corresponding figure for junior college is just 6 percentage points.

Family income is also an important determinant of university attendance, but the estimated partial effects, taken together, imply that the relationship between income and higher education decisions is complex and definitely not linear. In particular, they suggest that the

---

[26] Another reason why the partial effects of mother's and father's university education may differ is that mothers spend more time than fathers in child-rearing activities so that a mother's human capital would be expected to have a

income effect in the highest income class attenuates for university attendance, while it increases for junior college attendance. For example, a jump in family income from the lowest class (bracket 1) to the highest class (bracket 7), an increase of fifteen million yen or 3.8 standard deviations, is associated with a ten percentage point increase in a young woman's probability of attending university, whereas a lesser (though still large) jump in family income, from the second to the sixth class (an increase of ten million yen or 2.5 standard deviations) increases the predicted probability of a young woman's attending university by *more-* 15 percentage points. This non-linearity is more evident when one examines the partial effects computed between income classes in sequence. These partial effects (not shown here) indicate that the largest partial effect for university attendance is when family income increases from bracket 5 to 6, whereas for junior college, the largest partial effect is when income increases from bracket 6 to 7. This finding is important for other researchers who investigate the determinants of higher education decisions in Japan: empirical models that do not allow for a non-linear income effect would be clearly be mis-specified.

Not only is the income effect non-linear, its impact is moderate compared to the estimated effects of parents' education and juku attendance. One explanation for the relatively moderate income effect could be that income is measured with error, as noted earlier. Another explanation is that income operates not just directly, but also indirectly through the juku variables. That is, higher income families may manifest their desire for higher education for their daughters in part by "buying" juku, which in turn increases their daughters' probability of acceptance in the university or junior college of their choice. To determine if this is an empirically important effect, examine partial effects in the specification that excludes the set of juku variables, shown in the third and fourth columns of Table 4. These estimated income effects are larger, but the increase is generally not great and it varies by type of schooling and the income range .[27] Thus, our conclusion regarding the relatively lesser impact of income still stands

---

bigger impact on her childrens' development than would that of their father.

The variable that indicates whether or not the young woman attended private secondary school may also proxy family income at the time the education decision was made. This variable is associated with positive partial effects for both university and junior college. Interestingly, the larger partial effects are for junior college, where attending private secondary schooling is associated with an increase in the probability of attendance of 19 percentage points, as compared to 12 percentage points for university. Perhaps attendance at private secondary schools is an indicator of a broad concept of social class rather than simply income or taste for higher education, so that many of the parents who send their daughters to private secondary school are not so much preparing them for the type of career that results from university, but rather for marriage. The larger partial effects for junior college than for university, which we computed using the highest income class, are consistent with these findings for private secondary school attendance.

The predicted effects of family structure are small relative to the effects of the variables discussed above. The number of siblings variable was statistically significant, but increasing the number of siblings from one to two is associated with only a two-percentage point decline in the probability of university or junior college attendance. Having a male sibling is not statistically significant and the estimated partial effects are relatively small, at –2 percentage points for university and zero for junior college.[28]

The remaining variables in our model are not specific to the individual, but rather specific to the year in which she made her education decision. There are only eleven cohorts in the sample, so there are only eleven different possible values for each of these four variables, and

---

[27] For example, the partial effect on the probability of attending university of increasing income from the lowest to the highest income class rises from 9 to 10 percentage points, and the corresponding rise for junior college attendance is from 11 to 13 percentage points. The other partial effect that is noticeably altered when the juku variables are excluded is for mother's education in the case of university attendance—with an increase from 20 to 24 percentage points.

[28] These results are in contrast with those of Ono (2000) who reports that in his analysis of women's advancement to university "it is not sibship size per se which reduces their chances of advancing to university, but the number of additional brothers" (p. 26).

since they are time series data, they tend to be highly correlated. [29] This multicollinearity tends to raise the variance of each coefficient estimate so that it "harder" for these variables to be statistically significant, and, in fact, most of them are not.[30] We discuss the estimated partial effects but caution the reader that these estimates are subject to a relatively large amount of error.

The marriage market measure, while not statistically significant, generates surprisingly large partial effects. The partial effects, computed as the difference in the predicted probably of attendance at each type of higher education associated with moving the male/female ratio from its lowest value (.95) to its highest value (1.05) over the time period cover by our data, is 7 percentage points for university and -9 percentage points for junior college. These results are only suggestive, but they are consistent with the view that when the marriage market is more favorable, young women feel freer to attend university and have a reduced incentive to attend junior college. More specifically, if attending university is viewed as making a woman a less attractive marriage partner, it becomes a more viable option when the marriage market is strong enough to overcome this "obstacle".

The variables that represent the costs and returns to schooling, like the marriage market variable, are not statistically significant. In this case, however, the partial effects are smaller, or are not in the direction we predicted. For example, an increase in the vacancy rate, an inverse index of the opportunity cost of post-secondary schooling, was associated with a higher rather than lower probability of attending either university or junior college. Also, the estimated return to university education, contrary to our expectations, had a larger partial effect on the probability of junior college attendance than of university attendance, with the latter essentially zero. Overall, these results indicate that variations in the expected returns or opportunity costs of

---

[29] For those with high correlations, the measures are -.73 between the vacancy/applicant ratio and the internal rate of return measure, -.78 between the male/female ratio and the EEO Law, -.63 between the vacancy/applicant ratio and the EEO Law, and -.62 between the internal rate of return measure and the EEO Law.

[30] Kmenta (1986) shows that the variance of a coefficient is positively related to the Rsquared from a least squares regression of that variable on all of the other right-hand-side variables in the equation (p. 438).

higher education, at least as we measure them, do not appear to play a significant role in the higher education decision.

There are several possible explanations for this finding. The first and most obvious is that the difference by education level in lifetime earnings for men may not well represent the corresponding projected earnings difference for women (or, in the terms of our earlier discussion, k may equal zero). We did hypothesize, however, that women's expected returns to university education would more closely mirror those of men after the passage of the EEO Law, and the pattern of coefficients suggests that there may be merit to this hypothesis, as will be discussed below.

A second reason why the returns to university education may not play a large role in the decision to attend university is that many young women university graduates are supported by their parents and do not need to earn a living. In analyzing survey data from 1987, Amano (1997) reports that only 25% of young women university graduates, when asked about the "meaning of work," reported that it was a "mean to sustain living;" 48% responded that is was "necessary to realize the self." Among the women who responded that it was a means to earn a living, only one-third had to support themselves with their earnings; the remaining two-thirds were supported to a greater or lesser extent by their parents. Thus, the usual economic motivation for working seems to be attenuated for Japanese young women.

A related possibility is that the pecuniary return to higher education for women, rather than coming through their own earnings, comes from the earnings of their spouses, We know from our descriptive statistics that the proportion of university and junior college graduates whose husbands are university graduates, at 83% and 60%, respectively, are substantially higher than the corresponding figures for vocational or high school graduates (22%). These statistics suggest that this type of indirect pecuniary return may play a role in the educational choices of young women.

It may also be that financial returns to higher education are simply less important in Japan, for both men and women, than other, non-pecuniary payoffs. For example, Nakata and

Mosk (1987), who investigate the growth in university applications by Japanese men between 1959 and 1980, report results similar to ours, and conclude that their evidence "calls into question the effectiveness of the conventional indicators of long-run benefits for college education, such as the internal rate of return" (p. 402). Similarly, Arai (1998), whose research focuses on both women and men, reports that rates of return to education, both levels and changes, are not significant variables in explaining the decision to pursue university education. He points to the fact that capital markets are imperfect in Japan for investing in higher education and that, therefore, family income is likely to be and in fact is a more important determinant of higher educational choices than is the expected rate of return.

Finally, we turn to our hypotheses concerning the EEO Law. The computed partial effects of the passage of the law provide support for our view that the law increased women's career expectations. Passage of the law is associated with a 6 percentage point increase in the probability of university attendance and 10 percentage point decline in the probability of junior college attendance. What we are observing here, in essence, are women who have career aspirations switching from junior college to university (in the logit estimates, the significant (negative) coefficient is for junior college). The order of magnitude of the effects of the EEO Law is similar to an increase in parents' income from the fourth to the sixth income classes, not as substantial an increases as was associated with parents' education or juku attendance, but still notable. [31]

The specification that we have used to generate the partial effect of the EEO Law is subject to question because of the problems discussed above with the returns measures (recall that the EEO Law dummy variable was entered as an interaction term with the expected returns to schooling variable). Consequently, we re-estimate our equations using the most straightforward specification of the law variable: one in which the law is represented simply by

[31] We are indebted to a referee for pointing out that job opportunities for junior college graduates have been declining over this period as well, a trend that may partially explain the negative effect we observe beginning in 1985 as well as the increase in the proportion of junior college graduates pursuing higher degrees (noted in footnote 5).

the inclusion of the law dummy variable. The resulting estimates of partial effects of the law are virtually identical. [32]

V. Other Studies

Notwithstanding the fact that the other studies of higher education decisions in Japan are not strictly comparable with ours, it is still useful to see how our results compare with those in several recent papers. Ishida has published two studies, both of which use data from the 1985 Social Stratification and Mobility Survey. In the first study, Ishida (1993) investigates the educational decisions of Japanese men who were 20 to 69 years old in 1985. He does separate analyses for three different cohorts, the youngest of which, at ages 20-34 in 1985, is most comparable with our sample. Using logistic regressions, he estimates the odds of either completing high school or attending any type of college (versus not completing high school) as a function of the following variables: family income, father's education, mother's education, urban background, farm origin, father's occupation, and number of siblings. He reports that parents' income and education are important determinants of the probability that a young man attends college. Interestingly, similar to our results, he reports that the estimated coefficient for mother's education is larger than that for father's education.

In a subsequent study, Ishida (1998) examines the relationship between educational credentials and the labor market entry position for both men and women. As part of this research, he investigates the educational decisions of young women using data for all of the age groups in his broadly defined sample. His focus is on social background variables, which include father's education, father's social class (defined on the basis of the type of work he does), father's occupational prestige score, and the quality of the high school attended (he also includes

[32] The partial effects of the EEO Law variable for university and junior college are +.055 and-.106, respectively, in the specification which includes the juku variables and +.059 and -.101 in the specification which excludes the juku variables. Our rationale for preferring the specification that enters the law variable as an interaction with the returns variable is that it models a plausible mechanism by which the law could have altered behavior: by altering expected returns. Using a shift term only does not permit one to build in such a mechanism.

the respondent's age as a variable, since so many different cohorts are included in the analysis). He reports that young women whose fathers went to university and are of a higher social class are much more likely to attend university than young women whose fathers did not have these characteristics. It is not possible to disentangle the roles of income and parents' education in these results, however, because his model does not include a family income variable. Nor is it possible to explore how mother's education affects the young woman's enrollment decision from the results he reports.

Ono (2000) also uses data from the Social Stratification and Mobility Survey, but for 1995. He uses these data to examine the difference in advancement rates to university for men and women in the survey aged 20 to 70 with the objective of determining if family resources, at least for university education, are directed at sons rather than daughters. The variables he uses to explain the probability that a man or woman "advanced" to university are the person's age, the years of mother's education, years of father's education, city size, the number of brothers, and the number of sisters. He reports statistically significant gender differences in logit coefficients only for mother's education, the number of brothers, and the constant term: the positive coefficient of mother's schooling is almost twice as large for women than for men and the negative coefficient of the number of brothers is almost three times as large (in absolute value) for women than for men. While it is not possible to directly compare his results with those we report in this paper because of the narrower range of variables he considers and the much broader selection of birth cohorts included in his sample, his findings confirm that men and women are treated differently when it comes to decisions regarding university education.

Arai's (1998) uses the *Population Census of Japan* for 1980 and the *Basic School Survey* for 1981 to determine enrollment rates for men and women in universities and junior colleges in Japan. Similar to our study, he reports that variations in the rate of return to schooling do not explain variations in enrollments in higher education, and that family income is a better determinant. He also finds that parents' education is an important variable, as are the rate of mothers' labor force participation and proximity to institutions.

V. Conclusions and Discussion

One of the most striking changes in Japan since the mid 1980's has been the increased propensity of young Japanese women to attend four-year universities. In parallel, the Japanese Diet, in 1985, passed the Equal Employment Opportunity Law, which focused on improving women's opportunities to gain access to career employment. Our goal has been to investigate women's higher education choices in Japan, while exploring the possible role played by the passage of the EEO Law, using an excellent new micro data set to conduct our analysis, the JPSC.

We find that the most important factors for determining whether or not a young woman attends university in terms of statistical significance and magnitude of partial effects are whether or not her parents attended university, her ability as reflected by her pattern of juku attendance, family income, and her attendance at private secondary school. Lesser effects are reported for family structure variables and the male/female population ratio. In contrast, the expected financial returns to a university education did not appear to play an important role in the decision-making process, a finding consistent with other studies of higher education in Japan. While our primary focus has been on university attendance, our model is also useful for explaining decisions regarding attendance at junior college, as we have pointed out throughout our discussion.

One of our most notable findings is the powerful role of mother's university attendance in determining whether or not a young woman attends university. This finding helps explain why the proportion of young women who attend university in Japan has been low relative to other developed countries: the low propensity of past generations of women to attend university has been transmitted to their daughters (for example, only two percent of the mothers of the young women in our sample had a university education). As this and the other important factors we identify operate to increase women's university attendance rates, these increases will be reinforced in subsequent generations of women.

This is the first study that utilizes micro data to examine the impact of the EEO Law on educational decision-making. While data limitations prevent us from drawing strong conclusions, our results suggest that the passage of the law discouraged attendance at junior college and encouraged attendance at university, a finding consistent with a view that subsequent to the passage of the law a significant group of women who might have chosen junior college in the past are now more inclined to undertake university education, the path that is required if they wish to prepare themselves for career positions.[33] This finding is in contrast to studies of the labor market effects of the EEO Law, which typically conclude that the law has been too weak to counter gender bias entrenched in both Japanese society and in the labor market (Hanami (2000), Lam (1992), Gelb (1998), Knapp (1995), Omori (1993)). Our findings suggest that the impact of the law may be more indirect and have a much longer lag than anticipated.[34]

One issue that we do not address in this paper is the role of changes in the "supply" of places in universities over the period we study. Our model is demand-based and implicitly assumes that as more qualified women seek to undertake university education, more places are made available for them—either by the expansion of places at existing universities, the development of new universities, or the transformation of existing junior colleges into four-year institutions. There is evidence that the number of universities, though not necessarily student places, has increased: from 420 in 1975, to 460 in 1985, to 565 in 1995 (Japan Statistical Yearbook, 1998). But even so, it is still not possible for us to distinguish, with our data, a demand-based model like the one we present in this paper from a scenario in which there was latent demand for university education on the part of young women and their families and that an

[33] This finding is consistent with the results of a survey of employees of a large Japanese department store conducted by Alice Lam in 1984 and 1988, a period bracketing the passage of the EEO Law (Lam (1992)). Lam writes that young women report less pessimism about the expectations regarding their chances of promotion in 1988 than in 1984. She concludes, "Both survey results and interviews show that in comparison with the pre-EEO Law situation, women in 1988 perceived greater 'availability'of equal opportunities" (p. 30).

[34] It has been pointed out to us that over the period we discuss, employment rates of new female university graduates increased faster than the employment rates of new junior college graduates and that these improved employment opportunities are the reason for the increased enrollments in university. However, one must keep in mind that the improved employment opportunities for female university graduates may themselves be a result of the EEO Law.

expansion in educational opportunities, coincident with the passage of the EEO Law, enabled this latent demand to be realized.[35]

The growing numbers of young women who have been attending university since the passage of the law may have not yet appeared in careers, perhaps because of the entrenched recession gripping the Japanese economy since the 1990's. But these university-educated young women will be an important resource for Japanese businesses and government in the future, especially given the expected decline in the adult population. The Japanese Ministry of Labor, in its 1998 *White Paper on Working Women*, sees the greater integration of women in the labor market as a necessary way to prepare for the smaller working-age population that demographers predict for the next century. The Ministry also advocates solidifying the modifications already underway: making the workplace more hospitable to women; hiring potential workers on the basis of their skills and professional qualifications rather than their gender or age; and actively utilizing women who are returning to the workplace after leaving for childbearing (*Japan Labor Bulletin*, April 1999). The revisions that went into effect on April 1, 1999 to the EEO Law and those that are scheduled to go into effect in April 2002 to the Child Care and Family Care Leave Law are moves in the right direction. Changes like these will go a long way toward equalizing opportunity and results for women in the Japanese labor market.

[35] A supply-based explanation of the growth in women's attendance in universities was proposed in conversation by Marcus Rebick, who suggested that universities increased their acceptances of women applicants and made their institutions more attractive to women in preparation for an expected decline in male applicants as a result of the "baby bust" of the 1990s.

REFERENCES

Amano, Masako, "Women in Higher Education," *Higher Education*, Vol. 34 (1997), 215-235.

Amemiya, Takeshi, *Advanced Econometrics* (Cambridge, MA: Harvard University Press, 1985).

Arai, Kazuhiro, *The Economics of Education: An Analysis of College-Going Behavior* (Tokyo: Springer-Verlag, 1998).

Araki, Takashi, "Recent Legislative Developments in Equal Employment and Harmonization of Work and Family Life in Japan, *Japan Labor Bulletin*, Vol. 37, No.4 (April, 1998), 5-10.

Becker, Gary S., *Human Capital,* 3rd edition, (Chicago: Chicago University Press, 1993).

_____ and H. Gregg Lewis, "On the Interaction between the Quantity and Quality of Children," *Journal of Political Economy,* Vol. 82, Part 2 (March/April 1973), S279-88.

Brinton, Mary C, "The Social Institutional Bases of Gender Stratification: Japan as an Illustrative Case," *American Journal of Sociology,* Vol. 94, No. 2 (1988), 300-334.

Dore, Ronald, *Taking Japan Seriously* (London: Athlone Press, 1987).

Edwards, Linda N, "Equal Employment Opportunity in Japan: A View from the West," *Industrial and Labor Relations Review,* Vol. 41, No. 2 (January, 1988), 240-250.

_____, "The Status of Women in Japan: Has the Equal Employment Opportunity Law Made A Difference?" *Journal of Asian Economics*, Vol. 4, No. 2 (1994), 217-240.

Frost, Peter, "Examination Hell," in Edward R. Beauchamp, ed., *Windows on Japanese Education* (Westport, CT: Greenwood Press, 1991).

Gelb, Joyce, "The Equal Employment Opportunity Law in Japan: A Decade of Change for Japanese Women?" *Yale Asia-Pacific Review*, Vol. 1 (Fall, 1998), 41-65.

Goldin, Claudia, "The Meaning of College in the Lives of American Women: The Past One-Hundred Years," National Bureau of Economic Research Working Paper No. 4099 (June, 1992).

Hanami, Tadashi, "Equal Employment Revisited," *Japan Labor Bulletin* 39 (January, 2000): 5-10.

Higuchi, Yoshio, "Higher Education and Income Distribution in Japan," in Tsuneo Ishikawa, *Income and Wealth Distribution in Japan* (New York: Oxford University Press, forthcoming).

Hutchens, Robert, George Jakubson, and Saul Schwartz, "AFDC and the Formation of Subfamilies," *Journal of Human Resources*, Vol. 24 (Fall 1989), 599-628.

Institute on Household Economy, *Japan Panel Survey on Consumers, Year 1 (Shohi Seikatsu ni Kansuru Paneru Chosa, Dai Ichinendo)* (Tokyo: Ministry of Finance Printing Bureau, 1994).

Ishida, Hiroshi. *Social Mobility in Contemporary Japan*. (Stanford: Stanford University Press, 1993).

_____. "Educational Credentials and Entry Labor Market Outcomes in Japan," in Yossi Shavit and Walter Muller eds., *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations* (New York: Oxford University Press, 1998).

Japan Labor Bulletin, Vol. 36, No. 3 (March 1997).

Japan, Monbusho (Ministry of Education), *Gakko Kihon Chosa Hokokusho,*
(Report on Basic School Statistics), (Tokyo: Okurasho Insatsukyoku, various years).

Kaneko, Motohisa, "Japan", in OECD, *From Higher Education to Employment*, Vol. III (Paris), 1992.

Kmenta, Jan, *Elements of Econometrics* (New York: Macmillan Publishing Co., 1986).

Knapp, Kiyoko Kamio, "Still Office Flowers: Japanese Women Betrayed by the Equal Employment Opportunity Law," *Harvard Women's Law Journal*, 18 (1995): 83-137.

Lam, Alice, "Women and Equal Employment Opportunities in Japan," Nissan Occasional Paper Series, Nissan Institute of Japanese Studies, Oxford, England, 1992.

McFadden, Daniel, "Econometric Models of Probabilistic Choice." In *Structural Analysis of Discrete Data*, ed. by C. Manski and D. McFadden (Cambridge, MA: MIT Press, 1981) 198-272.

Ministry of Labor, Japan, *Basic Survey on Wage Structure (Chingin Kozo Kihon Chosa), 1976-1986.*

_____, *White Paper on Labor (Rodo Hakusho),* 1989.

Nakata, Yoshi-fumi, and Mosk, Carl, "The Demand for College Education in Postwar Japan," *Journal of Human Resources*, 22 (Summer 1987): 375-404.

Omori, Maki, "Gender and the Labor Market," *Journal of Japanese Studies*, 19 (1993): 79.

Ono, Hiroshi, "Does *Examination Hell* Pay Off? The Cost-Benefit Analysis of College Education in Japan," paper presented at an NBER conference in Tokyo, Japan, December, 1999.

_____, "Are Sons and Daughters Substitutable?" paper presented at the European Society for Population Economics Conference, Bonn, Germany, June, 2000.

Osawa, Machiko, "Changing Role of Education and Women Workers in Japan," *Keio Business Review*, Vol. 24 (1987), 87-101.

Rebick, Marcus E., "The Japanese Labour Market for University Graduates: Trends in the 1990s," *Japan Forum*, Vol. 10, No. 1 (1998a), 17-29.

_____, "The Importance of Networks in the Market for University Graduates in Japan: A Longitudinal Analysis of Hiring Patterns," Centre for Economic Policy Research Discussion Paper No. 1816 (May, 1998b).

Rouse, Cecilia Elena, "What to Do after High School: The Two-Year versus Four-Year College Enrollment Decision," in Ronald G. Ehrenberg, ed., *Choices and Consequences* (Ithaca, NY: ILR Press, 1994).

Schultz, T. Paul, *Investments in Women's Human Capital* (Chicago: Chicago University Press, 1995).

Statistics Bureau, Management and Coordination Agency, *Japan Statistical Yearbook,* 1976-1986, 1991, 1997.

Tachibanaki , Toshiaki, *Wage Determination and Distribution in Japan* (New York: Oxford University Press,1996).

TABLE 1

Enrollment in Four-Year Colleges and Universities, by Sex, 1975, 1980, 1985, 1990, 1995 and 1999

Panel A

Enrollment Levels	Total	Women	Men	Women as a percent of total
1975	1,652,003	356,167	1,295,836	21.6%
1980	1,741,504	389,890	1,351,614	22.4%
1985	1,734,392	414,384	1,320,008	23.9%
1990	1,988,572	554,666	1,433,906	27.9%
1995	2,330,831	767,886	1,562,945	32.9%
1999	2,448,804	886,873	1,561,931	36.2%

PANEL B

Percentage changes in enrollments	Total	Women	Men	Women-Men (in percentage points)
1975-80	5.4%	9.5%	4.3%	5.2
1980-85	-.4%	6.3%	-2.3%	8.6
1985-90	14.7%	33.9%	8.6%	25.3
1990-95	17.2%	38.4%	9.0%	29.4
1995-99	5.1%	15.5%	-0.1%	16.5

Sources: Statistics Bureau, Management and Coordination Agency,
1975 *Japan Statistical Yearbook, 1977,* Table 402;
1980 *Japan Statistical Yearbook, 1982,* Table 418;
1985 *Japan Statistical Yearbook, 1986,* Table 19-16;
1990 *Japan Statistical Yearbook, 1991,* Table 19-16;
1995 *Japan Statistical Yearbook, 1997,* Table 20-16;
1999 *Japan Statistical Yearbook, 2001,* Table 20-16.

TABLE 2
Descriptive Statistics by Type of Education Chosen
(Standard Deviations in Parentheses)

	Total Sample	I HS and Voc. Sch.	II Junior College	III University or Graduate School	Test for Equality of Means/Proportions (* if Different at 5% level)** IvsII	IvsIII	IIvsIII
Sample Size	1452	964	299	189			
Age at the Time of Survey (1993)	28.9(3.2)	28.9(3.2)	29.0(3.2)	28.6(3.3)			
Proportion of Fathers with Univ. Education	13%	5%	23%	41%	*	*	*
Proportion of Mothers with Univ. Education	2%	1%	3%	11%	*	*	*
Family Income in 1992 (in yen)	5,541,930 (3,930,944)	4,759,558 (3,513,801)	6,551,887 (4,065,444)	7,932,099 (4,404,175)	*	*	*
Proportion of Families with Income <2,500,000 yen	21%	26%	13%	8%	*	*	
Proportion of Families with Income of at least 2,500,000 yen but not more than 4,999,999 yen	26%	29%	23%	15%		*	*
Proportion of Families with Income of at least 5,000,000 yen but not more than 7,499,999 yen	18%	16%	21%	21%			
Proportion of Families with Income of at least 7,500,000 yen but not more than 9,999,999 yen	10%	8%	15%	15%	*	*	
Proportion of Families with Income of at least 10,000,000 yen but not more than 12,499,999 yen	7%	5%	8%	11%		*	
Proportion of Families with Income of at least 12,500,000 yen but not more than 14,999,999 yen	2%	1%	3%	6%		*	
Proportion of Families with Income of at least 15,000,000 yen	3%	2%	5%	9%	*	*	

** The test performed is the t-test.

TABLE 2 (continued)
Descriptive Statistics by Type of Education Chosen
(Standard Deviations in Parentheses)

	Total Sample	I HS and Voc. Sch.	II Junior College	III University or Graduate School	Test for Equality of Means/Proportions (* if Different at 5% level) IvsII	IvsIII	IIvsIII
Proportion of Mothers who Never Worked Outside Home before Respondent Turned 20	37%	33%	45%	43%	*	*	
Proportion who never attended Juku	34%	38%	26%	28%	*	*	
Proportion attending Juku during Elementary School	38%	40%	34%	38%			
Proportion attending Juku during Junior High	50%	45%	65%	54%	*	*	*
Proportion attending Juku during High School	14%	7%	23%	34%	*	*	*
Number of Siblings	1.5(1.0)	1.6(1.1)	1.3(.77)	1.2(.73)	*	*	
Proportion with one or more Brothers	59%	62%	57%	50%		*	
Proportion attending private High School	31%	29%	33%	34%			
Proportion Married	67%	71%	63%	49%	*	*	*
Proportion of Husbands with University Education	35%	22%	60%	83%	*	*	*
Proportion Working (of those Single)	90%	90%	88%	93%			
Proportion Working (of those Married)	42%	41%	40%	51%			
Proportion Working (of those Married and with one or more Children)	39%	40%	36%	44%			

TABLE 2 (continued)
Descriptive Statistics by Type of Education Chosen
(Standard Deviations in Parentheses)

	Total Sample	I HS and Voc. Sch.	II Junior College	III University or Graduate School	Test for Equality of Means/Proportions (* if Different at 5% level) IvsII	IvsIII	IIvsIII
Chose Education Type due to Probability of Acceptance	22%	26%	14%	10%	*	*	
Chose Education Type due to correlation with Career Choice	36%	32%	44%	43%	*	*	
Chose Education Type to "Obtain a Broad Education"	14%	10%	19%	28%	*	*	*
Chose Education Type to Help in Marriage	0.5%	0.5%	0.3%	0.5%			
Chose Education Type due to Parents' or Teacher's Advice	13%	15%	13%	8%		*	

TABLE 3
Logit Estimates of Young Women's Postsecondary Education Choice
(Standard Errors in Parentheses)

Independent Variables	Includes Juku Variables		Excludes Juku Variables	
	log[Pr(JrColl.)/ Pr(HSVoc.)]	log[Pr(Univ.)/ Pr(HSVoc.)]	Log[Pr(JrColl.)/ Pr(HSVoc.)]	log[Pr(Univ.)/ Pr(HSVoc.)]
Family Income 2	.242 (.206)	.035 (.287)	.165 (.203)	-.035 (.279)
Family Income 3	.710 (.225)**	.948 (.287)**	.725 (.221)**	.865 (.277)**
Family Income 4	.775 (.265)**	.997 (.322)**	.843 (.259)**	1.031 (.314)**
Family Income 5	.485 (.318)	.883 (.374)*	.594 (.309)*	.934 (.362)**
Family Income 6	.778 (.539)	1.637 (.562)**	.901 (.522)*	1.849 (.540)**
Family Income 7	1.081 (.443)*	1.370 (.480)**	1.215 (.434)**	1.443 (.472)**
Mother's Education	.331 (.646)	1.659 (.595)**	.488 (.649)	1.900 (.596)**
Father's Education	1.510 (.240)**	2.050 (.257)**	1.588 (.236)**	2.134 (.249)**
Attended Private Schools	3.441 (1.070)**	3.682 (1.24)**	3.445(1.057)**	3.212 (1.16)**
Homemaker Mother	.611 (.157)**	.379 (.199)*	.621 (.155)**	.450 (.193)*
Siblings	-.250 (.098)*	-.325 (.129)*	-.289 (.096)**	-.350 (.126)**
Brother	-.089 (.164)	-.312 (.208)	-.078 (.161)	-.315 (.202)
Expected Return to University – Expected Return to High School	.089 (.056)	.010 (.072)	.095 (.055)*	.039 (.070)
EEO Law * (Expected Return to Univ. – Expected Return to H.S.)	-.043 (.025)*	.027 (.034)	-.038 (.024)	.031 (.033)
Vacancy/Applicant Ratio	.337 (.240)	.348 (.297)	.359 (.234)	.490 (.288)
Male/Female Ratio	-5.163 (3.944)	5.895 (5.380)	-4.847 (3.88)	5.596 (5.220)
Juku2	-.421 (.165)*	-.268 (.209)		
Juku3	.399 (.168)*	-.418 (.212)*		
Juku4	1.096 (.224)**	1.798 (.256)**		
Chi2	557.15**		583.30**	

Notes:
Dependent Variable: 0=high school and vocational school (comparison group); 1=junior college; 2=university; N=1452; high school and vocational school=964; junior college=299; university=189. The equations also include a constant.

Dummy variables representing the 47 prefectures and metropolitan areas are included in the equations, but their coefficients are not reported in the tables.

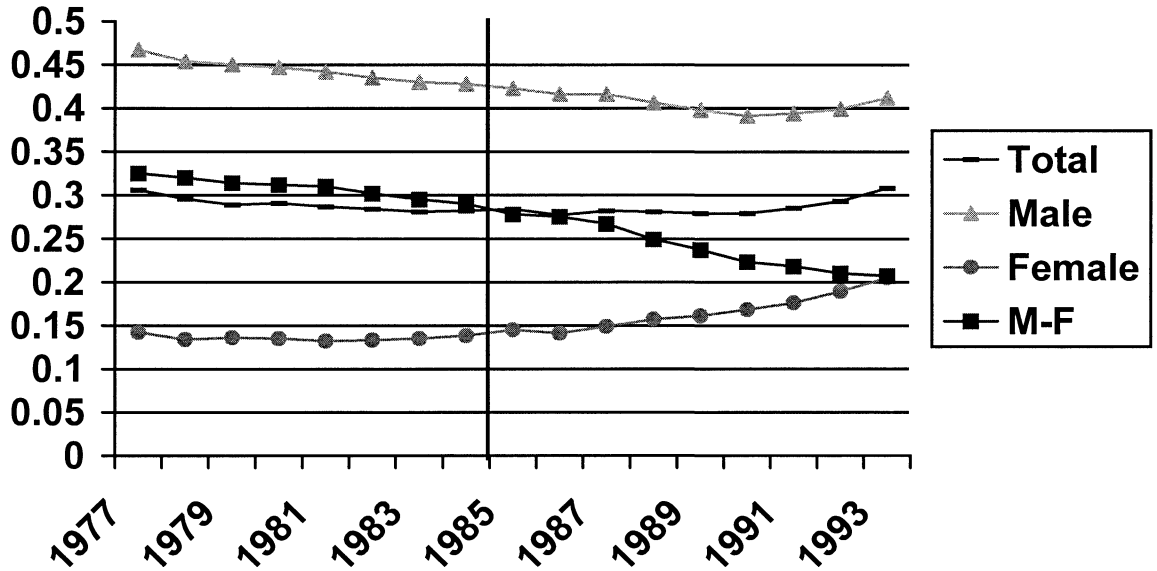
** Significant at the 5% level. * Significant at the 10% level.

TABLE 4

Predicted Changes in Attendance at Junior College, or University Associated with Changes in the Values of Explanatory Variables (Includes Juku Variables and Prefectural Dummies)

Explanatory Variable	Includes Juku Variables		Excludes Juku Variables	
	Junior College	University	Junior College	University
Mother is University Graduate vs. Not	-.03	+.20	-.03	+.24
Father is University Graduate vs. Not	+.14	+.17	+.16	+.19
Mother was Full-time Homemaker	+.07	+.01	+.08	+.02
Increase in Parents' Income from Low Income (Bracket 2) to High Income (Bracket 6)	+.01	+.15	+.03	+.19
Increase in Parents' Income from Lowest Income (Bracket 1) to Highest Income (Bracket 7)	+.11	+.09	+.13	+.10
Increase in Parents' Income from Bracket 4 to Bracket 6	-.03	+.08	-.04	+.11
Attended Private Schools vs. Not	+.19	+.12	+.20	+.11
Increase in Number of Siblings from 1 to 2	-.02	-.02	-.03	-.02
Having a Brother vs. no Brother	-.00	-.02	-.00	-.03
Increase in Differential Return to Univ. Education (vs. H.S.) from Lowest (11.36) to Highest (19.57) Value	+.09	-.01	+.09	+.01
Increase in Male/Female Ratio from the Lowest (.95) to the Highest (1.05) Value	-.09	+.07	-.09	+.06
Increase in VA Ratio from the Lowest (1.4) to Highest (2.9) Value	+.05	+.03	+.05	+.05
Juku in Elementary vs. No Juku in Elementary	-.05	-.01		
Juku in Jr. High vs. No Juku in Jr. High	+.07	-.05		
Juku in High School vs. No Juku in High School	+.09	+.16		
Juku in HS and no Juku in both Elem. and Jr. Hi. vs. Juku in Elem and Jr. Hi. And no Juku in HS	+.06	+.24		
Passage of Law	-.10	+.06	-.09	+.06

Figure 1
Advancement Rates to Universities in Japan by Gender (as a Percentage of High School Graduates)*



*Note: Advancement rates were calculated as the percentage of high school graduates in each year that entered universities within four years of graduating from high school, in order to incorporate the "ronin" status prevalent in Japan, where a high school graduate who has flunked an entrance exam into a university of her/his choice, will sit out a year or more in order to study to pass the entrance exam in the future. Source: Ministry of Education in Japan, *Basic School Survey*, various years.

Appendix

To estimate the present value of the earnings of men with a high school education, we use the following formula:

$$E_0 + \frac{E_1}{(1+r)} + \frac{E_2}{(1+r)^2} + \frac{E_3}{(1+r)^3} + ... + \frac{E_n}{(1+r)^n}$$

where *E* represents wages paid to male high school graduates, divided by the CPI. The actual wages are taken from the *Basic Survey on Wage Structure*, where the subscripts represent years of tenure. Wages in the *Basic Survey on Wage Structure* are reported for categories of education and tenure, and so we extrapolated the wages for each year after pegging the value reported to the midpoint of the category. We assume retirement at age 60, and assign n=42. We acknowledge that we do use an estimate that cuts across cohorts for each of the 11 years for which we have an estimate, but we are implicitly assuming that the best information a young women has in making her decision is no better than this kind of snapshot.

For the CPI, 1992 is used as the base year to be consistent with the family income variable that is reported in categories of 1992 yen. For "*r*", the discount rate, we utilized the postal savings rate rather than an educational loan rate, since almost all of higher education in Japan is financed through savings.

To estimate the present value of the earnings of men with a university education, we use the following formula:

$$U_0 + \frac{U_1}{(1+r)} + \frac{U_2}{(1+r)^2} + \frac{U_3}{(1+r)^3} + ... + \frac{U_n}{(1+r)^n}$$

where *U* represents wages paid to male university graduates, divided by the CPI. Assuming retirement at age 60, we assign n=38 for university graduates.

These estimates of the present value of the returns to schooling do not take into account the effects of bonus payments because the *Basic Survey on Wage Structure* did not report bonus payments for tenure for a portion of the years under study. To the extent that bonuses are strongly correlated with education than are wages and salaries, our returns measures will understate the true returns to post-high school education.

Appendix Table 1

Advancement Rates to Universities in Japan by Gender (as a Percentage of High School Graduates)*

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total	.306	.296	.289	.291	.287	.284	.281	.282	.284	.277	.282	.281	.279	.279	.285	.293	.308
Male	.467	.454	.450	.447	.442	.435	.430	.428	.423	.416	.416	.406	.398	.391	.394	.399	.412
Female	.142	.134	.136	.135	.132	.133	.135	.138	.145	.141	.149	.157	.161	.168	.176	.189	.205
M - F	.325	.320	.314	.312	.310	.302	.295	.290	.278	.275	.267	.249	.237	.223	.218	.210	.207

*Note: Advancement rates were calculated as the percentage of high school graduates in each year that entered universities within four years of graduating from high school, in order to incorporate the "ronin" status prevalent in Japan, where a high school graduate who has flunked an entrance exam into a university of her/his choice, will sit out a year or more in order to study to pass the entrance exam in the future. Source: Ministry of Education in Japan, *Basic School Survey*, various years.

Appendix Table 2
Variable Definitions

Independent Variables	Definition
Family Income 1	Parents' income was less than 2,500,000 yen in 1992.
Family Income 2	Parents' income was at least 2,500,000 yen but less than 5,000,000 yen in 1992.
Family Income 3	Parents' income was at least 5,000,000 yen but less than 7,500,000 yen in 1992.
Family Income 4	Parents' income was at least 7,500,000 yen but less than 10,000,000 yen in 1992.
Family Income 5	Parents' income was at least 10,000,000 yen but less than 12,500,000 yen in 1992.
Family Income 6	Parents' income was at least 12,500,000 yen but less than 15,000,000 yen in 1992.
Family Income 7	Parents' income was at least 15,000,000 yen in 1992.
Mother's Education	Dummy variable assigned the value 1 if the respondent's mother had at least a university education, and 0 otherwise.
Father's Education	Dummy variable assigned the value 1 if the respondent's father had at least a university education, and 0 otherwise.
Attended Private Schools	Dummy variable assigned the value 1 if the respondent attended a private school in junior high or high school.
Homemaker Mother	Dummy variable assigned the value 1 if the respondent's mother did not work outside of the home before the respondent turned 20 years of age.
Juku 1	Dummy variable assigned the value 1 if the respondent never attended juku, and 0 otherwise.
Juku 2	Dummy variable assigned the value 1 if the respondent attended juku during elementary school, and 0 otherwise.
Juku 3	Dummy variable assigned the value 1 if the respondent attended juku during junior high, and 0 otherwise.
Juku 4	Dummy variable assigned the value 1 if the respondent attended juku during high school, and 0 otherwise.
Siblings	The number of siblings for the respondent.
Brother	Dummy variable assigned the value 1 if the respondent had at least one brother, and 0 otherwise.
Expected Return to Univ. – Expected Return to H.S.	The difference between the expected return to attending and graduating from university and the expected return to high school, as described in the Appendix.
Vacancy/Applicant Ratio	The vacancy applicant ratio for those aged 19 and under during the year in which the respondent was 17, as an indicator of the business cycle.[36]
Male/Female Ratio	The ratio of males (18-20 yr. olds) to females (16-18 yr. olds) in Japan for the year in which the respondent was 17.[37]
Law	Dummy variable assigned the value 1 if the respondent made her educational decision (turned 17) after the Equal Employment Opportunity Law was passed, and 0 otherwise.
EEO Law * (Expected Return to Univ. – Expected Return to H.S.)	Interaction between the Law variable and the differential variable measuring the difference between the Expected Return to university the expected return to high school.
Ken	Dummy variables for each of the 43 prefectures in Japan as well as Hokkaido, and the metropolitan areas of Tokyo, Osaka, and Kyoto. The base case used for the estimations is Tokyo.

[36] Source: Ministry of Labor, *Rodo Hakusho (White Paper on Labor),* 1989.
[37] Source: Bureau of Statistics, *Report on Current Population Estimates,* various years.