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Male-Female Wage Differentials in Taiwan: A Human Capital Approach

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Abstract

This paper investigates gender wage differentials for Taiwan, based on the life cycle human capital model. Within the framework of maximizing the present value of lifetime earnings, it can be shown that an individual's human capital investment is crucially dependent upon his/her expected lifetime work behavior. Accordingly, to address the effect of working life expectations on market earnings, an augmented human capital measure is explicitly introduced into wage regressions. Based on 1989 micro data from Taiwan, the estimated results provide sufficiently robust evidence that both the quantity of human capital investment as well as its rate of accumulation varies among sex-marital status groups according to the degree of expected labor force intermittency. Married females with the least labor force commitment have a distinctly lower level of investment than either males or single females. Married males display a strong labor market attachment and hence provide a relatively greater human capital investment leading them to accumulate more human capital over the life cycle than either single males or both single and married females. Specifically, the empirical results suggest that different patterns of lifetime labor force participation are essential in the determination of both male-female and married-single wage differentials in Taiwan. As such male-female wage differentials will narrow given the secular rise in female work behavior. Accordingly, accelerating gender wage convergence by mandating quotas or comparable worth type legislation would lead to inefficiencies that would diminish long-run Taiwanese growth.

I. Introduction

During the past three decades, male-female wage differentials have attracted much scholarly attention in all countries for which there are data. The usual approach is to decompose wage differentials into two parts, one is attributable to different characteristics and the other to different rewards holding characteristics constant (Oaxaca (1973), Polachek (1975b), Corcoran and Duncan (1979), Goldin and Polachek (1987)).[1] The latter is usually defined to represent discrimination. Using this approach based on data from the 1967 Survey of Economic Opportunity, Oaxaca (1973) found that 20 percent of the observed sex wage differential can be explained by differences in productivity. The residual portion, 80 percent is ascribed to labor market discrimination. Corcoran and Duncan (1979) used the micro data from Panel Study of Income Dynamics, which provided detailed measures of work history for workers, and found that productivity-related characteristics accounted for 44 percent of the observed male-female wage differentials.

Because of inherent biases[2], alternative approaches have been suggested in decomposing the gender wage gap. Polachek (1975b) proposed a human capital approach. He directly measures the expected human capital and then embeds this measure in a wage regression on pooled male-female data. The result illustrates that over 90 percent of the male-female earnings gap can be attributable to sex differences in human capital. Goldin and Polachek (1987) applied Polachek's (1975b) technique to 1980 US Census data and found that sex difference in postschool investment accounted for about 80 percent of the male-female earnings gap.

This paper proposes to investigate the male-female wage differentials for Taiwan. Of major interest is that very few of the previous studies have focused on wage differentials in developing countries. Taiwan is well-known for its successful achievement in economic growth. However, income inequality in the form of wages among males and females is still an open question.In the literature,Gannicott(1986),LiuandLiu(1987),Lin(1988)andLiu(1989) have used micro wage data from Taiwan dealing with male-female wage differentials.[3] Even though these studies are valuable contributions, adjustments are not made for sex differences in work effort caused by the division of labor in the home (Polachek (1975a), and Becker (1985)).[4] In this paper, we utilize a human capital approach to explicitly account for these differential lifetime labor expectations which cause gender differences in human capital accumulation. Our results yield a far greater "explained" wage differential[5].

Section II provides an overview of trends in female employment and gender wage gap in Taiwan over the past two decades. Section III outlines the theory of life cycle human

capital accumulation underlying male-female wage differentials. This theory is applied in section IV to generate a technique for measuring expected human capital stock, a variable needed in estimating sex wage discrimination. Estimated human capital stock measures are then used to explain male-female wage differentials.

II. Trends in Female Employment and Gender Wage Gap in Taiwan

Taiwan has experienced one of the most rapid paces of economic growth in the free world during the past three decades. Among other things, the reliable and relatively cheap labor force has been said to be crucial to successful economic growth. The available data (Table 1: Panel A) indicates that the average total labor force's annual growth rate between 1965 and 1989 is 3.4 percent which is slightly higher than the civilian population's growth rate (3.1 percent), giving evidence of an increase in the overall labor force participation rate. Thus, during this time period the overall unemployment rate has gone down from 3.27 percent in 1965 to 1.57 percent in 1989. This phenomenon attests to the rising importance of the female labor force given that men and women have opposite movements in labor participation rates. Especially, the labor-intensive technological progress experienced by most of the industries has been shown to be highly in favor of increased female labor force participation.[6] Table 1 (Panel B and C) confirms that, over 1965-1989, the annual growth rate of labor force is 4.5 percent for females, which is much greater than for males of 2.6 percent. Accordingly, the females' labor force participation rate has risen from 33.1 percent to 45.35 percent, while for males, it has declined from 82.59 percent to 74.84 percent. During the same period, the annual growth rate of female employment is 4.7 percent, which is also higher than 2.7 percent for males. Therefore, the proportion of female workers in the total employment increased from 27 percent (1029/3764) in 1965 to 37 percent (3110/8258) in 1989. A closer examination shows that female participation rates increased among all except those aged 15-19 from 1965 to 1987 (Table 2a).

The rapid growth of the female labor force participation rates can be attributed not only to rising employment opportunities and higher educational attainment, but also to a reduction in fertility rates[7]. The lower feritility freed women from child rearing responsibiliites, enabling them to participate in the labor force. Further, the educational attainment of women has improved significantly. Table 2b shows that in 1965 as much as one-third of the female workers were illiterate. This figure has declined to less than one-tenth by 1989. In fact, the increasing educational attainment of the female work force not

only narrowed the educational gap between male and female workers, but also in a greater tendency of educated women to take part in the labor market.[8] The other interesting dimension of women in the labor force has been the increasing labor force participation rates of married women.[9]

Despite the rapid growth of female employment the relative pay level for females did not change by much. In 1989 just as was the case in 1978, men earned a wage premium averaging about 36 percent. In other words, this earnings gap persisted in Taiwan over the past decade inspite of favorable opportunities provided to women in the labor market. A closer examination shows that the earnings gap varies by schooling, marital status, and by age distribution (Table 3). The earnings difference is larger for marrieds than for singles (Panel A). Education has a strong positive effect on the earnings of both gender groups, but it takes considerably more years of schooling for women to achieve the same earnings as men (Panel B). For instance, in 1989, males with only primary school made more than female high school graduates; male senior high school graduates had higher earnings than women who had graduated from vocational school (i.e., junior college). However, the earnings gap narrows with increases in education with the exception of college and post-college graduates. Similar patterns can be found for the earnings gap across educational groups between 1978 and 1989.

From panel C , one can see that each gender group has a similar age-earnings profile. Earnings rise reaching a plateau in the mid-forties, then decline after the forties, showing a typical pattern of concavity. However, female age-earnings profiles are typically lower and flatter, implying that the extent of the gender earnings gap widens over the life cycle. For example, the earnings difference is only 9 percent for the youngest group, but 44 percent for those between age 50-54. The pattern of the male-female wage gap over the lifetime in 1987 is similar to that in 1978.

If men and women are equally productive, but men receive wage premiums due to discrimination against women, then growth can be hampered because of higher costs of production (i.e., due to inefficiency). So to assess the extent of economic efficiency, it is important to identify the sources of gender pay gap. To carry this out, we analyze gender pay differences by demographic groups paying particular attention to possible anomolies.

III. Theoretical Framework

1. Work expectations and human capital investment

Human capital theorists stress that the observed differences in earnings across individuals are the result of differences in human capital. In general, human capital represent acquired worker skills obtained not only from formal schooling and postschool training, but also family care in preschool years, health, and job search. More investing in human capital will increase one's productivity which in turn will generate higher earnings.

Theoretically, the production of human capital is a function of expected returns and costs. In each time period an individual would undertake human capital investment until the marginal cost equals the present value of marginal return. Returns depend on expected wage gains which are positively related to labor force participation rates. Accordingly, given the marginal cost of producing human capital, one would have lower expected wage gains and hence invest less, the less one's lifetime labor force participation.

To illustrate this, one can introduce labor force participation explicitly into the human capital investment decision. We note from Ben-Porath (1967) that an additional unit of human capital's marginal return equals [10]

$$(1) \quad MR_t = \int_0^{T-t} W_0 \exp(-rt)\, dt$$

where T is the span of working life, W_0 is the rental unit price of human capital, and r is the rate of discount including depreciation. Now, supposing that one is to have zero participation during the period from t_i to t_j, the new marginal revenue curve would be

$$(2) \quad MR_t = \int_0^{t_i-t} W_0 \exp(-rt)\, dt + \int_{t_j-t}^{T-t} W_0 \exp(-rt)\, dt$$

Upon integrating, we would find that the marginal revenue from any investment in the present would decline the greater the duration of the zero participation interval. But, the

marginal cost curve would be unaffected by a future absence from the labor force.[11] Accordingly, if one plans not to be in the labor force because of a greater degree of home specialization or unemployment, present investment would be lower than it would otherwise be. Furthermore, investment will decline more rapidly over the life cycle if the future work participation decreases, and this rate of decline again is dependent on the duration of zero participation.

2. Intermittency and the Male-Female Wage Gap

In general, given the traditional division of labor in the home, men and women have different patterns of expected lifetime labor force participation. To the extent that women have the primary responsibility for child care and housekeeping, they would be more likely than men to spend time out of the labor market.[12] In general, a woman expecting to spend fewer years in the labor market will have less investment in on-the-job training during each year on the job. Also, the more discontinuous the expected labor force participation, the lower are the expected returns on the investment, and hence the less incentive a woman has to invest in human capital.

The effect of market intermittency on lifetime earnings can be illustrated graphically by the following figure. For simplicity, we assume a typical pattern of intermittency which reflects that one enters the labor force upon graduation and works for e_1 years, drops out of the labor force for h years, and then returns to work for e_2 years. The corresponding age-earnings profile for the intermittent worker can be shown as $FABF_2$, which reveals that earnings increase, with respect to initial experience, (e_1), to level A, but the slope is smaller. During the period of intermittency, (h), the earnings fall to zero by definition, and the re-entry wage (B) is lower in real terms than the wage at the point just prior to leaving the labor market (A). On the other hand, a typical full lifetime labor force participant is supposed to have an age-earnings profile presented by MM', which reflects earnings capacity at each level of experience and thus rises continuously with age.

The traditional residual approach generally does not take account of the effect of intermittent labor force participation on market earnings. The studies that account for intermittency (Mincer and Polachek,(1974); Corcoran and Duncan, (1979); Mincer and Ofek, (1982)) typically estimate BC and CD (shown in Figure 1) but neglect to compute DK. They essentially estimate $FABF_2$ as the female earnings profile and compare it with the male earnings profile MM' to derive the discrimination measure. The segment BD is the measure

of earnings difference between the intermittent and the continuous worker. Thus, BD/BK is taken to measure the explained portion of the wage gap, while DK/BK is the unexplained residual portion, i.e., the discrimination measure. The problem is that, this discrimination measure may be overestimated because it does not account for the influence of expected lifetime labor force participation on the decision of human capital investment, and hence the earnings profile.

IV. Empirical Analysis

The implication of lifetime work affecting human capital investment is that, for females, a flatter age-earnings profile, a lower wage rate, and an increasing wage differential compared to males at higher ages may be attributable to a lower rate of lifetime work participation. This section will generate independent measures of human capital to assess this influence of labor market expectations on market earnings. These measures will then be employed in a wage regression to get at the previously unmeasured DK (as shown in figure 1) and better explain male-female wage differentials.

1. The Computation of Expected Postschool Investment

As noted earlier, an individual would undertake human capital investment until the current marginal cost of the investment equals the present value of its marginal wage gains in each time period to maximize the present value of his/her earnings over the lifetime.

The expected marginal returns, shown in equation (2), is essentially the present value of the revenues expected to be received over one's lifetime. To compute MR for each age, the discrete formula [as shown in equation (3)] is used.

$$(3) \quad MR_t = W_0 \sum_{\tau=0}^{T-t} \frac{N_\tau}{[1+(r+\delta)]^{(T-\tau)}}$$

To normalize, we assume that the rental rate of human capital (W_0) equals unity,[13] and that individuals form expectations of work participation on the basis of their elder's experiences.[14] Labor force participation (N_t) is calculated according to the conventional definition which is based on whether or not one is in the labor force during the survey

week.[15] The discount rate (r) is assumed to be 10 percent.[16] The rate of depreciation (δ) is computed as the ratio of net investment in the final year of work to the stock of capital accumulated until that year.[17] This is assumed to be constant and independent of age or the rate of participation in the labor force.

The marginal cost of investment (MC) depends on one's capacity to produce human capital, which to a great extent is determined by past investment behavior. The cost of investment is composed of the opportunity cost, or foregone earnings as well as the direct costs of purchased goods and services. Empirically, the marginal cost schedule is not directly observable. However, it can be measured if the amount of gross investment and the marginal returns of investment are known. By applying the Mincer earnings function the computed investment net of depreciation (I_n) and thus the gross investment (I_g) can be obtained.

Given Mincer's quadratic earnings function

$$(4) \qquad LnY_t = Y_0 + r\,S + \beta_1 T + \beta_2 T^2$$

the net investment in dollar terms (DI_{nt}) can be shown as [18]

$$(5) \qquad DI_{nt} = r^{-1}\left[\frac{dLnY_t}{dt} - \frac{dLn(1-k_t)}{dt}\right]\frac{Y_t}{(1-k_t)}$$

$$= r^{-1}\left[(\beta_1 + 2\beta_2 t) + \frac{dLn(1-k_t)}{dt}\right]\frac{Y_t}{(1-k_t)}$$

where Y_t is observed income at time t, r is the rate of return to schooling, S is years of schooling, T is years of exposure to the labor force, and k_t is the gross investment ratio.[19]

The procedure for estimating the computed net investment (DI_{nt}) can be briefly presented as follows. Equation (4) is estimated first for different groups. These estimated results are then used to compute the gross investment ratio, k_t. Substituting these results into Equation(5), the amount of net investment is obtained. Gross investment in each time period

can be measured by adding the depreciation (computed depreciation rate times the total stock of capital) to DI_{nt}.

In principle, human capital investment can be measured by such methods for all sex-marital status-education groups. However, since only cross-sectional data are available, the measurements may be biased for the groups whose labor force participation is intermittent. Furthermore, we wish to obtain independent gross investment measures for these groups so these measures can be used as an independent determinant of their own wage rates. To this end, the above investment estimates are computed only for married males,[20] who in turn are used as a reference group from which other groups' investment are derived.

Essentially, given the marginal returns and computed gross investment, married males' marginal cost functions can be uniquely determined for each education level. If we assume that across individuals for the same level of education the human capital production function and the marginal cost curve are identical, it then follows that equating the derived marginal returns of single males as well as single and married females with the married male marginal cost curves of comparable levels of education enables us to obtain gross investment estimates for each of these groups. Depreciation subtracted from gross investment gives net investment. The estimates of net investment per period (including the value of education) are summed to obtain expected human capital stock measures.

Table 4 presents the estimated results of postschool investment across sex-marital status-education group.[21] We note that levels of gross investment are different across marital status-sex groups. In most cases, married females have a distinctly lower level of investment than either males or single females, and married males have the highest level of investment among all groups. Furthermore, single males and females have the most similar investment behavioral patterns, although the single male investment profile is in general slightly higher than that of the single female. Due to the greater labor force commitment of the more educated, expected gross investment rises consistently with education. Table 4 also provides the expected net investment for each of the groups, which are computed by subtracting depreciation from gross investment.[22] The results are consistent with Polachek's (1975b) finding, namely, the married female investment profile is not a monotonically declining function of potential market experience in the labor force. We also found that the quantity of investment differs across sex-marital status-schooling groups in terms of the degree of labor force intermittency. For individuals with the least labor force commitment investment is in general least monotonic and smallest in magnitude.

The importance of the results shown in Table 4 lies in the way it has provided sufficiently robust evidence that human capital investments differ according to sex and marital status. However, these estimates of investment may be biased due to some assumptions imposed in the computation scheme.[23] For example, it might be inappropriate that for each schooling group the human capital production function is assumed to be identical across individuals if one believes differing work participation affects the quality of education as well as the quantity of investment. In this regard, if females tend to specialize in education that raises home productivity, then investment in schooling is not Hicks neutral with respect to home versus market production. Hence, the assumption of an invariant marginal cost function within each education group would cause an underestimate of the females' marginal cost schedule and hence, ceterus paribus, an overestimate of their expected investment. On the other hand, if the males' marginal cost schedule rises in reality over time, or if the cost of time increases more rapidly, then the outlined computation scheme would underestimate female expected investment.

There are many other examples showing that the computed human capital investment could be misestimated.[24] However, since each example gives different and opposite effects, the net effect of the biases is impossible to disentangle. The estimated results presented in Table 4 nevertheless are consistent with the life cycle human capital theory, namely that human capital investments differ among sex-marital status groups with the degree of labor force commitment.

2.Expected Human Capital Investment as a Determinant of Male Female Wage Differentials

To examine the importance of the postschool investment differentials on the observed male-female wage differentials, individual earnings are regressed on expected human capital stock.[25] Given the conventional earnings function:

(6) $Y_i = f(S, Exp, \mathbf{X}, \text{Gender Dummy}) + \text{Error}$

the new specification for this earnings equation which will allow for the possiblity that coefficient estimates may differ between men and women is to estimate equation (7) *separately* for men and women:

(7) $Y_i = a + bK_i + X_i\,c + \text{Error}$

where Y_i is the earnings of individual i, S is the years of schooling, Exp is potential market experience (defined as age minus years of schooling minus six), K_i is the expected human capital stock, and X_i is a set of other standardizing variables such as industry, occupation, region, and hours worked etc.,. The coefficient b can be interpreted as the rate of return on expected human capital stock. The coefficient c is a measure of individual deviations from expected labor market activity as well as other variables not used in computing K. The difference between fitted values of Y_i for men and women evaluated at the sample means will be the dollar male-female earnings differential. Note that in equation (7) adjustments are not made for schooling and labor market experience because they are already implicitly used in the computation of K.

The OLS regression results are presented separately, for men and women (Table 7), and by marital status (Table 8 for singles; Table 9 for marrieds). Each of these tables has *three* specifications[26]: (1) no controls for traditional human capital variables, (2) control for *Expected Human Capital* measure (EHC), and (3) control for traditional human capital variables. To capture the unexplained earnings gap ratio with which we are most concerned we can follow the lead of Oaxaca.[27] The explained and unexplained wage gaps derived from the regressions results (reported in Tables 7, 8, and 9) are summarized in Table 10. It shows that the gross male-female earnings differences are NT$ 7472, 3972, and 9760, for aggregate, singles, and marrieds, respectively. Across the board, we can notice the significant explanatory power of the second specification (i.e., where EHC is explicitly incorporated in the model) relative to other two specifications (i.e., with and without the controls for traditional human capital variables) in explaining the observed male-female wage differential (rows [7] and [11] of Table 10).

A closer inspection shows that the proportion of the crude male-female wage differential that can be explained by the expected human capital stock is higher for marrieds (84%) relative to aggregate (72%), and to singles (23%). We note also that, the dollar wage differential between men and women is larger for marrieds NT$7437 (NT$ 8084) with (without) the adjustments are made only for traditional human capital variables along with other controls. But when the expected human capital stock variable is taken into account, the wage differential is closer between married (NT$ 1549) and for the aggregate (NT$ 2080).

The above findings indicate that the bulk of wage differentials can be explained by differences in human capital stock accumulation based on differences in expected lifetime

labor force participation. That is, females on average earn less than males because they invest less. According to the regression results in Table 9, for example, such human capital stock differentials can explain about 84 percent of the crude earnings gap between married males and married females. Since expected human capital measures were obtained by assuming the same investment costs for all sex-marital status education groups, the differences in human capital investments are primarily determined by differences in marginal returns of investment, which in fact depend on differences in life-cycle labor force participation. Thus, male-female wage differentials can largely be attributed to differences in expected lifetime labor force participation.

It is interesting to compare our Taiwan results with those of other countries. Attention is focused on the United States because very few empirical results which are comparable to ours can be found. For the U.S. in 1984, the average white, female worker earned roughly 63 percent of what her male counterpart earned.[28] A similar situation exists in Taiwan for 1989 in that female workers on average earned 36 percent less than male workers.

Table 11 presents some previous studies from which we note that part, but not all, of the crude male-female wage differentials can be attributed to market discrimination. As can be seen, for the U.S., Oaxaca (1973) found that 80 percent of the male-female wage gap unexplained by productivity-related characteristics, is presumably ascribed to labor market discrimination. When a control for occupation is included, the portion decreases to 63 percent. The empirical results in Taiwan which are comparable with the U.S. are given by Gannicott (1986). By applying Oaxaca's technique, he found that 60 percent of the gross male-female wage differentials can be attributed to market discrimination. Similar empirical results are found in Canada, Malaysia, and Sweden (Table 11).

When Corcoran and Duncan (1979), as well as Mincer and Polachek (1974), include detailed work history measures (actual labor market experience) for workers, the unexplained portion of the crude male-female wage differentials further decreases to 54 and 56 percent, respectively. It suggests that a more appropriate measure of the labor market experience is relevant to sex wage differentials. To further to take account of the differing work expectations, Polachek (1975b) explicitly introduced expected lifetime labor force participation into the computation of the so-called expected human capital as was done in this paper.[29]

This paper utilized this human capital approach and the 1989 micro wage data of Taiwan, and found that the results are consistent with the U.S. in 1960 obtained by Polachek

(1975b) and in 1980, by Goldin and Polachek (1987). Among married males and married females, 84 percent of the unexplained male-female wage gap obtained from the traditional approach can be explained by differences in expected human capital stock. As single males and single females, the corresponding proportion is 23 percent. These findings are also consistent with the argument that the anticipated market discrimination may manifest itself by influencing the sex differences in the market and nonmarket work, which may further lead to occupational segregation[30].

Several points can be drawn from the comparisons. First, the patterns of Taiwan are very comparable to those in the United States. Gender wage differentials vary by marital status and age, and also are roughly of the same order of magnitude as in the United States. Second, our findings are consistent with Polachek (1975b) as well as Goldin and Polachek (1987), showing that lifetime work participation expectations are important in determining wage rates. When appropriate account is taken of these expectations far more of the male-female wage gap is explained than previous studies.

V. Summary and Concluding Remarks

This paper investigates male-female wage differentials for Taiwan based on the life cycle human capital theory. Following previous work (Polachek (1975b) as well as Goldin and Polachek (1987)) we hypothesized that there exists a relation between one's expected lifetime labor force participation, post-school investment, and the wage rates. By maximizing the present value of lifetime earnings, we have shown in theory that an individual's human capital investment is crucially dependent upon expected lifetime labor force participation. This model is used to explain male-female wage differentials.

To address the effect of working life expectations on market earnings, we incorporate lifetime rates of work participation in the computation of the human capital investment decision. The estimated results provide sufficiently robust evidence that both the quantity of investment as well as its rate of accumulation varies among sex-marital status groups according to the degree of expected labor force intermittency. Specifically, married females with the least labor force commitment in most cases have a distinctly lower level of investment than either males or single females. Married males' strong labor market attachment provides them with relatively greater incentive to invest in human capital. Consequently, married males accumulate more human capital over the life cycle than do single males as well as both single and married females.

These estimated human capital measures embedded in regressions on wages show that up to 84 percent of the observed wage differentials between the sexes can be explained. Although it is incorrect to say that such findings indicate a virtual absence of discrimination in Taiwan, nevertheless the hypothesis generated seems to yield results strongly supporting the human capital approach. Our findings suggest that different patterns of lifetime labor force participation are essential in the determination of male-female wage differentials.

[1] Ronald Oaxaca (1973), "Male-Female Wage Differentials in Urban Labor Markets," International Economic Review, 14(3), 693-709; Mary Corcoran and Greg J. Duncan (1979), "Work History, Labor Force Attachment and Earnings Differentials Between Races and Sexes," The Journal of Human Resources, 14(1), 3-20; Solomon W. Polachek (1975b), "Differences in Expected Post-School Investment as a Determinant of Market Wage Differentials," International Economic Review, 16(2), 451-470; Claudia Goldin and Solomon W. Polachek (1987), "Residual Differences by Sex: Perspectives on the Gender Gap in Earnings," American Economic Review Papers and Proceedings, 77(2), May, 143-151.

[2] For instance, the traditional discrimination estimates may be biased upward or downward due to incomplete information on all the characteristics of the individuals. Another example is that differences in some productivity-related attributes may be due to past or current discrimination, leading to underestimation of the discrimination measure. For detailed discussion, see Francine D. Blau and Marianne A. Ferber (1987), "Discrimination: Empirical Evidence from the United States," American Economic Review Papers and Proceedings, 77(2), May, 316-320, and Glen G. Cain (1986), The Economic Analysis of Labor Market Discrimination: A Survey," in Handbook of Labor Economics, Vol.1, eds. Orley Ashenfelter and Richard Layard, Amsterdam: North-Holland Press, 693-785.

[3] K. Gannicott (1986), "Women, Wages, and Discrimination: Some Evidence from Taiwan," Economic Development and Culture Change, 34(4), 721-730. Jin-Tan Liu and Jin Long Liu (1987), "Sex Wage Differentials in Taiwan," (in Chinese), The Economic Association Annual Conference Proceedings, Taiwan, Taipei, 107-129. Chung-Cheng Lin (1988), "Sex Differences in Hourly Earnings at Entry Levels: The Case of Taiwan," (in Chinese), Taiwan Economic Review, 16(3), September, 305-322. Ying-chuan Liu(1989), "Wage Discrimination by sex in Taiwan,"(in Chinese), Taiwan Economic Review, 17(3), September, 359-388.

[4] Gary S. Becker (1985), "Human Capital, Effort, and the Sexual Division of Labor," Journal of Labor Economics, 3(1), S1-S32, and Solomon W. Polachek (1975a), "Potential Biases in Measuring Male-Female Discrimination," The Journal of Human Resources, 10(2), 205-229. Both these papers theoretically established the possible link between division of labor at home and the resulting sex differences in work effort.

[5] See Feng-Fuh Jiang (1988), "A Study on the Sex Wage Differentials of Junior High in Taiwan: A Human Capital Approach," (in Chinese), Taiwan Economic Review, 16(3), September, 323-347. Even though Jiang used augmented human capital model to micro data from Taiwan, his sample consisted of individuals with only junior high education.

[6] For a good review of the growth of female labor force, see Ching-hsi Chang (1980), "Determinants of Female Labor Force Participation In Taiwan: A Micro Cross-Sections Analysis," Economic Essays, 9(1), 89-131, Paul K.C. Liu (1983), "Trends in Female Labor Force Participation in Taiwan: The Transition toward Higher Technology Activities," Academia Economic Papers, 11(1), 293-323, and Yu-lian Liu (1985), The Utilization of Female Labor Force in Taiwan: Retrospect and Prospect, Manpower Planning Committee, Council for Economic Planning and Development, Republic of China, June.

[7] Ibid.

[8] Yu-lian Liu (1985), The Utilization of Female Labor Force in Taiwan: Retrospect and Prospect, (in Chinese), Manpower Planning Committee, Council for Economic Planning and Development, ROC, June. Joseph S. Lee (1987), "Protective Legislation for Women Workers in Taiwan," presented at Conference on Economic Development and Social Welfare in Taiwan, Taipei, ROC: The Institute of Economics, Academia Sinica, working paper.

[9] See Liu (1985), Table 2-1, pp 302.

[10] Such a marginal revenue function is independent of the number of units added or the existing stock. Further, it is a declining function of time because of the finite horizon.

[11] Because marginal cost of investing would be the product of the basic wage rate [W_0] and the stock of human capital [K(t)].

[12] Jacob Mincer and Haim Ofek (1982), "Interrupted Work Careers: Depreciation and Restoration of Human Capital," Journal of Human Resources, 17(1), 1-23, and Francine D. Blau and Marianne A. Ferber (1986), The Economics of Women, Men and Work, New Jersey, Englewood Cliffs: Prentice-Hall.

[13] According to the model presented in Polachek (1975b), differences in the wage rates (W_0) per unit of embodied human capital would not affect the amount or rate of postschool investment because the amount of investment is assumed to be invariant to the direct costs of purchased goods and services. This assumption is made so as to isolate the implicit discrimination effect of differing wages for the same stock of human capital. However, if males and females have different wages, then this would only reinforce our result.

[14] Based on this assumption, we use older cohort's labor force participation rates as the individual's expected future labor force participation. This assumption could be criticized because the labor force participation rate for each age group is not unchanged over time. For instance, for males aged between 30 and 64, the expected labor force participation rates obtained on the basis of this assumption would be underestimated because the actual rates are higher (shown in Table 2, panel A). For age groups between 15 and 29, however, overestimates would be obtained.

[15] To analyze the effects of differing male-female labor force participation patterns on earnings, overall life-cycle labor force commitment would be the more relevant variable. However, little comprehensive data is available.

[16] The discount rate is taken as 10 percent, the rate of return on schooling, because various studies have yielded such values. See, for example, Mincer, Jacob (1974), Schooling, Experience, and Earnings, New York: Columbia University Press.

[17] The computation of the rate of depreciation is based on the assumption of maximizing the present value of lifetime income. This assumption implies that the gross investment remains positive until the MR from investment falls to zero. Assuming that gross investment at the age of retirement is zero, and that depreciation is a constant function over time of the stock of capital, the net investment occurring in one's final year of work would represent in total the amount of

depreciation. For Taiwan, according to the Labor Standards Law, we assume that employed workers in the private sector are forced to retire at the age of 60.

[18] Define $E_t = Y_t + DI_{gt}$, where E_t is potential earnings in year t, and DI_{gt} is the gross investment in dollar term in year t. And, define $DI_{gt} = k_t * E_t$,
where k_t is the gross investment ratio, i.e., the proportion of E_t used in human capital investment. Then equation E_t can be rewritten as

(a) $E_t = Y_t + k_t{*}E_t = Y_t/(1-k_t)$

As noted in Mincer (1974), k_t is assumed to be a decreasing function over the lifetime. Net investment in time-equivalent terms (TI_{nt}) is defined as the time rate of change of the logarithm of (potential) earnings (E_t) divided by investment returns (r). Since the logarithmic earnings profile

$$LnE_j = LnE_0 + r_s.S + r_p.K_j, \text{ where } K_t = \sum_{t=0}^{j-1} k_t$$

represents the cumulative amount of time expended in postschool investment before year j, then TI_{nt} can be written as

$$\text{(b)} \quad TI_{nt} = r^{-1} \frac{dLnE_t}{dt} = r^{-1} \left[\frac{dLnY_t}{dt} - \frac{dLn(1-k_t)}{dt} \right]$$

Net investment in dollar terms is measured as

$$\text{(c)} \quad DI_{nt} = r^{-1} \frac{dE_t}{dt} = r^{-1} \left[E_t \frac{dLnE_t}{dt} \right] = TI_{nt}{*}E_t$$

Given the following quadratic earnings function

$$\text{(d)} \quad LnY_t = Y_0 + r\,S + \beta_1 t + \beta_2 t^2$$

where Y_t is observed income at time t, r is the rate of return to schooling, S is years of schooling, and t is years of exposure to the labor force, the net investment in time-equivalent terminology (i.e., equation (b)) can be rewritten as

$$\text{(e)} \quad TI_{nt} = r^{-1} \left[(\beta_1 + 2\beta_2 t) + \frac{1}{(1-k_t)} \frac{dk_t}{dt} \right]$$

Substituting equations (a) and (e) into (c), we obtain

$$\text{(f)} \quad DI_{nt} = \frac{TI_{nt}\, Y_t}{(1-k_t)}$$

Equation (f) is exactly equation (5) in the text. For a good review of the earnings function, see Mincer (1974), Chapter 4 and 5.

19 Since human capital investment declines linearly with age, we utilize Mincer's (1974) technique and specify $k_t = k_0 - (k_0/T)*t$, where k_0 is the investment ratio during the initial period of experience, t=0. T is the total period of positive net investment, i.e., the span of working life. K_0 and T can be solved from the estimated parameters of an earnings equation. For more information, see Mincer (1974), pp.85-89.

20 To avoid the problem of simultaneity, investment for married males is computed on the basis of the human capital equation for 1985 data being available to the authors. That is, equation (4) is estimated for married males using 1985 micro data. The estimated coefficients are then used to compute married male net investment for 1987.

21 To estimate the human capital measures, we utilize a micro data set obtained from the Manpower Utilization Survey of Taiwan for May 1987. The data set originally contains 59,666 observations, from which we select preretirement age individuals who are currently employed in the private sector. This gives us 17,326 observations. However, the main regression results presented in tables 7, 8, and 9 are based on 1989 data from the same source. Description and sample means of the variables used (in tables 7, 8, and 9) are provided in tables 5 and 6 respectively.

22 The amount of depreciation is calculated by the computed rate of depreciation times the total stock of capital, where the depreciation rate delta is computed as the ratio of net investment at age 60 divided by total stock of investment for married males. Deltas for each schooling group were computed to be .0489, .0516, .0371, .0571, and .0384, respectively, from the lowest to the highest schooling group. The rate of depreciation for each of the other groups is assumed to be identical to that of married male for the same level of education.

23 Certain assumptions exist: (1) Males and females are assumed to possess the same human capital production function. (2) The depreciation rate of the human capital stock is assumed to be constant and independent of age or participation in the labor force. (3) Female labor force participation is implicitly assumed to be such that females work a full week when they are in the labor force.

24 For example, the computation of marginal returns is based on the crude labor force participation. It is implicitly assumed that, while in the labor force, females spend as much time as males at work. Since in reality females work less hours than men, female marginal returns would be overestimated causing an overestimate of gross investment. Furthermore, if the rate of depreciation depends not only on the amount of capital stock but also on age (see, e.g., Mincer (1974)) and labor force participation, then the amount of depreciation may be misestimated as would be net investment.

25 We noted that the dollar value of expected human capital stock can be obtained by summing net investment over each age across individuals.

[26] Note that all the three specifications have controls for log value of weekly working hours, firm size (dummies), industry (dummies), occupation (dummies), region (dummies), and location of work (i.e., urban dummy).

[27] Let us define $\overline{Y}_{fm}$ = "mean" female wage had a woman had a male earnings structure. Hence, the unexplained earnings gap ratio (i.e., the measure of discrimination) after adjusting for observed differences in male and female characteristics would be $(1- Y_{fm}/Y_m)$.

[28] This ratio has followed a U-shaped pattern since the mid-1950s remaining below 0.6 throughout the 1960s and 1970s and approaching 0.63 in 1984. See Ronald G. Ehrenberg and Robert S. Smith (1988), Modern Labor Economics: Theory and Policy, 3rd ed., Scott, Foresman and Company, Table 14.3, p.539.

[29] Goldin and Polachek (1987) also applied the same technique for the most recent U.S. Census data. Based on 1980 Census, they found that unexplained gender wage gap can be reduced by 78 percent for marrieds and 43 percent for singles.

[30] Jacob Mincer and Solomon W. Polachek (1974), "Family Investment in Human Capital: Earnings of Women," Journal of Political Economy, 82(2), S76-S108, and Solomon W. Polachek (1979), "Occupational Segregation Among Women: Theory, Evidence and a Prognosis," in Women in the Labor Market, eds., Lloyd, Andrew, and Gilroy, New York: Columbia University Press, 137-157.

Table 1 Selective Labor Statistics

	1965	1975	1985	1989	'65-'89 Annual growth rate
A.					
Overall Population aged 15 and over ('000)	6689	9712	12860	13955	3.1
Labor force ('000)	3891	5656	7651	8390	3.3
Total LFPR (%)	58.17	58.24	59.49	60.12	-
Employment ('000)	3764	5521	7428	8258	3.4
Unemployment rate (%)	3.27	2.39	2.91	1.57	-
B.					
Male Population aged 15 and over	3388	4894	6440	6989	3.1
Labor force	2798	3798	4860	5231	2.6
Male LFPR (%)	82.59	77.61	75.46	74.84	-
Employment	2735	3719	4719	5149	2.7
Unemployment rate (%)	2.25	2.08	2.90	1.57	-
C.					
Female Population aged 15 and over	3301	4818	6420	6966	3.1
Labor force	1093	1858	2790	3159	4.5
Female LFPR (%)	33.11	38.56	43.46	45.35	-
Employment	1029	1802	2709	3110	4.7
Unemployment rate (%)	5.86	3.01	2.90	1.56	-

Note: LFPR = labor force participation rate.
Source: (1) Yearbook of Labor Statistics, Directorate-General of Budget, Accounting and Statistics, Executive Yuan (DGBAS), Republic Of China (ROC), various years.
(2) Yearbook of Manpower Statistics Taiwan Area, DGBAS, ROC., 1989.

Table 2a Distribution of workers by sex and age ('000)

	1965		1970		1980		1989		F/M	
	F	M	F	M	F	M	F	M	1965	1989
Total	966	2735	1396	3180	2191	4357	3110	5149	.35	.60
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)		
15 - 19	249	327	414	457	406	381	239	228	.76	1.05
	(.26)	(.12)	(.30)	(.14)	(.19)	(.09)	(.08)	(.04)		
20 - 24	172	218	231	239	522	423	595	406	.79	1.47
	(.18)	(.08)	(.17)	(.08)	(.24)	(.10)	(.19)	(.08)		
25 - 29	225	838	293	874	341	795	553	891	.27	.62
	(.23)	(.31)	(.21)	(.28)	(.16)	(.18)	(.18)	(.17)		
30 - 34					213	549	475	885		.54
					(.10)	(.13)	(.15)	(.17)		
35 - 39	182	679	288	814	193	451	425	766	.27	.55
	(.19)	(.25)	(.21)	(.26)	(.09)	(.10)	(.14)	(.15)		
40 - 44					183	430	264	482		.55
					(.08)	(.10)	(.09)	(.09)		
45 - 49	108	458	133	540	146	404	218	440	.24	.50
	(.11)	(.17)	(.10)	(.17)	(.07)	(.09)	(.07)	(.09)		
50 - 54					99	413	158	375		.42
					(.05)	(.10)	(.05)	(.07)		
55 - 59	107	184	34	232	59	292	107	339	.58	.32
	(.11)	(.07)	(.02)	(.07)	(.03)	(.07)	(.03)	(.07)		
60 - 64					24	157	54	238		.23
					(.01)	(.04)	(.02)	(.05)		
65 and over	3	32	3	25	5	56	22	99	.09	.22
	(.00)	(.01)	(.00)	(.01)	(.00)	(.01)	(.01)	(.02)		

Note: Percentages are in parenthesis.
Source: Same as for Table 1.

Table 2b Distribution of Workers By Sex and Education ('000)

	1965		1970		1980		1989		Female proportion	
	M	F	M	F	M	F	M	F	1965	1989
Total	2735	966	3180	1396	4357	2191	5149	3110	.26	.38
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)		
Illiterate	451	294	369	356	326	318	195	271	.40	.58
	(.17)	(.30)	(.12)	(.26)	(.04)	(.10)	(.04)	(.09)		
Primary School	1619	511	1898	745	1878	817	1600	891	.24	.36
	(.59)	(.53)	(.60)	(.53)	(.46)	(.39)	(.31)	(.29)		
Junior High	284	77	410	131	841	387	1126	520	.21	.32
	(.10)	(.08)	(.13)	(.09)	(.20)	(.18)	(.22)	(.17)		
Senior High	252	67	356	128	810	468	1407	981	.21	.41
	(.09)	(.07)	(.11)	(.09)	(.19)	(.23)	(.27)	(.32)		
College and Over	129	17	146	35	483	198	821	447	.12	.35
	(.05)	(.02)	(.05)	(.03)	(.11)	(.10)	(.16)	(.15)		

Note: Percentages are in parenthesis.
Source: (1) Yearbook of Manpower Statistics Taiwan Area, DGBAS, ROC, 1989
(2) Yearbook of Labor Statistics, DGBAS, ROC, various years.

Table 3 Gender Differences in Earnings by Marital Status, Education, and Age over 1978 and 1989 unit: NT$

	1989 Male (1)	1989 Female (2)	Females/Male Earnings Ratio 1989 (2)/(1)	Females/Male Earnings Ratio 1978
A.				
Overall	20472	13081	0.639	0.643
By Marital Status				
Single, Never Been Married	16494	12780	0.775	n.a.
Married, Spouse Present	22540	13399	0.594	n.a.
Other Once Married (Separated, Divorced, and Widowed)	19498	12421	0.637	n.a.
B.				
By Education				
Illiterate & Self-educated	18641	10392	0.557	0.562
Primary School	17367	11489	0.662	0.606
Junior High School	19413	12576	0.648	0.688
Senior High School	20514	13550	0.661	0.714
Vocational School	23612	17643	0.747	0.647
College and Graduate School	31663	21981	0.694	0.597
C.				
By Age				
15 - 19	11170	10150	0.909	0.953
20 - 24	15911	12008	0.755	0.742
25 - 29	18823	13907	0.739	0.761
30 - 34	22085	14190	0.643	0.637
35 - 39	23866	14451	0.606	0.600
40 - 44	23996	14085	0.587	0.589
45 - 49	23138	13296	0.575	0.579
50 - 54	21808	12342	0.566	0.621
55 - 59	20779	12400	0.597	0.473
60 - 64	19142	10107	0.528	0.488
65 and over	18342	7190	0.392	0.511

Source: The Manpower Utilization Survey in the Taiwan Area, DGBAS, ROC, 1989

Table 4 Computed Gross and Net Investment at Five Year Intervals By Education, Sex, and Marital Status Unit: NT$

Education	Age	Expected Gross Investment				Expected Net Investment			
		Male		Female		Male		Female	
		S	M	S	M	S	M	S	M
6 or less	20	3120	5157	3362	881	2090	3748	2262	388
	25	3571	5441	2644	881	2034	3172	1107	302
	30	3362	5470	2152	1161	1377	2487	391	515
	35	3120	5144	1623	1161	841	1633	-199	400
	40	2644	4481	1161	889	222	665	-544	78
	45	2409	3571	661	661	-50	-310	-897	-145
	50	1428	2409	889	459	-912	-1298	-492	-286
	55	459	1161	459	222	-1603	-2198	-781	-417
	60	0	0	0	0	-1653	-2759	-1034	-506
6 - 9	20	8288	9693	7431	1252	6231	7359	5541	638
	25	9064	10873	6036	1699	5440	6693	2991	913
	30	8288	11160	4573	1699	3435	5373	995	700
	35	7431	10534	3107	2159	1799	3538	-511	973
	40	5553	9064	3107	1699	-318	1374	-413	374
	45	3107	6978	1252	819	-2377	-836	-1987	-484
	50	1699	4573	819	401	-3117	-2813	-1956	-768
	55	1252	2159	401	0	-2841	-4332	-1838	-950
	60	0	0	0	0	-3346	-5263	-1734	-729
9 - 12	20	7817	8732	7817	2299	7215	8077	7215	1871
	25	9429	9952	7817	2299	7450	7808	5946	1549
	30	9161	10421	7009	2299	5917	6886	4198	1282
	35	8539	10044	5203	2299	4352	5336	1795	1061
	40	7009	8864	4243	2299	2150	3309	611	878
	45	4726	7009	2299	1289	-377	1009	-1296	-265
	50	2299	4726	1821	1289	-2615	-1287	-1532	-219
	55	1289	2299	1289	437	-3068	-3319	-1816	-977
	60	0	0	0	0	-3740	-4876	-2672	-1230
12 - 16	25	13999	16876	13172	6777	11286	13197	10281	4863
	30	13176	18890	10518	7715	7545	11591	5239	4515
	35	9591	18863	6777	7715	2514	8566	470	3364
	40	4934	16812	4934	7715	-2277	4518	-1246	2506
	45	4934	13176	4037	6777	-1735	96	-1543	935
	50	2324	8655	738	4037	-3528	-3971	-4124	-1695
	55	2324	4037	0	1513	-2762	-7071	-3811	-3421
	60	0	0	0	0	-4126	-8852	-2839	-3895
16 and over	25	24295	28142	14738	14738	22352	25681	13231	13167
	30	28175	32181	18064	13069	21814	24799	13774	9153
	35	25685	32333	16407	13069	15668	20444	9787	7522
	40	21287	29253	11439	9789	8736	13878	3620	3082
	45	13069	22825	5179	5179	-500	5418	-2751	-1784
	50	8200	14738	1170	1170	-4975	-3048	-5966	-5168
	55	2427	6660	1170	2427	-9472	-9973	-4946	-3130
	60	0	0	0	0	-9941	-14335	-5065	-4729

Note: S and M are referred as Single and Married, respectively.

Table 5: Variable descriptions.

Y: Monthly wages in current NT$.
LnY: Log value of hourly wage rate in current NT$.
Edu: Years of schooling completed.
Market Experience variables:
Exp : Age - Edu - 6.
Exp2: Square term of Exp.
LNHR: Log value of weekly working hours.
Occupational Dummies:
DOC1 =1, if professional workers; =0, otherwise.
DOC2 =1, if managerial workers; =0, otherwise.
DOC3 =1, if clerical workers; =0, otherwise.
DOC4 =1, if sales workers; =0, otherwise.
DOC5 =1, if service workers; =0, otherwise.
The 'manual workers' group is used as a reference group.
Industry Dummies:
DIN1 =1, if mining, quarrying and agricultural sector; =0, otherwise.
DIN2 =1, if manufacturing; =0, otherwise.
DIN3 =1, if utilities; =0, otherwise.
DIN4 =1, if transportation and communication; =0, otherwise.
DIN5 =1, if construction; =0, otherwise.
DIN6 =1, if commerce; =0, otherwise.
DIN7 =1, if finance and insurance; =0, otherwise.
The 'personal and other services' group is used as a reference group.
Dummy variables for Survey job location:
DAR1 =1, if northern region; =0, otherwise.
DAR2 =1, if central region; =0, otherwise.
DAR3 =1, if southern region; =0, otherwise.
The 'eastern region' is used as a reference group.
DRE =1, if working in an urban area; =0, otherwise.
Firm size Dummies:
DFR1 =1, if large size (with employees greater than 500); =0, otherwise.
DFR2 =1, if medium size (with employees less than 500, but greater than 100); =0, otherwise.
DFR3 =1, if small size (with employees less than 100, but greater than 30); =0, otherwise.
Firm size with employees less than 30 is used as a reference group.

TABLE 6 Sample Means

	Total		Single		Married	
	Male	Female	Male	Female	Male	Female
SAMPLE	9659	6623	3725	3163	5934	3460
EDU	9.7396	9.6778	10.4811	11.2245	9.2587	8.2639
EXP	17.7396	14.2396	9.4419	6.2450	22.9484	21.5480
EXP2	453.1213	336.0439	145.1868	66.8716	646.4237	582.1110
LNHR	49.0452	47.5171	49.2609	48.8922	48.9198	46.2601
DMR	0.6143	0.5224	---	---	---	---
DFR1	0.0592	0.0675	0.0421	0.0661	0.0699	0.0688
DFR2	0.1323	0.1795	0.1119	0.1834	0.1451	0.1760
DFR3	0.1728	0.1961	0.1705	0.2144	0.1743	0.1795
DIN1	0.0432	0.0237	0.0295	0.0035	0.0517	0.0422
DIN2	0.4851	0.5772	0.5095	0.4878	0.4698	0.6590
DIN4	0.1757	0.0322	0.1332	0.0161	0.2024	0.0468
DIN5	0.1288	0.1484	0.1562	0.2077	0.1116	0.0942
DIN6	0.0604	0.1065	0.0400	0.0177	0.0731	0.0153
DIN7	0.0322	0.0578	0.0373	0.0778	0.0290	0.0396
DOC1	0.0522	0.0571	0.0585	0.0809	0.0482	0.0353
DOC2	0.0122	0.0014	0.0011	0.0009	0.0192	0.0017
DOC3	0.1075	0.2451	0.0856	0.3364	0.1212	0.1616
DOC4	0.1040	0.0788	0.1205	0.1065	0.0935	0.0535
DOC5	0.0426	0.0849	0.0502	0.0911	0.0377	0.0792
DAR1	0.4851	0.4862	0.5227	0.5033	0.4616	0.4705
DAR2	0.2063	0.2072	0.2075	0.2033	0.2056	0.2107
DAR3	0.2858	0.2861	0.2526	0.2792	0.3067	0.2925
DRE	0.4381	0.4424	0.4870	0.5365	0.4075	0.3564

TABLE 7 Regression Results (Aggregate) Dependent Variable: Monthly Wages in cureent NT$.

	Reg.1				Reg.2				Reg.3			
	Male		Female		Male		Female		Male		Female	
	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.
INTERCEP	10918.20	651.02	5324.29	510.42	7050.91	622.00	1944.63	490.57	-1272.47	847.31	-4984.65	690.95
EDU	---	---	---	---	---	---	---	---	756.16	33.56	611.53	30.22
EXP	---	---	---	---	---	---	---	---	738.42	26.32	334.63	20.84
EXP2	---	---	---	---	---	---	---	---	-12.90	0.51	-5.31	0.43
LNHR	83.55	10.90	99.80	8.08	97.36	10.26	110.24	7.57	82.62	10.36	101.15	7.70
DMR	4572.48	151.10	846.93	126.52	2225.68	156.78	1981.56	124.17	2102.18	188.07	-170.31	165.26
DFR1	-2276.69	197.38	-1864.01	143.05	-1324.34	187.59	-1562.62	134.30	2207.49	314.63	2325.22	236.21
DFR2	---	---	---	---	---	---	---	---	1236.32	226.95	2233.32	161.54
DFR3	---	---	---	---	---	---	---	---	368.81	198.87	1871.43	155.29
DIN1	327.88	451.94	-552.33	459.24	910.57	425.42	-152.77	430.18	691.07	433.74	450.35	445.24
DIN2	-33.25	298.76	192.00	240.70	348.35	281.23	407.80	225.48	-215.33	286.15	-389.10	232.25
DIN4	3176.80	334.36	3602.33	394.33	3599.25	314.72	3801.19	369.26	3094.89	318.60	3971.70	375.10
DIN5	1017.71	373.27	1019.54	263.59	1095.48	351.11	1139.15	246.83	792.54	353.38	1036.41	249.57
DIN6	4103.03	405.29	2670.07	505.57	4185.18	381.22	2431.17	473.43	3392.47	385.34	2336.76	478.58
DIN7	2389.58	492.75	2457.17	325.48	2316.18	463.49	2919.89	305.12	1973.43	466.94	2104.93	309.29
DOC1	7738.26	346.22	5826.16	315.89	4735.30	336.49	3884.35	302.54	5087.71	349.93	3433.91	318.58
DOC2	18924.87	662.17	20997.36	1600.74	13438.03	641.79	19208.93	1499.91	15255.13	645.10	18816.61	1517.43
DOC3	4627.86	254.48	2987.23	180.25	2020.04	250.42	1770.12	173.42	2121.88	262.75	986.23	194.92
DOC4	2550.81	318.99	2546.58	299.12	1148.16	302.64	1513.85	282.11	946.19	309.31	1123.83	290.00
DOC5	-1269.52	394.29	1510.79	279.32	-1141.14	370.89	1336.10	261.59	-1034.67	375.67	1150.61	265.17
DAR1	1350.45	146.86	1421.48	120.10	1178.40	138.22	1160.36	112.77	-964.09	471.02	1975.99	405.96
DAR2	---	---	---	---	---	---	---	---	-1938.72	480.33	1501.45	412.23
DAR3	---	---	---	---	---	---	---	---	-2574.31	476.96	332.10	410.87
DRE	1238.88	154.30	672.39	130.59	882.01	145.49	397.62	122.61	1200.66	151.89	598.52	129.08
EHC	---	---	---	---	0.04576	0.00129	0.07538	0.00247	---	---	---	---
ADJ R-SQ	0.2814		0.2307		0.3642		0.3256		0.3571		0.3120	
SAMPLE	9659		6623		9659		6623		9659		6623	

TABLE 8 Regression Results (Single) Dependent Variable: Monthly Wages in cureent NT$.

	Reg.1				Reg.2				Reg.3			
	Male		Female		Male		Female		Male		Female	
	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.
INTERCEP	4323.16	675.45	10108.25	752.15	2293.49	657.29	6351.49	720.17	-1659.31	1121.73	-1479.99	1046.10
EDU	---	---	---	---	---	---	---	---	775.56	43.43	644.91	42.08
EXP	---	---	---	---	---	---	---	---	767.55	30.47	493.66	33.28
EXP2	---	---	---	---	---	---	---	---	-14.22	0.76	-10.35	1.22
LNHR	144.48	10.27	-5.77	12.89	148.63	9.84	20.13	12.05	51.44	14.04	25.61	12.12
DFR1	-1904.45	203.12	-1147.82	192.38	-1671.13	195.04	-997.37	179.13	1737.90	427.25	1521.67	314.83
DFR2	---	---	---	---	---	---	---	---	550.49	284.34	1304.31	214.08
DFR3	---	---	---	---	---	---	---	---	688.41	235.07	1026.93	199.82
DIN1	-625.61	582.75	542.53	1337.56	-44.07	559.26	630.62	1244.55	2206.83	567.38	414.22	1244.26
DIN2	-457.76	405.28	987.52	282.73	88.84	389.51	848.20	263.14	295.56	307.18	246.74	273.20
DIN4	4087.30	544.26	1930.65	658.75	4546.82	522.07	1651.64	613.07	3177.74	361.39	1533.49	612.02
DIN5	704.12	441.54	1552.48	308.27	916.61	423.17	1419.55	286.89	561.81	374.25	1234.17	286.46
DIN6	2005.06	761.59	3158.86	633.90	2030.79	729.61	2731.34	590.14	3480.11	497.42	2485.02	590.31
DIN7	3320.02	561.19	1923.13	372.96	3968.39	538.89	2078.36	347.09	1549.66	518.26	1596.30	347.50
DOC1	8859.76	561.03	3712.67	359.82	4980.64	580.95	3053.73	336.16	3024.22	396.11	1854.07	356.12
DOC2	24331.81	2018.99	13347.23	2521.99	22272.62	1937.76	12537.73	2346.91	14609.98	2487.20	10905.45	2343.94
DOC3	4177.61	287.59	1629.15	223.36	2659.81	288.71	962.15	210.00	710.73	340.42	-50.37	234.25
DOC4	4320.02	504.06	1137.65	354.74	3312.94	486.28	426.33	331.64	324.35	340.40	-163.44	337.44
DOC5	500.54	427.57	2258.24	352.22	741.64	409.85	1862.75	328.21	341.64	426.03	1494.98	329.34
DAR1	1315.43	172.02	1544.01	157.02	1135.82	165.11	1259.76	146.67	737.44	647.99	1883.62	623.96
DAR2	---	---	---	---	---	---	---	---	390.51	657.62	1485.56	632.35
DAR3	---	---	---	---	---	---	---	---	-349.65	655.56	36.13	633.27
DRE	548.47	188.55	768.92	169.33	310.53	181.14	520.88	157.96	633.37	178.68	616.94	164.86
EHC	---	---	---	---	0.07141	0.00406	0.06858	0.00310	---	---	---	---
ADJ R-SQ	0.3475		0.1288		0.4012		0.2458		0.3010		0.2504	
SAMPLE	3725		3163		3725		3163		3725		3163	

TABLE 9 Regression Results (Married) Dependent Variable: Monthly Wages in cureent NT$.

	Reg.1				Reg.2				Reg.3			
	Male		Female		Male		Female		Male		Female	
	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.	COEF.	STD.
INTERCEP	14983.77	879.88	11947.18	881.18	9102.66	869.14	8144.92	830.99	598.13	1266.64	-4259.30	1000.45
EDU	---	---	---	---	---	---	---	---	720.18	46.41	464.12	42.68
EXP	---	---	---	---	---	---	---	---	725.78	43.40	213.30	33.02
EXP2	---	---	---	---	---	---	---	---	-12.48	0.80	-3.05	0.63
LNHR	102.37	14.41	44.60	15.50	117.26	13.72	52.18	14.36	101.00	13.95	131.62	10.02
DFR1	-2772.43	268.53	-1352.71	264.29	-1651.31	259.27	-914.37	245.56	2415.06	424.91	2333.83	337.93
DFR2	---	---	---	---	---	---	---	---	1677.03	317.98	2503.29	233.52
DFR3	---	---	---	---	---	---	---	---	168.19	287.57	2227.84	230.17
DIN1	-637.19	637.53	3086.43	612.81	147.84	607.11	2665.29	568.17	416.34	620.53	438.64	576.14
DIN2	-730.37	466.78	1141.62	333.14	-82.64	444.67	373.79	309.16	-369.10	453.09	-611.86	394.22
DIN4	2726.05	506.53	4311.24	395.76	3418.63	482.51	3510.46	368.20	3282.71	490.83	4877.76	529.66
DIN5	1138.28	586.02	1159.20	413.22	1269.17	557.34	787.49	383.23	1189.32	564.66	999.07	427.41
DIN6	3417.71	579.14	5572.17	543.18	3827.78	551.01	4343.17	505.84	3480.48	557.92	2198.50	736.20
DIN7	2872.33	742.31	2460.71	571.91	2674.27	705.99	1921.77	530.45	2766.40	714.78	2937.75	545.26
DOC1	9373.28	518.59	5535.04	406.30	5721.30	514.32	3458.54	385.79	6851.53	529.35	6537.88	577.15
DOC2	18958.35	749.10	19366.21	2741.53	13933.96	740.14	15743.24	2544.89	15613.47	751.85	22899.70	1955.43
DOC3	5368.78	341.80	2959.53	351.07	2460.74	345.20	1362.69	331.70	2954.45	361.84	2410.67	317.91
DOC4	3117.28	483.00	1798.75	366.82	1421.05	646.32	850.93	342.10	1587.07	475.60	3156.79	497.46
DOC5	-2295.83	577.79	264.88	468.92	-2099.47	549.55	255.730	434.56	-1938.42	561.32	571.41	414.48
DAR1	1622.10	207.27	528.86	283.64	1452.20	197.23	742.00	170.35	-1534.51	630.00	1718.84	525.12
DAR2	---	---	---	---	---	---	---	---	-2909.17	644.16	1163.39	534.08
DAR3	---	---	---	---	---	---	---	---	-3487.45	638.03	175.93	529.83
DRE	1627.38	218.84	620.14	191.36	1165.94	208.93	471.21	177.44	1554.84	220.42	618.47	190.00
EHC	---	---	---	---	0.04059	0.00162	0.06332	0.00256	---	---	---	---
ADJ R-SQ	0.2457		0.1431		0.3178		0.2641		0.3024		0.3920	
SAMPLE	5934		3460		5934		3460		5934		3460	

Table 10 Decomposition of Earnings Differentials

	Aggregate			Single			Married		
	Reg.1	Reg.2	Reg.3	Reg.1	Reg.2	Reg.3	Reg.1	Reg.2	Reg.3
$\bar{Y}_m$[1]	19538	19538	19538	16358	16358	16358	21534	21534	21534
$\bar{Y}_f$[2]	12066	12066	12066	12386	12386	12386	11774	11774	11774
$\bar{Y}_{fm}$[3]	12501	17458	13254	11874	13305	12552	13450	19985	14097
$\bar{Y}_m-\bar{Y}_f$[4]	7472	7472	7472	3972	3972	3972	9760	9760	9760
$\bar{Y}_m-\bar{Y}_{fm}$[5]	7037	2080	6284	4484	3053	3806	8084	1549	7437
$\bar{Y}_{fm}-\bar{Y}_f$[6]	435	5392	1188	-512	919	166	1676	8211	2323
([6]/[4])[7]	0.058	0.72	0.158	-0.128	0.231	0.042	0.172	0.841	0.238
$\bar{Y}_f/\bar{Y}_m$[8]	0.6176	0.6176	0.6176	0.7572	0.7572	0.7572	0.5468	0.5468	0.5468
$\bar{Y}_{fm}/\bar{Y}_m$[9]	0.6398	0.8935	0.6784	0.7259	0.8134	0.7673	0.6246	0.9281	0.6546
$1-\bar{Y}_f/\bar{Y}_m$[10]	0.3824	0.3824	0.3824	0.2428	0.2428	0.2428	0.4532	0.4532	0.4532
$1-\bar{Y}_{fm}/\bar{Y}_m$[11]	0.3601	0.1065	0.3216	0.2741	0.1866	0.2327	0.3754	0.0719	0.3454

Note: (a) Reg.1: No human capital variables are included.
Reg.2: includes EHC variable.
Reg.3: includes traditional HC variables.

(b) Units for the earnings are NT$ per month.

(c) $(1-\bar{Y}_f/\bar{Y}_m)$: gross earnings gap ratio;

$(1-\bar{Y}_{fm}/\bar{Y}m)$: unexplained earnings gap ratio

(d) [7]: Proportion of the unexplained gender wage gap that is explained.

Table 11 Summary of Selective Studies on Gender - Wage Differentials

Country	Source	U_r	A_r	U_x	Data Base
U.S. (1972)	Corcoran and Duncan (1979)	0.72	0.85	0.54	White employed household heads and employed spouses aged 18-64.
U.S. (1967)	Mincer and Polachek (1974)	0.66	0.81	0.56	Married white wage and salary workers, aged 30-44.
U.S. (1967)	Oaxaca (1973)	0.65	0.72	0.80	White urban employees, aged 16 and over.
U.S. (1967)	Oaxaca (1973)	0.65	0.78	0.63	White urban employees, aged 16 and over.
Taiwan (1982)	Gannicott (1986)	0.64	0.84	0.56	Nonfarm workers
Malaysia (1973)	Chua (1984)	0.59	0.73	0.66	Civilian workers.
Canada (1972)	Gunderson (1985)	0.60	0.82	0.45	Civilian workers working 35 hours and over per week 49 weeks and over per year.
Sweden (1974)	Gustafsson (1981)	0.67	0.80	0.61	White color workers in private sector.

Notes: U_r (the unadjusted earnings ratio) = $\bar{Y}_f / \bar{Y}_m$

A_r (the adjusted earnings ratio) = $\bar{Y}_{fm} / \bar{Y}_m$

where $\bar{Y}_m$ and $\bar{Y}_f$ are the mean male and female earnings. $\bar{Y}_{fm}$ is the average earnings of women if they had the average male worker characteristics. Furthermore, U_x (i.e., the proportion of unexplained gender wage gap that can be explained by the differences in male-female charactristics) is equal to $(1-A_r)/(1-U_r)$.

Source: D. Treiman & H. Hartmann (1981), Women, Work and Wages: Equal Pay for Jobs of Equal Value, Washington D.C.: National Academy Press, Tables 4, 10 as well others.

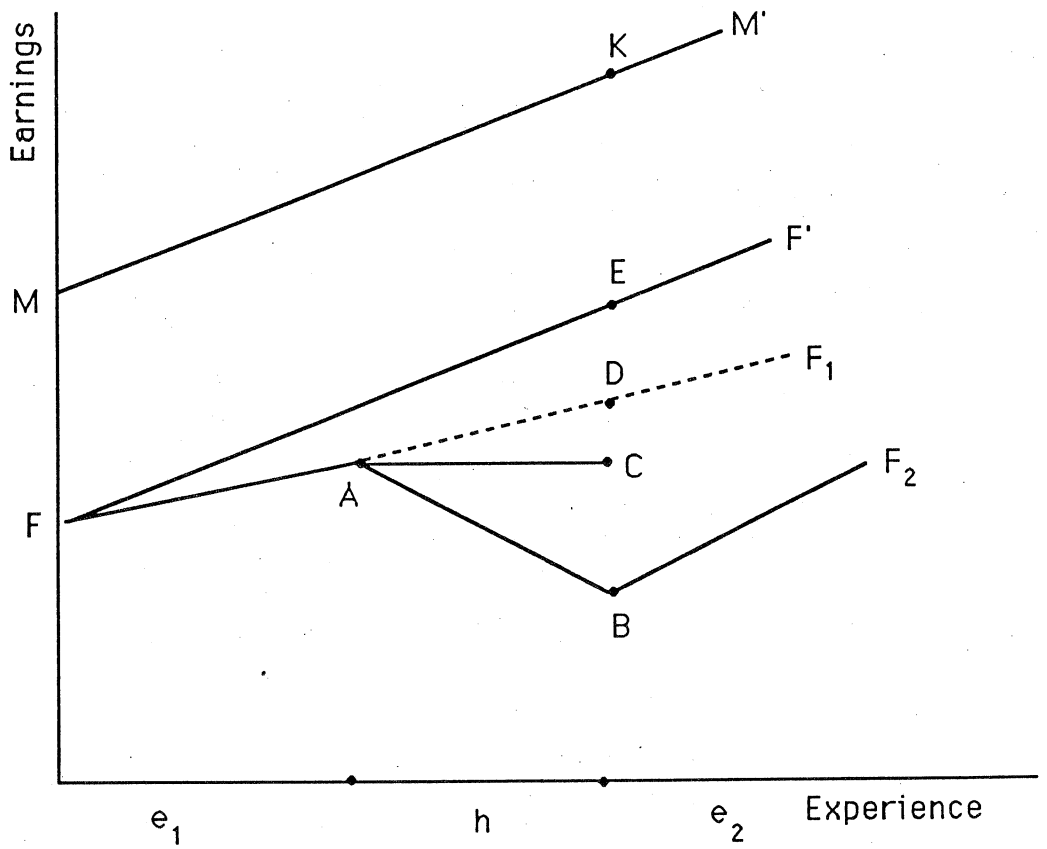

Figure 1: Effects of market intermittency on earnings in a life-cycle framework

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