

OTHER ESSAYS

**The Return on Women's Human Capital and  
the Role of Male Attitudes Toward Working  
Wives**

***Gender Roles, Work Interruption, and Women's  
Earnings in Taiwan***

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ABSTRACT. This study empirically investigates women's work interruption behavior in Taiwan and this behavior's influence on women's earnings. The most striking finding from our analysis of women's work history patterns is that a husband's negative attitude toward a working wife will more greatly discourage his wife from attaching to the labor market than will the presence of young children in the family. Thus, it is critical to educate men to give up their traditional attitudes toward gender roles in order to raise the female labor force participation rate in Taiwan. As to the effect of work interruption on earnings, a depreciation rate of 2.8% is found for women with at least a high-school level of education, while no penalty of foregone experience is shown for less-educated women. Since this depreciation effect may discourage women from re-entering the labor market, government programs encouraging self-employment should be helpful, as self-employed women find it easier to overcome the conflict between family obligations and work needs.

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## I

**Introduction**

THE FEMALE LABOR FORCE PARTICIPATION RATE in Taiwan has grown rapidly, from 33% in 1965 to 46% in 1988, accompanying the increase in women's educational attainment. However, this rate has flattened out in the past decade, although women's educational level continues to grow steadily. This phenomenon indicates the need to further investigate Taiwan's labor supply behavior of women.

It is well documented in the literature (see, for example, Heckmen 1978; Smith 1980) that women's work participation decisions are quite different from men's. Because of the common attitude toward traditional gender roles, most working women have to balance family and work demands (Vella 1994; Boden 1999). Therefore, withdrawal from the labor market on either a temporary or permanent basis is commonly observed for working women. The influence of this gender role attitude on Taiwanese women is shown by the data from the 1989 "Taiwan Women and Family Survey," which shows that 68% of working women surveyed have withdrawn from the labor market at least once in their life.

Given this common interruption of women's life-cycle labor force participation, many studies have focused on investigating the causes and results of this phenomenon. Mincer and Polachek (1974) argue that withdrawal from the labor market influences wages through human capital depreciation and underinvestments in on-the-job training. In this pioneer work, Mincer and Polachek found an average depreciation rate of 1.5% per year, based on the 1967 NLS data for women. Using the same data, Sandell and Shapiro (1978) estimate an average depreciation rate of 0.5% per year with their extended model considering the distinction between general training and specific training. One of the most recent works by Kim and Polachek (1994), using 1976–1987 panel data from the PSID, has found much larger estimates of the depreciation rates, ranging from 2.6 to 26.5% when based on more complicated econometric specifications that take into account the problems of heterogeneity and endogeneity.

Much knowledge about the depreciation effect of women's with-

drawal from the U.S. labor market has been accumulated, given the continuous work on this issue over the past 25 years. However, little is known regarding the effect of an interrupted working career for Taiwanese women, since not many studies have been undertaken based on data for Taiwan. The purpose of our study is to fill in the almost blank space in the literature about the depreciation effect for Taiwanese women by investigating empirically whether there is a human capital depreciation effect on wages due to work interruption. This is important, not only because the majority of Taiwanese working women have experienced career interruption, but also because this issue may be the key to answering the question of why the female labor force participation rate has stayed at the same level for more than 10 years.

Our empirical examination of the depreciation effect based on the earning equations indicates that there is a significant depreciation rate of 2–4% per year for women with at least a high-school level of education, and that this depreciation effect declines as the post-interruption working period for these women increases. However, no significant depreciation effect is found for less-educated women.

The remainder of this paper is organized as follows. Econometric specification and the description of the data used for the estimation are presented in Section II. Section III discusses the estimation results based on data drawn from the 1989 “Taiwan Women and Family Survey.” The final section summarizes our findings and discusses some policy implications.

## II

### **Econometric Specification and Data**

#### *A. Econometric Specification*

The main theory of this study's econometric specification is based on Mincer's human-capital earnings function. According to Mincer and Poleshek (1974), “earnings in the labor market are a function of the human-capital stock accumulated by individuals, a sequence of positive net investments give rise to growing earning power over the life cycle.” Thus, the basic specification of the “human-capital” earnings

function focusing on the contribution of school education and post-school labor market experience to earnings is as the following:

$$\ln E_t = \ln E_0 + rs + r \sum_{j=s}^{t-1} k_j, \quad (1)$$

where  $s$  denotes schooling,  $k_j$  represents the post-school investment ratio,  $r$  is the average rate of return to the individual's human-capital investment,<sup>1</sup>  $E_0$  denotes the earning power at time 0, and  $E_t$  denotes the earning power at time  $t$ .

In studying women's earnings, it is crucial to consider the aspect of interruption or intermittence of the work experience commonly observed for women. The life cycle of married women features several stages that differ in the nature and degree of labor market and home involvement. Therefore, a monotonic specification of the earnings function, as in Equation (1), is not sufficient to capture the pattern of women's life-cycle earnings. As stated in Mincer and Polechek (1974), a step-function that can reflect the discontinuity of the labor market experience is more appropriate:

$$\ln E_t = \ln E_0 + rs + r(k_1e_1 + k_2b + k_3e_3 + k_4e_4). \quad (2)$$

Specifically, women's life-cycle human-capital investment profile is divided into five periods:  $s$  for the schooling period,  $e_1$  for the employment period prior to interruption,  $b$  for the interruption period,  $e_3$  for the employment period after interruption but prior to the current employment, and  $e_4$  for the current employment period.<sup>2</sup>

As human capital may depreciate due to work experience discontinuity, the distinction between gross and net investment should be taken into account. Following the literature, the gross investment ratio,  $k_t^*$ , and the net investment ratio,  $k_t$ , are related as  $rk_t = k_t^* - \delta_t$ , where  $\delta$  is the human-capital depreciation rate. With this consideration, Equation (2) can be rewritten as:

$$\begin{aligned} \ln E_t = \ln E_0 + (rs - \delta_s) + (rk_1^* - \delta_1)e_1 \\ + (rk_2^* - \delta_2)b + (rk_3^* - \delta_3)e_3 + (rk_4^* - \delta_4). \end{aligned} \quad (3)$$

Moreover, given the relation between observed earnings ( $Y_t$ ) and potential earnings ( $E_t$ ),  $Y_t = E_t(1 - k_t^*)$ , the econometric specification

of the earnings function reflecting women's discontinuous labor force participation can then be written as:

$$\ln Y = a_0 + rs + \alpha_1 e_1 + \alpha_2 b + \alpha_3 e_3 + \alpha_4 e_4 + u. \quad (4)$$

To finally estimate the earnings function based on women with observed earnings, the potential problem of selectivity bias cannot be ignored. Working women are not a random sample selected from the population of all women. Hence, Heckman's two-stage procedure is applied to correct for the potential problem of selectivity bias. Let  $\lambda$  denote the selection term derived from the first stage of the Probit equation; then the selection-bias corrected earnings function for women in the current study is as follows:

$$\begin{aligned} \ln w = a_0 + rs + \alpha_1 e_1 + \alpha_2 b + \alpha_3 e_3 + \beta_1 e_3^2 \\ + \alpha_4 e_4 + \beta_2 e_4^2 + \rho \sigma_\varepsilon \lambda + v, \end{aligned} \quad (5)$$

where the specification of the quadratic terms allows for the possible non-linearity of the human-capital profile.

### B. Data

The data set used for this analysis is drawn from the 1989 Taiwan Women and Family Survey. This island-wide survey was conducted under the cooperation of the National Taiwan University, Academia Sinica, and the University of Chicago. It provides information about the status of living, working, and income transferring within family members for women from ages 25 to 59 in Taiwan.<sup>3</sup> The complete sample of this survey includes 3,803 women. A subsample of 2,401 women with spouse present and some work experience are the focus of this analysis.

This survey's unique property is that it collects retrospective information about marriage history, fertility history, work history, schooling history, and residence history beginning from age 15. The work history records the job characteristics, including the work hours per day, work days per week, and beginning and ending salaries, for each job taken by the respondents. This allows us to investigate the pattern of women's life-cycle labor force participation. In addition, the survey includes questions on the individual's attitude toward working women

from each respondent and her husband. This provides us the opportunity to examine the impact of the attitude toward traditional gender roles on women's work participation decisions.

According to the characteristic of these women's life-cycle labor force participation patterns, we categorize them into three groups: women with a continuous work history, women with an interrupted work history, and women with a ceased work history. Women with a continuous work history are defined to be those who have never withdrawn from the labor market since their first entrance. Women with an interrupted work history are defined to be those who have left the labor market some time after their first entrance and have re-entered the labor market. Women with a ceased work history are defined to be those who have left the labor market and have never returned by the survey year of 1988. Of the 2,401 women in the sample, 759 women have a continuous work history, 802 women are associated with an interrupted work history, and 840 women are observed to have a ceased work history.

A multinomial logit analysis is applied to find out the major factors determining these women's work history patterns. As these work history patterns also imply the women's labor market attachment tendency, it is reasonable to assume that those women with a continuous work history should have a higher commitment to the labor market, while those women with a ceased work history should tend to have a lower labor market commitment. The results, presented in Table 1, suggest that the level of education, work experience prior to the first birth, living in a city or town area, and the husband's attitude toward a working wife are all significant determinants of these women's labor market attachment tendencies. Women with a higher level of education are more likely to have a stronger labor market commitment, as shown by their higher probability of belonging to the group with a continuous work history. Work experience tends to enhance these women's labor market commitment, as indicated by the finding that women with a longer work experience prior to the first birth are more likely to have a continuous work history.

As to the effect of family composition, the number and the age structure of children do have some influence on women's labor

Table 1  
 Multinomial Logit Estimates of the Determinants of Work  
 History Type for Women

Variables	P <sub>2</sub> /P <sub>1</sub>	P <sub>3</sub> /P <sub>1</sub>
Constant	-1.5942 (-0.99)	-10.4830 (-5.73)***
Personal Characteristics		
Age	0.0804 (1.00)	0.6125 (6.76)***
Age-Squared	-0.0002 (-0.19)	-0.0067 (-6.32)***
Years of Schooling	-0.0432 (-2.32)**	-0.0770 (-4.07)***
Work Experience	-0.3381 (-6.70)***	-0.3931 (-7.41)***
Work Exp-Squared	0.0098 (3.20)***	0.0095 (2.82)***
Poor Health Status	0.0024 (0.02)	0.0902 (0.61)
Family Background		
Husband's Earnings	0.0049 (0.17)	-0.1174 (-2.74)***
Number of Kids	-0.1204 (-1.83)*	-0.1835 (-2.75)***
Kids Aged 0-2 Present	0.9460 (5.01)***	0.2039 (0.99)
Kids Aged 3-5 Present	0.1740 (1.17)	0.0890 (0.56)
Kids Aged 6-11 Present	0.3309 (2.13)**	0.3444 (2.21)**
Kids Aged 12-17 Present	-0.3159 (-1.94)*	-0.2542 (-1.61)
Kids Aged 18+ Present	-0.4109 (-1.61)	-0.4499 (-1.89)*
Residential Area		
City	1.6664 (8.94)***	0.9235 (5.41)***
Town	0.9353 (4.82)***	0.8210 (4.75)***
Country	R	R

Table 1 *Continued*

Variables	$P_2/P_1$	$P_3/P_1$
Attitude Toward Working		
Strong Tendency to Work	-0.6195 (-1.39)	-0.2204 (-0.53)
Supportive Attitude to Working Wife	-0.6061 (-5.33)***	-0.2693 (-2.38)**
Number of Observations		2401
Log-likelihood		-2368

*Note:* (1)  $P_1$  is the probability of being a woman with a continuous work history.  $P_2$  is the probability of being a woman with a ceased work history.  $P_3$  is the probability of being a woman with an interrupted work history.

(2) The variable "Work Experience" computes the years of working experience prior to the first birth.

(3) T-values are in parentheses.

market commitment. The results imply that, as expected, the presence of young children in the family has a negative influence on their mothers' labor market commitment. However, this negative effect is not very strong compared to that implied by the husbands' attitude toward a working wife, as shown by the magnitudes and the significance levels in Table 1. In other words, a husband's negative attitude toward working wives will discourage his wife from attaching to the labor market to a greater extent than will the presence of young children in the family. On the other hand, women's own attitude toward working women does not show any significant effect on their commitment to the labor market. This implies that a husband's attitude toward traditional gender roles would dominate women's market work decisions. Therefore, in order to raise the female labor force participation rate, educating women to develop a perception of modern gender roles is not enough; it is even more critical to educate men to give up their traditional attitudes toward gender roles.<sup>4</sup>

Among the three groups we have defined, women with an interrupted work history are the main focus of our analysis on deprecia-

tion rates. Among the 802 women with an interrupted work history, 643 have experienced only a one-time interruption, 154 have experienced interruptions twice, and only five have experienced three or more periods of career interruptions. The average length of the total duration of interrupted periods is 8.3 years. The average length is shorter (7.4 years) for those women with a one-time interruption.

Since the length of interruption duration may have some impact upon the depreciation rate of human capital, further analysis of this duration for women with a one-time interruption is reported in Table 2. Those women with a younger age, higher level of education, and longer work experience tend to have a shorter length of interrupted duration. The differences in their family background indicate that women with a shorter length of interrupted duration are more likely to come from families with fewer children and higher husband's income. There is little difference in the characteristics of residence area observed for women with various lengths of interrupted duration. The results from the multinomial logit analysis confirm the results from the above descriptive analysis. That is, women's personal characteristics are more significant determinants of their length of interrupted duration, while family background and residence area have little effects on the length of their interrupted duration.

The estimation of the earnings function for the analysis of the depreciation effect will be based on the group of women with an interrupted work history. The following section will present and discuss the estimation results of the earnings function.

### III

#### **Estimation Results**

IN ORDER TO HAVE A MORE COMPLETE UNDERSTANDING of the possible depreciation effect due to career interruption, two specifications of the earnings function based on Equation (5) are estimated for various groups of women with an interrupted work history. Specification (I) includes the standard human-capital variables described in the literature, accounting for the interruption of women's labor force participation. Specification (II) further includes the occupational and industrial dummy variables with the consideration of the compensating wage

Table 2

## Analysis of Interruption Duration for Women with One-Time Interruption

## (a) Descriptive Statistics

Variables	Total	Short-Term Interruption	Mid-Term Interruption	Long-Term Interruption
Personal Characteristics				
Age	38.83 (7.15)	35.79 (6.63)	38.12 (6.44)	43.67 (6.32)
Years of Schooling	7.41 (3.85)	9.16 (3.51)	7.49 (3.72)	5.12 (3.26)
Work Experience	5.72 (3.01)	5.94 (3.02)	5.80 (3.07)	5.34 (2.91)
Family Background				
Husband's Earnings	2.14 (1.95)	2.34 (1.30)	2.23 (2.68)	1.76 (0.97)
Number of Children	2.97 (1.10)	2.65 (1.14)	2.86 (1.00)	3.55 (0.97)
Residential Area				
City	0.55 (0.50)	0.57 (0.50)	0.52 (0.50)	0.57 (0.50)
Town	0.35 (0.48)	0.33 (0.47)	0.37 (0.48)	0.34 (0.47)
Country	0.11 (0.31)	0.11 (0.31)	0.12 (0.32)	0.09 (0.29)

*Note:* "Short-Term Interruption" denotes those with an interruption duration less than three years. "Mid-Term Interruption" denotes those with an interruption duration greater than three years and less than 10 years. "Long-Term Interruption" denotes those with an interruption duration greater than 10 years.

differentials implied by the hedonic wage theory. The estimation results are reported in Tables 3–7.

As shown in Table 3, for the sample of all women with an interrupted work history, the human-capital variables are significant determinants of women's life-cycle earnings in both specifications. However, the insignificant estimate of the *b* variable implies that there is no depreciation effect of human capital due to the interruption of women's work history in general. It is noticed that the magnitude of

Table 2 *Continued*

## (b) Multinomial Logit Estimation Results

Variables	P <sub>2</sub> /P <sub>1</sub>	P <sub>3</sub> /P <sub>1</sub>
Constant	-8.5567 (-3.24)***	-28.1450 (-6.38)***
Personal Characteristics		
Age	0.5421 (3.98)***	1.3435 (6.56)***
Age-Squared	-0.0060 (-3.64)***	-0.0142 (-6.05)***
Years of Schooling	-0.1521 (-4.47)***	-0.2614 (-6.00)***
Work Experience	-0.2142 (-1.98)**	-0.2516 (-1.77)*
Work Exp-Squared	0.0068 (0.92)	0.0018 (0.17)
Family Background		
Husband's Earnings	0.0069 (0.15)	0.1499 (-1.38)
Number of Children	-0.1942 (-1.68)*	0.1038 (0.77)
Residential Area		
City	-0.0012 (0.01)	0.9543 (2.17)**
Town	0.0784 (0.23)	0.7185 (1.57)
Country	R	R
Number of Observation		643
log-likelihood		-565

Note: (1) P<sub>1</sub> is the probability of being a woman with a short-term interruption. P<sub>2</sub> is the probability of being a woman with a mid-term interruption. P<sub>3</sub> is the probability of being a woman with a long-term interruption.

the estimates for the post-interruption work experience variable is larger than the prior-interruption work experience variable. This implies that the employer rewards higher to the more recent work experience (both the coefficients of  $e_3$  and  $e_4$  are larger than that of  $e_1$ ). Moreover, the coefficient of  $e_4$  is greater than that of  $e_3$ , indicating that the return to the specific human capital is greater than the return to the general human capital. Both implications are consistent with the human-capital theory.<sup>5</sup> Further investigation of the human-capital variables also suggests that the non-linear structure is more significantly reflected in the prior work experience than in the current

Table 3  
 Estimation Results of Women's Earnings Function

Variables	Mean	Specification (I)	Specification (II)
Constant		3.2515*** (36.67)	3.5536*** (33.68)
Years of Schooling	8.66 (4.40)	0.0690*** (14.18)	0.0294*** (5.02)
$e_1$	3.03 (4.03)	0.0091* (1.72)	0.0070 (1.46)
$b$	5.08 (6.47)	0.0040 (0.91)	0.0033 (0.85)
$e_3$	5.10 (7.71)	0.0176*** (2.65)	0.0111* (1.83)
$e_3$ squared	85.36 (213.25)	-0.0005** (-2.43)	-0.0005** (-2.31)
$e_4$	6.24 (5.85)	0.0307*** (4.16)	0.0170** (2.50)
$e_4$ squared	73.12 (145.81)	-0.0005* (-1.72)	-0.0002 (-0.78)
Multiple	0.11	-0.0854	-0.0482
Interruption	(0.32)	(-1.48)	(-0.93)
Professional	0.08	—	0.7124***
Occupation	(0.27)		(9.17)
Sales and Assistant	0.26	—	0.3316***
Managers	(0.44)		(6.33)
Clerks and	0.66	—	R
Laborers	(0.48)		
Primary Industry	0.02 (0.13)	—	0.2408* (1.89)
Manufacturing	0.57 (0.49)	—	-0.0305 (-0.60)
Mining, Utility, and	0.05 (0.21)	—	0.1121 (1.36)
Transportation			
Industry			

Table 3 *Continued*

Variables	Mean	Specification (I)	Specification (II)
Commerce and Financial Service Industry	0.16 (0.36)	—	0.1793*** (3.27)
Social and Individual Service Industry	0.20 (0.40)	—	R
Selection Term ( $\lambda$ )	0.41 (0.38)	-0.0202 (-0.31)	-0.0869 (-1.49)
R <sup>2</sup>		0.36	0.48
Number of Observations		672	672

Note: (1) Specification (I) includes human-capital variables only. Specification (II) includes human-capital variables and variables of occupation and industry.

(2) Standard errors are in parentheses in the Mean column. T-values are in parentheses in the Specification (I) and Specification (II) columns.

(3) \*\*: 5% significance level, \*\*\*: 1% significance level.

employment. Results from Specification (II) indicate that the occupational differences have a stronger influence on women's earnings than do industrial differences.

Table 4 presents the estimation results of the earnings function for women grouped by their level of education. For those women with at least a high-school level of education, human-capital variables possess significant coefficients, implying that human capital is the key element in determining the earning ability of more-educated women. However, these variables show little effect on the earnings for women with less than a high-school level of education. This finding holds for both Specifications (I) and (II). As to the effect of work interruption, a statistically significant estimate of a 2.8% depreciation rate is found for women with at least a high-school level of education, while no significant depreciation effect is found for less-educated women. In other words, highly-educated women would suffer a reduction in their

Table 4  
 Estimation Results of Women's Earnings Function by Level of  
 Education

Variables	Specification (I)		Specification (II)	
	s ≥ 12	s < 12	s ≥ 12	s < 12
Constant	1.9229*** (6.84)	3.7857*** (38.92)	2.8488*** (8.85)	3.7331*** (30.18)
Years of Schooling	0.1469*** (7.85)	0.0144* (1.93)	0.0670*** (3.13)	0.0115 (1.53)
$e_1$	0.0325*** (2.97)	0.0007 (0.12)	0.0302*** (3.03)	0.0004 (0.07)
$b$	-0.0278** (-2.33)	-0.0018 (-0.43)	-0.0221** (-2.02)	-0.0010 (-0.25)
$e_3$	0.0493*** (3.27)	0.0017 (0.24)	0.0457*** (3.35)	-0.0036 (-0.52)
$e_3$ squared	-0.0008 (-1.04)	-0.0003 (-1.45)	-0.0009 (-1.33)	-0.0002 (-0.75)
$e_4$	0.0628*** (4.05)	0.0044 (0.57)	0.0506*** (3.59)	0.0024 (0.32)
$e_4$ squared	-0.0014** (-2.14)	0.0001 (0.53)	-0.0011** (-2.00)	0.0002 (0.64)
Multiple Interruption	0.0161 (0.15)	-0.0839 (-1.44)	0.0849 (0.81)	-0.0870 (-1.55)
Professional Occupation	—	—	0.5032*** (4.76)	0.6399*** (3.38)
Sales and Assistant Managers	—	—	0.2003*** (2.75)	0.2677*** (2.88)
Clerks and Laborers	—	—	R	R
Primary Industry	—	—	0.4377 (1.51)	0.2653* (1.94)
Manufacturing Industry	—	—	-0.1344* (-1.66)	0.0733 (1.12)

Table 4 *Continued*

Variables	Specification (I)		Specification (II)	
	s ≥ 12	s < 12	s ≥ 12	s < 12
Mining, Utility, and Transportation Industry	—	—	0.0583 (0.43)	0.1802* (1.79)
Commerce and Financial Service Industry	—	—	0.2420*** (3.43)	0.1532* (1.71)
Social and Individual Service Industry	—	—	R	R
Selection Term (λ)	0.3359*** (2.74)	0.0300 (-0.45)	0.2004 (1.76)	-0.0656 (-1.01)
R <sup>2</sup>	0.33	0.072	0.46	0.14
Number of Observations	262	410	262	410

*Note:* (1) Specification (I) includes human-capital variables only. Specification (II) includes human-capital variables and variables of occupation and industry.

(2) S ≥ 12 denotes high school graduates or higher level of education. S < 12 denotes less than a high-school level of education. (3) T-values are in parentheses. (4) \*\*: 5% significance level, \*\*\*: 1% significance level.

earning power due to a discontinuous work experience, as human capital is the key determinant of their earnings. For less-educated women, no penalty of foregone experience is found, since human capital has little to do with their earning ability. It is also noticed for the highly-educated women that the magnitude of the estimates for the post-interruption work experience variables is larger than the prior-interruption work experience variable. The above-mentioned human-capital theory can provide justification for this finding. In

addition, according to Mincer and Ofek (1982), the restoration of depreciated human capital is easier than the construction of new human capital. Thus, the rate of return for the post-interruption work experience should be higher.<sup>6</sup>

Results from Specification (II) suggest that, for both educational groups, occupational differences have a stronger influence on women's earnings than do industrial differences. The significant estimate of the selection term implies that sample selectivity bias is non-negligible for the group of women with at least a high-school level of education.

In the literature, it is found that the depreciation effect will dampen as time goes by. That is, the depreciation rate is larger for women who have just re-entered the labor market than it is for women who re-entered the labor market a long time ago. To examine whether this difference in the long-run and short-run effects is confirmed by the data in Taiwan, the earnings function is estimated for a subsample of women, ages 30–44. As reported in Table 5, the results are similar to those found for all women. There is a significant depreciation effect for women with at least a high-school level of education and no significant depreciation effect for less-educated women. Moreover, as found in the literature, the short-run depreciation rate for these highly-educated women is larger (4.5%) compared to that found for all highly-educated women (2.8%). As to the effects of occupational and industrial differences, the findings for the women with a shorter re-entry period are consistent with those found for women in general. That is, occupational differences have a stronger influence on women's earnings than do industrial differences, no matter how long it has been since the women have re-entered the labor market.

Table 6 and Table 7 present the estimation results of the earnings function for women grouped by their occupations. The results show that schooling is a consistently significant factor in determining the earnings for women in different occupations. Post-schooling human-capital investment, as measured by the work experience variables, has a significant influence on women's earnings only for those in a professional occupation. These findings hold even with the inclusion of the industrial dummy variables.

In general, our empirical results suggest that the human-capital

Table 5

Estimation Results of Women Aged 30–44 Earnings Function by Level of Education

Variables	Specification (I)		Specification (II)	
	s ≥ 12	s < 12	s ≥ 12	s < 12
Constant	2.0986*** (5.56)	3.7459*** (23.23)	2.8797*** (7.24)	3.6839*** (19.06)
Years of Schooling	0.1419*** (6.00)	0.0136 (1.39)	0.0631*** (2.49)	0.0169* (1.71)
$e_1$	0.0211 (1.46)	0.0039 (0.49)	0.0203 (1.59)	0.0046 (0.58)
$b$	-0.0446*** (-2.81)	-0.0011 (-0.19)	-0.0303** (-2.17)	0.0009 (0.14)
$e_3$	0.0172 (0.65)	-0.0134 (-0.89)	0.0175 (0.76)	-0.0193 (-1.29)
$e_3$ squared	0.0015 (0.91)	0.0008 (1.278)	0.0012 (0.86)	0.0010 (1.64)
$e_4$	0.0623*** (2.67)	0.0059 (0.39)	0.0492** (2.40)	0.0084 (0.54)
$e_4$ squared	-0.0016 (-1.38)	0.0002 (0.27)	-0.0011 (-1.06)	0.0002 (0.23)
Multiple Interruptions	-0.1464 (-1.05)	-0.1308*** (-1.91)	-0.0168 (-0.14)	-0.1035 (-1.50)
Professional Occupation	—	—	0.6072*** (4.48)	1.1003*** (2.85)
Sales and Assistant Managers	—	—	0.2517** (2.46)	0.2571*** (2.02)
Clerks and Laborers	—	—	R	R
Primary Industry	—	—	0.4305 (1.12)	0.2123 (1.11)
Manufacturing Industry	—	—	-0.0497 (-0.47)	0.0059 (0.06)

Table 5 *Continued*

Variables	Specification (I)		Specification (II)	
	s $\geq$ 12	s < 12	s $\geq$ 12	s < 12
Mining, Utility, and Transportation Industry	—	—	0.1407 (0.80)	0.0972 (0.75)
Commerce and Financial Service Industry	—	—	0.2469*** (2.97)	0.1217 (0.91)
Social and Individual Service Industry	—	—	R	R
Selection Term ( $\lambda$ )	0.5716*** (3.88)	0.0265 (0.28)	0.3995*** (3.02)	-0.0124 (-0.13)
R <sup>2</sup>	0.34	0.04	0.46	0.12
Number of Observations	183	288	183	288

*Note:* (1) Specification (I) includes human-capital variables only. Specification (II) includes human-capital variables and variables of occupation and industry.

(2) S  $\geq$  12 denotes high school graduates or higher level of education. S < 12 denotes less than high-school level of education.

(3) T-values are in parentheses.

(4) \*\*: 5% significance level, \*\*\*: 1% significance level.

variables can explain almost 40% of the earning power for Taiwanese women. As to the effect of work interruption, our findings indicate a depreciation rate of 2.8% for women with at least a high-school level of education, while no significant depreciation effect is found for less-educated women. In addition, similar to the common findings in the literature, a significantly larger depreciation rate in the short run (4.5%) is observed for these highly-educated women.

Table 6  
 Estimation Results of Women's Earnings Function  
 (Specification [I]) by Occupation

Variables	Professional	Sales and Assistant Managers	Clerks and Laborers
Constant	2.5675*** (3.71)	3.2554*** (8.79)	3.8548*** (44.57)
Years of Schooling	0.1054*** (2.99)	0.0742*** (3.42)	0.0141** (2.34)
$e_1$	0.0140 (0.59)	0.0317** (2.08)	-0.0043 (-0.92)
$b$	-0.0180 (-0.50)	-0.0060 (-0.35)	-0.0027 (-0.77)
$e_3$	0.0499 (1.34)	0.0317* (1.68)	-0.0085 (-1.38)
$e_3$ squared	-0.0005 (-0.25)	-0.0001 (-0.14)	-0.0001 (-0.43)
$e_4$	0.0976** (3.28)	0.0051 (0.24)	0.0058 (0.85)
$e_4$ squared	-0.0029*** (-2.81)	0.0004 (0.46)	0.0001 (0.13)
Multiple Interruptions	-0.4370 (-1.39)	0.2600 (1.48)	-0.0919* (-1.89)
Selection Term ( $\lambda$ )	0.2656 (1.17)	0.1764 (0.12)	-0.0811** (-1.57)
R <sup>2</sup>	0.40	0.14	0.12
Number of Observations	53	178	441

Note: (1) \*\*: 5% significance level, \*\*\*: 1% significance level.

Table 7  
 Estimation Results of Women's Earnings Function  
 (Specification [II]) by Occupation

Variables	Professional	Sales and Assistant Managers	Clerks and Laborers
Constant	2.3477*** (3.52)	3.1660*** (8.34)	3.7634*** (35.09)
Years of Schooling	0.1160*** (3.44)	0.0748*** (3.52)	0.0166*** (2.71)
$e_1$	0.0159 (0.73)	0.0396*** (2.68)	-0.0031 (-0.66)
$b$	-0.0076 (-0.23)	-0.0167 (-1.00)	-0.0018 (-0.50)
$e_3$	0.0392 (1.12)	0.0335* (1.86)	-0.0070 (-1.13)
$e_3$ squared	0.0001 (0.08)	-0.0003 (-0.32)	-0.0001 (-0.55)
$e_4$	0.0940*** (3.37)	0.0077 (0.38)	0.0066 (0.98)
$e_4$ squared	-0.0026*** (-2.68)	0.0004 (0.49)	0.0001 (0.14)
Multiple Interruption	-0.4094 (-1.37)	0.3299** (1.96)	-0.0855 (-1.77)*
Primary Industry	—	0.1498 (0.43)	0.2441** (1.99)
Manufacturing Industry	-0.0798 (-0.29)	-0.1693 (-1.54)	0.0444 (0.79)
Mining, Utility, and Transportation	—	0.1131 (0.69)	0.1560* (1.75)
Commerce and Financial Service Industries	0.4857*** (2.92)	0.2204** (2.42)	0.1234 (1.46)

Table 7 *Continued*

Variables	Professional	Sales and Assistant Managers	Clerks and Laborers
Social and Individual Service Industries	R	R	R
Selection Term ( $\lambda$ )	0.2670 (1.26)	0.0109 (0.08)	-0.0850* (-1.65)
R <sup>2</sup>	0.49	0.22	0.13
Number of Observations	53	178	441

Note: (1) \*\*: 5% significance level, \*\*\*: 1% significance level.

## IV

**Conclusions**

DUE TO THE INFLUENCE OF THE ATTITUDE toward traditional gender roles, most working women have to balance family and work demands. The consequence of this is a discontinuous work experience for women that is well documented in the literature. For example, as indicated by the data from "Taiwan Women and Family Survey," 68% of working women have withdrawn from the labor market at least once in their life. Mincer and Polachek (1974) have argued that withdrawal from the labor market influences wages through the depreciation of human capital and underinvestments in on-the-job training. We have empirically investigated the determinant of working women's decision to interrupt their working career, and have further analyzed whether there is a human-capital depreciation effect on wages due to work interruption.

The most striking findings from our multinomial logit analysis of women's working patterns are that a husband's negative attitude toward working wives will discourage his wife from attaching to the labor market more than will the presence of young children in the family. On the other hand, women's own attitude toward working

women does not show any significant effect on their commitment to the labor market. This implies that a husband's attitude toward traditional gender roles will dominate women's market work decisions. Therefore, in order to raise the female labor force participation rate, educating women to develop a perception of modern gender roles is not enough; it is even more critical to educate men to give up their traditional attitudes toward gender roles.

Our empirical examination of the depreciation effect based on the estimated earning equations indicates that a statistically significant estimate of a 2.8% depreciation rate is found for women with at least a high-school level of education, while no significant depreciation effect is found for less-educated women. In other words, highly-educated women would suffer a reduction in their earning power due to a discontinuous work experience, as human capital is the key determinant of their earnings. For less-educated women, no penalty of foregone experience is found, since human capital has little to do with their earning ability. It is also noticed that the depreciation rate is higher for more-educated women in Taiwan compared to the 0.5% or 1.5% depreciation rate for U.S. women in the 1970s. Finally, similar to the common findings in the literature, a significantly larger depreciation rate in the short run (4.5%) is observed for these highly-educated Taiwanese women.

A flat female labor force participation rate over the past decade has become an important enough phenomenon to merit further empirical inquiry on the labor supply behavior of Taiwanese women. Our empirical results indicate that most Taiwanese women take family responsibilities as their first priority due to the influence of the attitude toward traditional gender roles.<sup>7</sup> It is thus difficult for women to avoid work interruption. The significant depreciation effect for highly-educated women implies that these women will face lower wage rates when they re-enter the labor market than they had during their prior employment. Therefore, this depreciation effect may discourage them from re-entering the labor market. Hence, employers offering more flexible working schedules should be encouraged to help women to stay in the labor market. Moreover, government programs that can assist women to become self-employed would also be helpful, since it is easier for self-employed women to overcome the conflict between family obligations and work needs.<sup>8</sup>

### Notes

1. The average rate of return,  $r$ , denotes the return to each unit of the human capital that an individual has accumulated. This rate is the same for each unit of the human capital, whether it is accumulated during the school years or during the post-school period. The rationale is similar to that behind the average rate of return being the same for each dollar of a physical capital investment, whether the money comes from the investor's own pockets or is borrowed from the financial institutions.

2. A more detailed segmentation of the life-cycle human-capital investment may be preferred. However, there is a cost of increasing number of parameters for a more detailed segmentation. This specification is based on the characteristic of the data described in the following section.

3. Please see Parish and Willis (1993) for a detailed description of this survey.

4. Influenced by both Chinese and Japanese culture (Taiwan was controlled by Japan from 1895 to 1945), the traditional attitude toward gender roles in Taiwan is that men are breadwinners and women are responsible for housekeeping and childrearing. That is, family responsibility is regarded as the first priority for a woman whether she is a working woman or not.

5. Specific human capital is the amount of human capital accumulated during current employment, and the general human capital is the amount of human capital accumulated from the labor market experience prior to the current job. The return to the specific human capital is higher because it is more related to the current job than is the general human capital. Similarly, the return to the more recently accumulated human capital is higher because it is more related to current employment. Please see Mincer (1993) for more detailed discussion.

6. This is the rebound effect found in the literature based on the U.S. data.

7. A recent survey (1999) on family values in Taiwan indicates that more than 90% of men responded that women should give up their jobs when there is a conflict between work and family responsibilities.

8. The government is scheduled to propose a draft plan to enhance female employment in Taiwan. The draft plan includes programs to provide low interest rate loans to self-employed women.

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