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**A study on schooling and employment of married women in
Korea**

Shin, Ho Hyun, Ph.D.

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A STUDY ON SCHOOLING AND EMPLOYMENT
OF MARRIED WOMEN IN KOREA

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENT FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
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By

Ho Hyun Shin

Dissertation Committee:

Edwin T. Fujii, Chairman
Young-Ho Choe
John Bauer
Chung H. Lee
James E.T. Moncur

ABSTRACT

The main objective of this study is to explain two counter-intuitive behavior patterns: the elevated aspiration for female higher education and the low employment rate of highly educated married women in Korea. For this purpose, a testable hypothesis is presented to explain the behavior pattern in terms of total household income, including the marital output of assortative educational mating, instead of using conventional analyses in terms of individual earnings or wage rate. In the model formulated, the overall schooling effect of a married woman on her employment decision is analyzed.

The major findings of this study are: first, as the educational level of married women increases, their employment rate tends to decline, and the schooling and earnings of the husband have a consistent positive relation to the wife's educational attainments. Second, as is to be expected, the educational mating between marital spouses indicates a very high correlation (0.7282), and the husband's earnings are strongly positive correlated, not only to his own education, but also to his wife's education. Third, when the non-employed wife group is compared with the employed group, the mean of the wife's educational attainment in the non-employed group is higher, and the mean schooling and earnings of the husband of the non-employed

wife are higher than those of the husband of the employed wife. Fourth, as results of probit estimation on the employment of married women show, the schooling and earnings of the husband, and the employment of other family members are all negatively related to the work of the wife, and their coefficients are all significant. The predicted wage of the wife and the region dummy variable for large city size reveal a strong positive sign. Fifth, the regression result for the husband's earnings equation indicates that the wife's education is an especially important component in the semi-log earnings function of the husband. Sixth, the analysis of the overall schooling effect of the wife on her employment decision reflects that the negative factors of household income dominate the positive wage effect.

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I. INTRODUCTION

1.1 Background

Traditionally Korean people, who have been affected by Confucianism for centuries, have emphasized education as a top priority. Thus, the economic and social lives of Koreans have been substantially influenced by their educational attainments. In this social and cultural environment, it is rather reasonable that Koreans have a very high aspiration for education. As a consequence, Korea has experienced remarkable economic growth since the early 1960s, thanks to the successful utilization of accumulated human resources of high quality. On the other hand, the country has faced serious social problems caused by a large number of 'repeaters' who are preparing to retake the entrance examination for higher education.

A major reason for the popularity of higher education in Korea is its favorable cost-benefit analysis. Since there is a large wage differential on the basis of educational attainments, the excessive demand for higher education is a result of rational economic behavior, in anticipation of the expected net gain over one's lifetime. As an alternative interpretation, the social experience which comes from the instability of society can be considered. Education has been regarded as the best way of saving and investment for old

age and of providing an inheritance. During the last half century, the Koreans have experienced a great variety of socio-economic revolutions such as war, land reform, political upheaval, monetary renovation, severe inflation, etc. Under these circumstances, investment in human capital may be considered as the most secure investment behavior (Koo,1988). Other explanations come from the tradition regarding education as of great importance, and from the conventional extended family system emphasizing successful succession of family lineage, particularly in the case of sons, as the main channel for mobility of social and economic status.

The reasons stated above explain the desire for higher education fairly in the case of the male. However, these interpretations are weak as an explanation in the case of the female. The expected income of female graduates is much less than that of male graduates, because the employment rate and the average earnings of female graduates are much lower compared with those of males.

Education is a costly investment and it competes against alternative uses for limited resources. Why, then, are more than 20 percent of females in the eligible age group enrolled currently in colleges, and why do more than 70 percent of parents desire higher education for their daughters? Why is there no evidence that, as females are more highly educated, they are more likely to be employed to justify expensive educational costs? Is this a rational

behavior pattern of females as economic agents? Otherwise, can it be attributed to the extra-ordinarily high aspiration for education caused by a specific cultural background or ethnic value system?

1.2 Objective of the Study

The major purpose of this paper is to explain the two apparently incompatible behavior patterns of the elevated aspiration for female higher education, and the lower employment rate of highly educated women in Korea. For this study, a testable hypothesis is presented. The main idea of this hypothesis focuses on the effect of total household income, including marital output from the assortative educational mating pattern, as well as the personal earnings or wage rate which is often used in conventional analysis.

The studies based on the conventional human capital theory analyze the returns on education in terms of one's own expected earnings. However, in the case of female education, the standard human capital theory does not explain satisfactorily the investment behavior in human capital. These studies may misrepresent the effect of education, because they concentrate on the direct effect of schooling on earnings but ignore other possibly important channels for educational effects.

Based on the view of 'New Household Economics,' there is an alternative explanation for educational investments

that associates the direct educational effect on earnings and the indirect effect of marital output through the schooling effect on mating (Behrman and Wolfe 1982, Blau et al 1988). We apply this idea in this study for the case of Korea.

Since most Korean people of eligible ages are married and lead a stable marital life,¹ the couple-life in Korea is critical in explaining investment behavior for human capital, as well as employment of married women. Especially, since educational attainment is a significant factor in marital selection in an uncertain marriage market, the positive effect of schooling on assortative mating is supposed to be very high in Korea.

Therefore, the relationship between the employment of the married woman and her schooling is examined. Through this analysis, we try to explain a decision pattern on the work of married females as an important source of potential labor supply in Korea. For this study, a testable hypothesis is presented that, even though the predicted wages of highly educated wives are higher, their actual employment rate can be lower than that of the less educated wives, because their decision on working is largely influenced by the negative household income effect increased via educational assortative mating. If empirical results are

¹. According to the Population and Housing Census Report (Economic Planning Board, 1985), the proportion of the divorced among female population (25 years of age and over) occupies only 0.9%.

obtained supporting this hypothesis, we may not expect the rapid diffusion of active participation of the more highly educated housewives in economic activities, unless any changes occur in present institutional environments. Thus, in order to utilize the potential labor force with high quality, some positive policy alternatives are required.

1.3 Organization of the Study

The organization of this paper is as follows: In Chapter II, a survey of the literature relevant to this study and comparisons among theories are generally presented. Chapter III shows the features and current situation of education and the labor market in Korea, and compares them with those of other countries. In Chapter IV, the theoretical framework and models for empirical analysis are suggested and developed, while in Chapter V the data and estimation procedures to be used are explained in detail and the major findings of empirical results are reported. Finally, the major empirical results are summarized and some policy implications are proposed in Chapter VI.

II. LITERATURE REVIEW

2.1 Human Capital Effects on Individual Earnings

2.1.1 Human Capital Theory

As a theoretical mainstream explaining investment behavior in terms of human capital, the human capital theory argues that investment in human capital results in higher labor productivity, and thus the more educated (or the more highly trained) workers with higher productivity receive higher earnings. This logic is based on the marginal productivity theory, that the wages of workers are decided by and paid on the basis of their marginal productivity.

Becker (1962) presents the view that training as an investment pattern in human capital leads to steeper experience-earnings profiles. In the case of general training such as education, the productivity of trained workers increases not only in the current job but also in other jobs as potential alternative occupations. The workers are, therefore, expected to be willing to pay the full costs of general training, and to receive higher wages after training. This is consistent with the fact that individuals invest in education and gain higher earnings through expected higher labor productivity.

In his theoretical analysis of individual acquisition of earning power, Mincer (1974) suggests the schooling model for estimation of the educational effect on earnings.

$$(2.1) \quad \ln Y_S = \ln Y_0 + rS$$

where, $\ln Y_S$: annual earnings of an individual with S years of schooling in natural logarithm.

r : discount rate

S : years of schooling

Equation (2.1) implies that percentage increases in earnings are strictly proportional to the extent of the schooling period, with the rate of return (r) as the coefficient of proportionality.¹

In this empirical analysis, as the human capital model expands to include job-experience as a post-educational investment, its explanatory power is largely increased. Mincer (1974) suggests his familiar semi-log earnings function from the alternative regression results as follows:

$$(2.2) \quad \ln Y = a + rED + b_1EX + b_2EX^2 + [b_3 \ln WEEK]$$

where $\ln Y$: natural logarithm of annual earnings,

ED : years of schooling,

¹. It is assumed that spans of earning life are fixed, regardless of schooling. In this case, k , the ratio of annual earnings after s years to earnings after $s-d$ years of schooling, is constant. This means that k does not depend on the level of schooling (s) nor on the length of earning life (n), i.e., $k_{s,s-d} = Y_s / Y_{s-d} = e^{rd}$. For details, refer to Mincer (1974) pp.9-11.

EX : years of job experience,

ln WEEK : natural logarithm of the number of weeks worked.

The partial coefficient of schooling (r) is an estimate of the average rate of return to schooling (Mincer 1974, Conlisk 1987). This coefficient, (r) is expected to be positive because usually earnings increase with schooling. Since job-experience is regarded as post-educational investment, the b_1 is also predicted to be positive. However, b_2 is supposed to be negative, indicating that the experience-earnings profile is concave from downward due to depreciation of productivity as workers become older. This earnings function can be regressed with ln WEEK or without it. Since Mincer finds that b_3 is very stable in the U.S., it may be assumed constant, though this coefficient is positive from the relation that as worked weeks increase, earnings are higher. As an overall evaluation, Mincer's earnings function has satisfactory explaining power for the relationship between human capital and earnings, although its assumptions on the earnings function have some limitations (Blinder 1976).

Since schooling and training are viewed as production processes for human capital, we would like to have independent output measures of such processes; but it is not easy to estimate the outputs exactly. Thus, we use the time spent in educational institutions as a proxy of the input measure of schooling for production of human capital.

According to Griliches (1977), the production models are expressed as follows:

$$(2.3) \quad Y = P_h \cdot H \cdot e^u$$

$$(2.4) \quad H = e^{\beta S} \cdot e^v$$

$$(2.5) \quad \ln Y = \ln P_h + \beta S + u + v$$

where, P_h : market rental price of a unit of human capital
 H : implied unobserved quantity of human capital
 β : rate of return to schooling
 S : years of schooling
 u : random influences on wages
 v : other factors affecting human capital

Here, equation (2.4) is an implicit production function for human capital, with time spent in school (S) as the major input and other influences (v) augmenting human capital. Griliches explains these functional forms as coming from a cost function whose only component is foregone income excluding the direct educational cost.

The earnings function cannot contain all relevant factors, and includes only some important observed variables. As a considerable omitted variable in the earnings function, we may think of ability, which is not easily observed but may affect earnings (Griliches 1977). Let us assume the actual estimated earnings function as equation (2.6).

$$(2.6) \quad \ln Y = a + rED + u$$

where u : stochastic error term

And the true earnings equation including ability variable is as follows:

$$(2.7) \quad \ln Y = a' + r'ED + b'A + u'$$

where A : ability measure, and the prime means true value.

From the above two equations, the estimated rate of return to education has the following relationship compared with the true equation.

$$(2.8) \quad r = r' + b'\{Cov(A,ED)/Var(ED)\}$$

As a result of the omission of the ability variable, it is expected that the actual estimated rate of return to schooling is overestimated (i.e. has an upward-bias), since all terms in (2.8) are positive.

As another omitted variable, quality of education is considered (Behrman and Birdsall 1983). Behrman and Birdsall regard the average schooling years of a teacher as a proxy of education quality in estimating earnings function. They obtain from the empirical results the conclusion that the omission of education quality leads to overestimation of the rate of return to education (r). However, their research has some limitations, such as assuming that teachers had education of the same quality (i.e., quality is classified only by schooling period) and omitting other significant

factors of education-quality, such as the ratio of students per teacher, or facilities.

Actually, it is very difficult to find true measures of factors like ability and education quality. Also, since the involvement of these proxies in the earnings function does not change the coefficients significantly, estimation without these variables may not raise serious problems (Yoo 1988). Therefore, we focus only on the earnings function, omitting these proxies of ability or education-quality for the sake of simplicity of analysis in this paper.

2.1.2 Signaling Hypothesis and Credentialism

The interpretation of the positive relationship between the education and earnings of workers has been questioned. For example, it is asked whether, as the conventional human capital theory assumes, the coefficient of the education variable in earnings function measures the effect on productivity of a worker with human capital acquired in school. It has been hypothesized that education, in part or instead, represents signaling for ability and motivation or credentialism; as a consequence, social benefit estimates of education by conventional measures are substantially upward-biased (Boissiere, Knight and Sabot 1985).

In the signaling (or screening) hypothesis, schooling itself does not directly raise market productivity. Usually, since the abler individuals enter higher educational institutions, entrepreneurs believe that highly educated

employees are more productive and they pay higher wages to these workers. So, according to this hypothesis, education is seen as a screening device, or as a signal of abler workers in an environment in which employers cannot identify productivity of workers certainly (Spence 1973, Stiglitz 1975). From the empirical test related to this hypothesis, Riley (1979) finds that the average level of education is lower in the unscreened sector than in the screened sector, supporting this hypothesis. But, Layard and Psacharopoulos (1974) justify the human capital theory by raising some problems of the signaling hypothesis, and they maintain that this hypothesis explains only partly the relation between education and schooling.

Meanwhile, credentialism, which is a hypothesis regarding reward for educational qualification as irrelevant to economic value, emphasizes the direct effect of schooling years on earnings. According to this view, schools provide students with a credential which is personally valuable but not productive. For example, employers may determine wages and establish education-based hiring and payment criteria, or may discriminate in favor of the more educated when employees share similar socio-economic backgrounds.

In terms of the signaling (or screening) hypothesis, employers may reward ability on an individual basis, or they may use schooling years as a means of identifying workers who are potentially more productive. Educational attainment signals workers with greater average ability and it is this

ability, rather than what is actually learned in school, that is rewarded (Boissiere, Knight and Sabot 1985).

In the actual labor market situation, the human capital theory, the signaling hypothesis and credentialism take a part respectively in explaining the positive relation between education and earnings, though their explanatory power is different in each country with its unique culture and socio-economic structure. Generally, the human capital theory predominates in developed countries, while the signaling hypothesis and credentialism have relatively stronger explanatory power in developing or less developed countries, although it is very difficult to identify certainly whether or not the latter theories explain existing conditions better than the human capital theory.

According to Rosen (1977), though the normative implications of the related theory and hypotheses are different from each other, their positive and behavioral effects appear to be identical from an individual point of view. Since the explanation of personal behavior in investment in education is the focus in this paper, serious problems do not seem to arise in selecting a theoretical approach. Therefore, the standard approach of the human capital theory and its extension will be used as a basic tool for analysis in this paper.

2.1.3 Alternative Specifications of Earnings Function

Following the standard Mincerian semi-log earnings framework, Psacharopoulos (1977) shows the results of the four alternative specifications of the basic human capital earnings function for application in a less developed country (LDC).

(2.9)

- (a) $\ln Y = f_1 (S)$
- (b) $\ln Y = f_2 (S, EX, EX^2)$
- (c) $\ln Y = f_3 (S, S^2, EX, EX^2)$
- (d) $\ln Y = f_4 (S, S^2, EX, EX^2, (EX \cdot S))$

where, $\ln Y$: Log_e of annual earnings

S : completed years of schooling

EX : years of job-experience

Anderson (1980) also presents almost the same four alternative specifications, excluding EX^2 on applying in another LDC. Both Anderson and Psacharopoulos find that education alone explains approximately one third of the dispersion in relative earnings using (a). When (b) is selected, adding the experience variable, it raises the explanatory power of the model (raising R^2) and also raises the average rate of return to education, as it removes the downward bias on the S coefficient. This is because this bias is caused by the fact that the younger cohorts have more years of schooling and less experience. When S^2 is considered also in (c), they find that the returns to

education decline at the margin. The function (d) tests for the existence of interaction between experience and years of schooling in determining earnings. Psacharopoulos finds that the interaction term is negative but insignificant. Mincer (1974) also obtained a significant negative coefficient in his earnings function, indicating a negative relation for the U.S. However, Anderson (1980) finds a positive coefficient on the product term, and Knight and Sabot (1981) also discover that this term is generally positive and significant.

The rate of return between two different levels of schooling is estimated by fitting the equation to those with $S-dS$ and S years of schooling.

$$(2.10) \quad \ln Y = a + b_1 EX + b_2 EX^2 + c (\text{Education Dummy})$$

Here, the dummy has a value of 1 if the individual belongs to the higher level of schooling. In this case, the rate of return is equal to the coefficient of the educational dummy divided by the number of schooling years as the difference between the two educational levels (i.e., c/dS). These rates of return are called hybrid rates, in the sense that they contain an unknown training component as a post-educational investment (Psacharopoulos 1977). However, Psacharopoulos finds that the implicit rate of return to schooling is not very different from the observed rate (hybrid rate) in his empirical results. Therefore, we focus only on the analysis of the observed rates in this study.

Meanwhile, Gaag and Vijverberg (1989) present another specification of the well-known Mincerian framework in an analysis on the determinants of wages in an LDC. They use the average years of schooling for each level of education as dummy, and divide the total experience into experience related to current occupation and other general experience. They obtain the empirical results that the rates of return to schooling increase with the level of schooling and that the effect of occupation-specific experience is significant. They consider that completed schooling may indicate ability and motivation, and thus may be used by employers to screen for these desirable attributes. Productivity differentials associated with differences in schooling are then thought to be caused by these basic attributes, rather than by the schooling investment in human capital. By including information on completed schooling (i.e., diplomas acquired) in addition to years of schooling in the equation, Gaag and Vijverberg try to show the relative importance of these variables in explaining wage differentials. If years of schooling can be viewed as a proxy for investment in human capital, while diplomas are signals to employers regarding ability and motivation, then the regression results may show the relative merits of the human capital theory and the screening hypothesis.

In their regression results of extended models including variables on diplomas received, the diploma dummy variable turned out to be very high compared to schooling

years. This evidence of an impact of school diplomas received may lend credit to the screening or credentialist explanation. However, this empirical test result is only a specific case of an LDC. Nevertheless, this consideration is meaningful for research in the case of Korea, which has an outstanding wage, employment and promotion differential by educational level, considerably exceeding the productivity difference.

2.2 Assortative Mating in the Marriage Market

Becker (1973,74) presents a framework of his theory of marriage. The principal assumptions of his theory are that each person tries to search and mate as well as possible and that the marriage market is in equilibrium. Under these basic assumptions, optimal sorting in an efficient marriage market is suggested. The efficient marriage market tries not to maximize the household commodity output of any single marriage, but to maximize the sum of the outputs over all marriages, just as competitive product markets maximize the sum of the outputs over all firms. Thus, the marriage market acts as if it selects not the maximum gain from marriage compared to remaining single for any particular marriage, but the maximum average gain over all marriages.

Assortative mating is considered in Becker's theory as the optimal sorting when male and female differ in a trait or set of traits, such as education, intelligence, race,

wage rate, age, etc. His analysis of assortative mating implies that likes or unlikes mate when that mating maximizes total household commodity output over all marriages. Becker (1973,1981) argues that an efficient marriage market usually has positive assortative mating, where high-quality men are matched with high-quality women, and low-quality men with low-quality women, though negative sorting cases exist.

If we assume that men and women are different in the quantitative traits A_m and A_f respectively, and that each trait has a positive marginal productivity, then

$$(2.11) \quad dZ(A_m, A_f)/dA_m > 0 \quad \text{and} \quad dZ(A_m, A_f)/dA_f > 0$$

where Z : marital output

The major theorem on assortative mating is that if increasing both A_m and A_f adds more to output than the sum of the additions when each is increased separately, a mating of large A_m with large A_f and small A_m with small A_f would produce maximum total output, since an increase in A_m (A_f) reinforces the effect of an increase in A_f (A_m). The converse holds if increasing both adds less to output than the sum of the separate additions. Therefore, positive assortative mating is optimal when $d^2Z(A_m, A_f)/(dA_m \cdot dA_f) > 0$. And negative assortative mating is optimal when the inequality is reversed. This relation implies that the mating of likes is optimal when traits are complements and the mating of unlikes is optimal when they are substitutes,

since high values of different traits reinforce each other when they are complements and offset each other when they are substitutes.

Generally, positive assortative matings are common but negative assortative matings also exist, though they are not so common. As a major example of negative assortative mating among economic traits in Becker's theory (1973, 1981), the market wage rate is presented. A negative mating between a couple's market wages maximizes total marital output over all marriages because the gain from the division of labor is maximized. In other words, a low-wage wife must spend more time in household production than a high-wage wife because the foregone value of the time of a low-wage wife is lower. Also, a low-wage husband has to spend more time in household production than a high-wage husband. Therefore, through negative mating (low-wage wife with high-wage husband and low-wage husband with high-wage wife), the cheaper time of both male and female is spent more extensively in household production, and the expensive time of both is more concentrated in market production.

However, in the results of empirical test using a 20 percent random sample of married persons in the 1967 Survey of Economic Opportunity, Becker finds not only positive correlation in years of schooling but also in wage rates. Although strong positive correlation between educational level is expected by the theory, positive correlation between wage rates is an opposite result since the theory

predicts a negative correlation. Becker explains this opposite result on the basis that the sample for the test is biased because it is limited to married women in the labor force in a certain year. He states the reason for the positive bias as follows:

"Since the higher the husband's wage rate the higher must be his wife's wage rate to induce her to enter the labor force, a negative correlation across all mates is consistent with a positive one for those having wives in the labor force (Becker 1973, p.833)."

"Since a woman is more likely to participate when her wage rate is high relative to her husband's, a positive correlation between wage rates for those marriages where both participate is consistent with a negative correlation for all marriages (Becker 1981, p.76)."

2.3 Human Capital Effects on Household Earnings

2.3.1 Effect of Marital Selection

Generally, researches on the conventional human capital theory analyze the returns to human capital, such as formal education, in terms of an individual's own expected earnings. However, even if the estimation of the expected returns of human capital is limited to observable income for simplicity of analysis, the traditional approach to an individual's own earnings may provide only a partial explanation or misleading illustration of the expected private returns to human capital investments.

Behrman and Wolfe (1982) maintain that if the welfare of one adult depends on household income and if there is positive assortative mating of human capital, then the

estimation of total returns from human capital investments needs to incorporate expected returns from assortative mating, in addition to those from one's own earnings. Actually, if the expected earnings of one sex, usually female, are much less than those of the male spouse, the returns from the expected earnings of the spouse may be more significant in determining full household income than the expected returns from her own earnings. Behrman and Wolfe (1982) argue that the literature on the marriage market or on returns of human capital investment has not integrated the expected gains of marriage into the conventional decision-making approach to human capital investment.

They, therefore, suggest that the alternative definition of expected full household income should be used in deciding investment in education, instead of the traditional estimation method focusing only on one's own expected earnings. This broader definition integrates the approaches of the conventional human capital investment and the marriage market.

Their model including the definition of expected full household earnings from the woman's point of view (H^W) is as follows:

$$(2.12) \quad H^W = XE^W + ZPE^M$$

where XE^W : the expected earnings of the wife,

E^M : the expected earnings of the husband,

X : multiplicative factor which represents respects in which the earnings function for females may

differ from that for males,

Z : weighting factor of the husband's expected earnings,

P : the probability that the wife mates with the husband.

It is assumed that both earnings functions of spouses depend on one's own and on spouse's schooling. This dependence reflects potential relations such as the varying spouse's productivity through one's contribution to home production.² However, such dependence is often hypothesized to be asymmetrical because of the relatively minor contribution of the male to home production. Thus, the schooling of the female is assumed to affect the full earnings of the male spouse, but not vice versa. The basic point is that if the equation (2.12) is not dominated in magnitude by the first term (own-earnings), then it may make a substantial difference compared with the standard human capital approach. The empirical test on Nicaragua shows that the effects of a more extended human capital approach on the returns of education are significant, supporting the theoretical presentation.

Although sorting individuals through marriage into household units has an important meaning for the

². In other words, one's human capital, such as education, affects the spouse's productivity indirectly through improving home productivity, such as better health or nutrition of household members. This view is compared with Benham's, which emphasizes the cross-productivity effect admitting direct transmission of human capital between spouses.

distribution of income, and expenditures, economists have turned their attention only in relatively recent times to family formation, making use of the household production and search theory (Becker 1973, 1974; Keeley 1977). However, Boulier and Rosenzweig (1984) argue that one potentially significant shortcoming of the existing related theoretical literatures is the assumption that all of the traits which individuals bring to the marriage market are exogenous.

Thus they attempt to test the meanings of the economic theory of marriage in a framework in which educational investment, marital search and matches are responsive to marriage market conditions and the personal traits of individuals. Especially, they test the central propositions of the theory of marriage that there is positive assortative mating with respect to complementary characteristics (Becker 1973), and that searching in the marriage market results in mating with a better spouse, indicating the existence of payoffs (Keeley 1977).

For this, they develop a mating function in linear form:

$$(2.13) \quad H^{ijl} = b^k_0 + b^k_1 T^i_e + b^k_2 T^i_s + b^k_3 A^i + b^k_4 D^l \\ + b^k_5 R^k + b^k_6 J^k + b^k_7 J^l + u^{ki}$$

where, k : male, l : female; k : female, l : male,

H^{ij} : human capital of the spouse j of individual i,

T^i_e : i's educational attainment,

T^i_s : marital search time,

A^i : other traits of i that attract a higher-quality mate (marital attractiveness),

J^k, J^l : variable representing sex-specific labor market conditions,

D : features of the marriage market reflecting the dispersion of potential mates,

R : ratio of potential mates to competitors,

u^i : random error term.

This model is applied to sample data in the Philippines. The analysis is limited to once-married women aged 35-45 with spouse present. The near parity of Filipino female and male education levels, despite the low market-participation rate of married women, suggests that the schooling of women in the Philippines must be linked to the marriage market. From the empirical results, Boulier and Rosenzweig find that the percentage increase in expected wealth³ due to marriage choice resulting from a 1-year increase in the wife's education is 5.6 percent by OLS.

2.3.2 The Cross-Productivity Effect of Human Capital

Benham (1974) proposes that the observed strong positive relationship between formal schooling and labor market productivity can be better explained by the fact that, in addition to providing specific skills, formal schooling improves the individual's ability to acquire and understand information, and to perceive and respond efficiently to changing conditions and environments.

³. The gross returns to female schooling in terms of the husband's expected income.

From this perspective, Benham suggests that associates contribute to a person's effective stock of education by providing a close substitute for his formal education; they do this by extending information and advice, and by helping the person acquire general skills related to information acquisition and assimilation, and to his response to changing conditions. From this cross-productivity effect, an individual's effective stock of acquired abilities will be a function not only of his formal schooling and job experience, but also of his associates' education, the incentives the associates have to share their knowledge and the length of the association.

Benham investigates this transmission of educational benefits in marriage. As one type of association, marriage is distinguished from most other nonmarket associations in that there are greater incentives to share acquired abilities within the household. Both current and future benefits of increased knowledge by family members are shared. On the other hand, the costs of sharing would be lower since the transaction cost of communication within the household is likely to be less than in other types of association. Therefore the household would provide a good opportunity to analyze the benefits of association.

Benham demonstrates his model, which represents a household-firm composed of a husband and a wife rather than an individual. The assumption under this model is that the effective stock of human capital for each marriage partner

$(H_t^{h*}$ or H_t^{w*}) is a positive function of the individual human capital stock of each spouse within the household:

$$(2.14) \quad H_t^{h*} = H(H_t^h, H_t^w) \text{ and } H_t^{w*} = H(H_t^h, H_t^w)$$

where, $dH_t^{i*}/dH_t^j > 0$ for $i, j = h, w$

Hence, increments to the human capital stock of either spouse should be reflected in the productivity of both. The focus of the analysis is the extent to which the earnings of a married man are positively related to the human capital stock of his wife, measured by the wife's schooling years. In order to examine this relationship, the wife's education is incorporated into Mincer's standard earnings model to estimate the returns of men's education. The logarithm of the husband's earnings is given as a function of the formal education years of each spouse and the job-experience of the husband. The specification of the model is as follows:

$$(2.15) \quad \ln \text{EARN} = a + b_1 \text{EDH} + b_2 \text{EDW} + b_3 \text{EXP} + b_4 \text{EXP}^2 + u$$

where, $\ln \text{EARN}$: \log_e annual earnings of husband in family with husband and wife present,

EDH : years of education completed by husband,

EDW : years of education completed by wife,

EXP : years of job experience of husband.

Here, the coefficients b_1 and b_2 are estimates of the percentage earnings differentials to the husband's and wife's formal schooling. However, this model is restrictive

in that the same percentage earnings differentials are assumed for all years of schooling.

The results of Benham's empirical study to estimate this model, using data from three different samples of the population of the U.S., indicate that the coefficient of the wife's education is positive and significant in all three data sets. The simple null hypothesis that the education of the wife is unrelated to her husband's earnings can be rejected. Given the level of the husband's education and his years of job experience, his earnings increase from 3.5 to 4.1 percent for each year of his wife's education. Meanwhile, his earnings increase between 6.3 and 7.0 percent for each year of his own education. This has important implications both for the interpretation of the returns to education for man and woman and for understanding of the market returns to marriage.

Benham recognized the selective mating hypothesis that the more productive males marry more highly educated females as the principal alternative argument to the family-firm hypothesis emphasizing cross-productivity effects. The relationship of these two hypotheses is very similar to that between the human capital theory and the signaling hypothesis for the positive relation between schooling and earnings. Schooling could either serve as a screening device or as increasing human capital. However, devising a test which provides clear evidence concerning the relative importance of the selective mating hypothesis versus the

family-firm hypothesis does not appear straightforward. The literature on this issue has tried to accumulate evidence of the consistency of earnings patterns with theoretical implications rather than to test to clearly distinguish between these two hypotheses.

On the other hand, Welch (1974) criticizes Benham's hypothesis that the wife's education provides substantial benefits to the family beyond increase of her own earnings. Welch considers the social cost of the "marriage-go-round". In a nutshell, his basic idea is that more productive marriage partners are preferred and that, on balance, net productivity in marriage is positively related to education. Higher education serves to increase an individual's opportunity of a good marriage (i.e. with a more educated spouse). If an individual's social product is independent of his spouse's education, then the "marriage-go round" results in overinvestment in schooling. Compared with this perspective, Benham's view is a clear alternative. Welch tests Benham's model using other data of the U.S. population. According to Welch's test, the estimated net effect of a wife's schooling is roughly one-tenth of the effect of a husband's schooling and is only one-fifth of Benham's estimates. Welch concludes as follows:

"Consider models of selective mating. If forces for selectivity exist in the absence of this cross-productivity effect, they are clearly magnified by its existence (Welch, 1974)."

While Benham investigates his hypothesis in the U.S. marriage market, Scully (1979) tests Benham's hypothesis

using data from a sample household survey of Iran. On the whole, the U.S. marriage market can be characterized as similar to a competitive market. This feature contributes to a vast expansion of the pool of potential mates. However, much of the world has more traditional cultural norms. The qualifications of entry and exit into the marriage market are more restrictive, transaction costs are higher and the pool of eligible mates relatively smaller due to difference in socio-economic status. Therefore, Scully is interested in checking if Benham's results are applicable in a more traditional marriage market. The results of an empirical test applying the same model as Benham's show that the association between the husband's and the wife's schooling is as strong in Iranian culture as it is in U.S. culture. The rate of returns on education also are remarkably consistent with the results obtained for the U.S.

However, Scully suggests an alternative model which abandons the simple specification of EDH and EDW in the earnings regression, and instead uses the educational dummy variables. In the estimated results of the modified model, there is no evidence that the joint productivity of human-capital interaction within marriage is a function of the endowment of human capital. After graduation from primary school, the rates of return from the wife are almost constant in each educational attainment dummy, while the rates of return due to the husband increase as his education level becomes higher.

Meanwhile, further researching Benham's view, Wong (1986) suggests that the cross-productivity effect is stronger within families managing self-business. He uses a sample of the Hong Kong population. Here, in small family enterprises, household members participate in managing the family business. In such households the marketable skills acquired by different members are more likely to be similar. The overlap of household and firm membership strengthens the identification of mutual interest and increases incentives to share acquired knowledge. The close relationship of household members also reduces the transaction costs of communicating information and of monitoring each other's activities. Therefore, given the total stock of human capital of all household members, the effective stock that is available to each member would be larger in entrepreneur families than in worker families. In other words, the gains of market productivity associated with marriage will be greater in entrepreneur families than in worker families. The basic frame of Wong's model is almost the same as that of Benham, except that Wong classifies entrepreneurs (including employer, self-employed, and family workers) and wage workers. The empirical results support his proposition, showing that entrepreneurial families derive greater benefits from marriage than wage-earner families, (i.e. male entrepreneurs obtain more labor market benefits than wage workers from mating with well-educated women).

2.3.3. The Labor Force Participation of Married Women

Generally, the decision of married women to enter the labor force varies positively with expected wage rates in the labor market and inversely with the value of time in the household. Economic theory also suggests that women's labor force participation reflects a comparison between gains from market earnings and opportunity costs in terms of foregone household production in child care and in other activities for a given level of household income from all other sources. Increased income from all other sources, such as a male companions earnings, is likely to reduce the relative gains from market participation due to the standard income effect (Behrman et al 1985). As further research, Grossbard-Shechtman and Neuman (1988) pursue the idea stated in Becker (1973) that the share of household income going to a particular spouse, and consequently the value of that spouse's time, can vary with circumstances specific to a marriage or marriage market. From this perspective, they hypothesize that the wife's traits valued in the marriage market are supposed to be associated with lower labor force participation, whereas the husband's traits valued in the marriage market are expected to be associated with lower participation rates on the part of wives. Grossbard-Shechtman and Neuman (G-N) set their model as follows:

(2.16) $G(W, W^*)$: decision to participate in the labor force

where, W : the expected wage

W^* : the value of time in the home

$$(2.17) \quad W^* = k \cdot I$$

where, I : a vector of household income sources other than the wife's income from work,

k : the portion of such income that the wife obtains for her own benefit.

They are assuming that spouses' well-being depends on the extent to which they control the household's income. Proportion (k) of the household's income is set as a result of marriage market forces and internal bargaining between husband and wife. This k is composed of a set of spouses' traits. The relative traits of a wife in comparison with those of her husband influence the strength of her bargaining power. If a female spouse is comparatively well endowed in a trait lacked by the husband, the value of proportion (k) would be raised and therefore the value of her time. From this view, G-N suggest the hypothesis of compensating differentials in marriage. A husband with characteristics which are comparatively unfavorable in comparison with his wife's has to compensate his spouse materially by letting her have a larger proportion of his income or the joint income.

In an empirical study, they test for a higher labor force participation rate for women with lower proportion (k), and, as a consequence, lower W^* . Also, they test for lower participation rates for women married to men

considerably older than themselves. Such husbands are expected to give their wives compensating differentials. So proportion (k) is expected to be high and labor force participation low. But it has been argued that older husbands have higher incomes and hence can afford a housewife. However, G-N maintain that the husband's schooling and income are already included and controlled in the regressions. The empirical results of these tests satisfied the hypothesis, and suggest that studies on female labor supply should also include the determinants of success in the marriage market.

Blau, Behrman and Wolfe (1988) present a set of reduced-form equations that determine the marital status and labor force participation of a woman and her spouse. Although it is feasible (but much more complicated) to specify a structural model, they take a reduced-form approach because they are concerned only with the net impact of education on the results. To allow for correlation between unobserved determinants of labor force and marital decision, and because of the discrete nature of these outcomes, they specify an unordered, multinomial logit model. The joint outcome of mating and labor force participation can be described by an unordered indicator variable Y defined as follows for a given household:

$$\begin{aligned}
 (2.18) \quad Y &= 1 \text{ if } C = 0 \text{ and } P_w = 0 \\
 Y &= 2 \text{ if } C = 0 \text{ and } P_w = 1 \\
 Y &= 3 \text{ if } C = 1, P_w = 1, \text{ and } P_m = 1
 \end{aligned}$$

$Y = 4$ if $C = 1$, $P_w = 0$, and $P_m = 1$

$Y = 5$ if $C = 1$, $P_w = 1$, and $P_m = 0$

$Y = 6$ if $C = 1$, $P_w = 0$, and $P_m = 0$.

where, C : indicator variable defined 1 if husband is present; 0 otherwise,

P_i : 1 if the member is a labor force participant; 0 otherwise.

i : w,m for woman and husband

This multinomial logit specification allows the schooling effects on marital status to depend on labor force participation and vice versa. This procedure also permits the effect of one spouse's schooling on earnings to depend on marital status and on the labor force status of the other spouse.

In their empirical results, using a sample of urban Nicaraguan women aged 15-45, Blau, Behrman and Wolfe find that the woman's schooling raises the likelihood that she will participate in the labor force whether a male spouse is present or not, and that her schooling will have little impact on her spouse's labor force participation decision in the situation of almost universal participation of prime-age males. However, the male spouse's education raises the log odds of the case in which he participates and his wife does not, relative to that in which both participate and that in which only the woman participates. These findings suggest a negative household income effect on the labor supply of married females, and this is consistent with the argument of

Grossbard-Schechtman (1984) that a backward-bending supply curve is more likely to be observed among women than among men in view of the larger importance of household labor in the work history of women.

Meanwhile, Shimada and Higuchi (1985) maintain in their study of female labor force participation (FLFP) in Japan that increased higher education among women does not seem to have triggered conspicuous improvements in female wages or in the greater participation of educated women. These phenomena may reflect some unique traits of Japanese society, such as strong family cohesiveness, and limited employment and promotion opportunities for female workers. They find empirical results of the relatively strong negative income effect and weak wage effect of education on the female labor supply, and interpret this situation as a marginal and supplementary role of women in their families rather than reflecting their independent wish to make optimal choices in the labor market.

CHAPTER III. CHARACTERISTICS OF THE EDUCATION AND
LABOR MARKET IN KOREA

3.1. Education and Economic Development in Korea

Since the early 1960s, Korea has experienced remarkable economic growth and speedy structural changes in industrialization procedures, largely due to the successful implementation of five mid-term (5 year) economic and social development plans. This rapid economic growth of Korea, reporting over 8 percent on an annual average basis for twenty-five years, owes much to its abundant human resources of high quality, since Koreans are comparatively better educated than the people of other developing countries. Since substantial elements of economic and social life such as employment, wage, promotion, and social status are largely affected by their educational attainments, Korean people have had a very high aspiration for education.

As a characteristic of the economic growth of Korea, the export-oriented and labor-intensive growth pattern shows that the number of the employed has more than doubled from 7.7 to 16.4 million, during 1963-1987, registering a 3.2 percent increase on an annual average basis. This figure is much higher compared with the population increase rate, 1.8 percent, for the same period. New employment opportunities have been largely created by the non-farm sector. The ratio

of the employed in agriculture, forestry and fishery occupied 21.9 percent in 1987, representing a consistent sharp decrease from 63.1 percent in 1963. The numbers of those employed in secondary industries (Mining and Manufacturing) and tertiary industries (Social Overhead Capital and Other Services) have increased swiftly, reaching 28.1 percent and 50.0 percent respectively in 1987, from 8.7 percent and 28.2 percent in 1963 (Table 3-1). This indicates that new entrants in the labor force and migrants from rural areas during this period have been mainly absorbed into the non-farming sector, including secondary and tertiary industries.

Table 3-1

Employed Persons by Industry

(Unit:1,000 persons,%)

	Employed Pop.	Agri., Fishing & Forestry	Mining & Manufac.	SOC & Others
1963	7,662 (100.0)	4,837 (63.1)	667 (8.7)	2,518 (28.2)
1972	10,559 (100.0)	5,346 (50.6)	1,499 (14.2)	3,714 (35.2)
1981	14,023 (100.0)	4,801 (34.2)	2,983 (21.3)	6,239 (44.5)
1987	16,354 (100.0)	3,580 (21.9)	4,602 (28.1)	8,172 (50.0)

Source: Economic Planning Board, Handbook of Korean Economy, 1980 and Korea Statistical Yearbook, 1988.

The average years of educational attainment of the Korean population have been increased gradually due to the continuous expansion of opportunities for education with Korea's economic and social development (Table 3-2). Thus, the average years of schooling of the employed have been continuously augmented. Especially, employment opportunities for the highly educated rose sharply during the latter half

Table 3-2

Average Years of Educational Attainment
By Sex and Age Group

(Unit:Year)

	Average Education	AGE				
		6-19	20-29	30-39	40-49	50+
1966	5.03	4.98	7.44	6.15	3.90	1.52
Male	6.19	5.25	8.48	7.90	5.43	7.46
Female	3.97	4.75	6.40	4.49	2.40	0.74
1970	5.74	5.33	8.32	7.15	4.83	1.98
Male	6.86	5.47	8.81	8.65	6.42	3.06
Female	4.72	5.21	7.48	5.64	3.36	1.09
1975	6.62	6.16	8.83	8.12	6.26	2.74
Male	7.61	6.26	9.25	9.33	7.90	4.02
Female	5.70	6.08	8.41	6.88	4.75	1.72
1980	7.61	6.53	9.88	9.17	7.52	4.16
Male	8.67	6.60	10.33	10.19	9.01	5.03
Female	6.63	6.10	9.44	8.10	5.95	2.25
1985	8.58	6.71	10.96	10.12	8.52	4.55
Male	9.66	6.71	11.34	10.93	9.88	6.49
Female	7.58	6.71	10.61	9.28	7.14	3.08

Note: Average Years of Educational Attainment = (Cumulative years of education received to total population) / (Population 6 years old and over - Total students)

Source: Economic Planning Board, Social Indicators in Korea, 1987.

of the 1970s, during which the Korean economy experienced the establishment of the heavy-machinery and chemical industries, a departure from the previous concentration on light industries such as textiles and footwear. In the pre-industrial period of the 1950s, many of the highly educated were included in a large pool of the unemployed because there were not sufficient and proper job opportunities for them. Though this unemployed group of the highly educated had been gradually absorbed in the employed labor in the 1960s, they had faced the disadvantage of an excess supply of highly educated persons in the labor-intensive growth stage, which emphasized utilization of abundant labor with lower wages (Koo, 1988).

These labor forces with relatively lower wage and higher quality contributed largely to the speeding up of the economic growth of Korea through raising the competitive power of its products in international markets. However, in the late 1970s, the development of the heavy-machinery and chemical industries and an economic boom from large-scale construction in the Middle East raised the demand for the highly educated in an expanding number of professional and managerial jobs. This trend is reflected in the wage levels by educational attainment in Table 3-3. As shown in this table, the wage level of college graduates is reported as 175.2 compared with 100.0 of graduates of high school in 1971. But this ratio increased swiftly in the latter half of the 1970s due to an excess demand for college graduates

associated with the rapid tempo of economic growth. However, since the early 1980s, mainly due to a continuous increase in the number of college graduates, which results from the expansion of education opportunities and a more stable stage of economic development, the ratio has been declining.

Also, the employment rate¹ of graduates in each level of schooling shows the same trend, particularly in the case of college graduates (Table 3-4). The employment rate of

Table 3-3

Wage Levels by Educational Attainment

(Unit: Won)

Year	Middle School and Less	High School Graduates	Jr.College Graduates	College&Univ. Graduates
1971	16,637	27,004	-	47,309
1976	43,226	73,144	106,256	167,982
1979	104,034	157,790	232,884	364,010
1983	193,855	267,442	372,638	604,662
1986	250,968	323,541	417,361	718,266
High School Graduates = 100				
1971	61.6	100.0	-	175.2
1976	59.1	100.0	145.3	229.7
1979	65.9	100.0	147.6	230.7
1983	72.5	100.0	139.3	226.1
1986	77.6	100.0	129.0	222.0

Source: Ministry of Labor, Report on Occupational Wage Survey, 1986.
Economic Planning Board, Handbook of Korean Economy, 1980.

¹. The definition of this rate is somewhat different from that of the usual employment rate. The Ministry of Education only examines the post-school status of graduates in the short-term (1 year) after graduation.

college graduates jumped to 71.4 percent in 1979 from 58.0 percent a decade before. But since the early 1980s the role has been continuously declining, while that of high school graduates indicates rather stable trends.

Table 3-4

Employment Rate of Graduates

	High School		Junior College		College & Univ.	
	Employed	ER(%)	Employed	ER(%)	Employed	ER(%)
1969	35,580	35.3	7,361	74.1	12,659	58.0
1974	67,727	39.2	5,418	36.1	17,227	61.2
1979	142,548	43.7	17,942	47.2	29,378	71.4
1984	158,711	41.5	28,827	43.2	43,907	55.0
1987	205,427	44.4	37,792	46.3	60,718	43.8

Note: ER(Employment Rate) = (Employed graduates at each level of schools) / (Graduates at each level of school - Students going to higher level school).

Source: Economic Planning Board, Social Indicators in Korea, 1987.
Ministry of Education, Statistical Yearbook of Education, 1988.

3.2 Traditional Family System and Social Customs in Korea

Before studying the features of education and the labor market in Korea, to understand the behavior patterns in human capital investment and the socio-economic activities of Koreans, we need to review the Korean traditional family system and social customs. As a traditional commoner class, we may consider the farmer group as a type of family

business in the past agricultural society. In this group, the division of roles among household members is not so clearly defined. Married females perform not only household work but also farm work as co-workers of their husbands. Nowadays, however, as this farmer group has decreased continuously, and the family of the employed predominates in the current society, the division of roles between the marital couple in household work and outside job work becomes relatively more distinct. Considering this trend, we focus the review on the general social customs and family life of the noble class, the so called yang ban, as a typical form of the traditional Korean family, because this class shows distinct roles and functions of family members and has more common characteristics with the current ordinary families.

For this, first of all, we should realize that Confucianism formed the backbone of all Korean thought and constituted the basis of political ideals, as well as being the mainstream of pre-modern Korean philosophy (Hong 1973). As for the status of religions in Korea, at present the religious population is estimated at about two fifths of the total population (40 million persons). Among religions, Buddhism (48 %) has the largest number of followers; Christianity, including Protestantism (34 %) and Catholicism (10 %), also has an important position; but Confucianism (5%) is practiced by only a small portion of the religious population (Korea Overseas Information Service (KOIS) 1988).

There has been argument for a long time over the tenets of the Chinese sage Confucius (B.C. 551-478) and whether the social institutions based on these tenets constitute a religion or not. Actually, there is no deity in the Confucian system. On the other hand, Confucianism comprises a moral and ethical system, a philosophy of life and interpersonal relations, a code of conduct, and a method of government, all viable enough to have taken the place of more orthodox religious beliefs in China and Korea for many centuries (KOIS 1985).

The philosophy of Confucius entered Korea at nearly the same time as the religion of Buddha (A.D. 372), and had a strong influence on social and governmental institutions. But it was not until the establishment of the Chosun Kingdom (Yi Dynasty) and its deposing of Buddhism from political influence in the late 14th century that Confucianism was elevated to the status of state cult, a position left vacant by the disestablishment of Buddhism (KOIS 1985). The Yi Dynasty attempted to change the dual structure of Buddhism and Confucianism, which dictated the social conventions of the daily life of the people, into the monolithic unity of Confucian morality (Hong 1973). Study of the Chinese classics, and particularly the ethical and philosophical books of Confucius, became the sole basis of education; and erudition represented the only path to social and political success. State examinations, which many students failed and retook for years while dependent on their families for

support, determined an individual's chance of advancement in the scholar-administration (KOIS 1985).

The typical Korean family was large, with several generations living together. In this traditional family, marriage was emphasized for the succession of the lineage and the prosperity of the family, not for the welfare and happiness of the couple themselves. Thus, marriage seems more a union between the families concerned than a coupling of individuals (KOIS 1983). During marital life, many children were desired for stability and security. With modernization, however, such large extended families are disappearing, while nuclear families are increasing. Nevertheless, the family is still the major unit of social identity in Korea. The members of a family customarily share a collective social status devolved from that of their family head. People are not ordinarily referred to by name, but rather as so-and-so's wife, or so-and-so's son and daughter (Chung 1977).

In a household, the family head was traditionally regarded as the source of authority, and all members were expected to obey him. It was understood that the patriarch of the family should be fair in dealing with family members (KOIS 1988). The adage that a man must first cultivate himself and manage his family properly before he can govern the nation reflects the Confucian idea of order. If a man cannot control his family, he can hardly be qualified to govern the country. Man has traditionally been given the

responsibility of representing, supporting, and protecting the family as well as the power to command (KOIS 1988).

This tradition of the patriarch comes from the Confucian idea that the law of nature decreed that the position of woman is inferior to that of man, so that a woman should obey her father before marriage, her husband during marital life, and her son in widowhood (Lee 1982). This idea emphasized the succession of the family lineage through male offspring and created a male-dominated society. Thus, though a Korean woman kept her maiden name after marriage, the married woman was regarded as an outsider by her original family and as a member of the different family line (of the husband). As a consequence, this tradition has led to strong son preference in fertility and human capital investment (Lee 1982). In the family lineage, only one son inherits the patriarchal line. Generally speaking, this is the first-born son, and Koreans are very reluctant to violate this norm. However, the first son may not be selected as the inheritor through incompetence, or having other employment. Younger sons receive shares of property and establish their own livelihood (McBrian 1978).

Based on the ideas of Confucianism, there is a basic pattern of relationship between the sexes. This postulates that both men and women have certain duties to perform and a set of ethics for each to observe vis-a-vis the other. In its practical use, this pattern, which was learned from an early age, affected not just the husband and wife, but

virtually all relations between the sexes. From early childhood, children played and grew up segregated by sex as illustrated in the adage, "Boys and girls at the age of seven should not be allowed to sit in the room." Segregation was strictly observed except in the case of brothers and sisters who followed another set of ethics governing family relations. The women's role was "within," that is within the home, which was her domain, while the men's role was "outside," that is in all the affairs of society and life beyond the confines of the home.

Thus, today, almost all Korean husbands are family heads and primary earners for family members, while most wives actually manage their family economy in the household. For example, the husbands give their whole salaries to their wives and get pocket money from their wives. These behaviors are largely affected by the Confucian idea that the gentleman or scholar must be detached from material considerations such as the handling of money and should not pay much attention to small things like managing the household economy. This living style is supported by the very stable and persistent Korean marital life and compares well with the Western style.

Meanwhile, as an example of cooperative economic activities, there is the so-called Kye, implying 'agreement' or 'bond'. According to the Handbook of Korea (1988), this Kye is a social organization based on the principle of mutual cooperation and aid and having a specific purpose.

Almost all Kye collect dues and manage a fund. They are classified into many kinds, depending on the objective. For example, there is a type of Kye for the parents. This Kye is organized by those who have aged parents to provide for their 60th birthday celebration.² In preparation for this occasion, funds are collected regularly to help each member in turn to pay the cost of the celebration. For the same reason, Kye also exist for a parent's funeral and the weddings of children. The village Kye is characterized by the admission of all villagers. This has the general objective of helping villagers through unexpected times of need or building and repairing facilities for the community. In Korea, through this cooperative system, many families have prospered and many villages developed.

Conventionally, the Kye is established on the basis of mutual aid, with members performing their duties as if for their own business. Since the Kye is not easy to maintain if a member does not pay dues or reneges on duties, solidarity is necessary. Thus, a Kye is formed mainly from three major sources or a mixture of them; the clan, the regional group and the school alumni group. Lately, Kye characterized by monetary interests are becoming very popular among housewives in cities, as they not only provide extra cash but also opportunities for getting together, exchanging gossip and partying (KOIS 1988).

². This is a very special celebration, for in the past few people lived to be 60 years old. Thus, offspring should honor their parents at this time with a large party.

Today, informal group meetings among women as well as men as alumni, relatives, and regional friends, are very widespread in Korean society. In Korean, as compared to Western, society, the participation of a couple in informal or formal parties was formerly unusual, though this trend is now changing. Instead, due to Confucian ideas, sexually segregated informal meetings of husbands and wives are still popular and these meetings have been used as opportunities for lobbying activities as well as mutual cooperation.

Nowadays, although strict observance of Confucian virtues is disappearing, Korean men and women are still very conscious of their positions in their speech and behavior. Young modern Koreans may express disinterest in Confucianism but they remain bound by the Confucian approach to disciplinary habits of work, study, and life.

3.3. Characteristics of Education in Korea

Most Koreans who have been affected by Confucianism for a long time, have regarded education as a top priority. As a result, the economic and social lives of Korean people are greatly influenced by their educational attainments. Also, schooling plays a major role as a significant channel for mobility of economic and social status. In these social institutions, it is rather reasonable that Koreans have had an elevated aspiration for education. This strong desire is reflected in the trend of the school enrollment ratio,

showing a rapid increase parallel to economic development (Table 3-5).

The high aspiration of Korean people for education is also shown in Table 3-6, indicating a relatively higher school enrollment ratio compared with those of other

Table 3-5

School Enrollment Ratio
(By Level of School and Sex)

(Unit:%)

	1966	1970	1975	1980	1985	1987
Primary School	96.6	102.4	103.2	101.0	102.0	-
Male	98.1	102.9	103.0	100.7	101.5	-
Female	95.1	101.9	103.4	101.4	102.5	-
Middle School	42.3	57.0	74.2	94.6	99.7	-
Male	50.9	65.1	80.8	96.4	100.0	-
Female	33.0	46.5	67.0	92.6	99.3	-
High School	27.5	30.5	43.6	68.5	78.3	-
Male	35.0	36.7	51.1	74.4	81.9	-
Female	19.6	24.1	35.8	62.2	74.5	-
College & Univ.	6.6	6.4	10.3	15.8	31.6	33.9
Male	-	-	14.6	23.0	42.7	45.9
Female	-	-	5.9	8.1	19.5	20.9

Note: School Enrollment Ratio = (Enrolled students at each level of school) / (School age population for each level of School).

The college figures are cited from UNESCO data, Others are from Social Indicators.

Source: Economic Planning Board, Social Indicators in Korea, 1987.

UNESCO, Statistical Yearbook, 1988.

developing countries.³ In particular, the male enrollment ratio of college education in Korea is more than double that of females, reflecting the significance of the patriarchal family and the major role of males in socio-economic activities on the basis of Confucianism. Also, as shown in Table 3-7, the Korean government generally bears a greater burden of educational expenditure in its total government budget than any other country.

Table 3-6

International Comparison of School Enrollment Ratio

(Unit: %)

Country	Year	Second Level			Third Level		
		Total	Male	Female	Total	Male	Female
Korea	1987	95	97	92	33.9	45.9	20.9
Singapore	1984 [@]	71	70	73	11.8	13.3	10.2
Hong Kong	1984	69	66	72	12.8	16.0	9.3
Philippines	1986 [@]	68	66	69	38.0	35.5	40.3
Japan	1986	96	95	97	28.8	36.0	21.2
W.Germany	1985	72	71	74	29.8	33.8	25.6
France	1986	95	92	99	30.2	29.0	31.6
U.K.	1985	85	83	87	22.4	24.3	20.4
U.S.A.	1986	100	100	100	59.3	55.1	63.6

Note: Second Level: Middle school and high school education

Third Level: Junior college or over

@: Those figures of the third level are of the previous year.

Source: UNESCO, Statistical Yearbook, 1988.

3. Only the Philippines has a higher enrollment ratio of college education in developing countries, mainly due to a higher rate of female employment.

Table 3-7

Total Educational Expenditure

(Unit:%)

Country	Year	As % of GNP	As % of Total Gov't Expenditure
Korea	1986	4.5	27.3
Singapore	1982	4.3	9.6
Hong Kong	1984	2.8	18.7
Philippines	1986	1.7	7.0 ^a
Japan	1985	5.1	17.9
W.Germany	1985	4.6	9.2
France	1984	6.1	18.5 ^b
U.K.	1984	5.2	11.3
U.S.A.	1983	6.7	-

Note: a):in 1984, b):in 1983

Source: UNESCO, Statistical Yearbook, 1988

Nevertheless, the exceptionally high excess demand for schooling has always existed in Korea. The Korean government has suffered from great social pressures demanding the expansion of opportunities for higher-education. In the early 1980s, the Korean government adopted the graduation quota system for college and university, increasing the number of new students by 30 percent compared with the conventional entrance quota system. This change in the college educational system reflects the increasing pressure of the high aspiration of parents to obtain higher education for their children, and serious social problems arising from the large number of repeaters who are preparing to retake the college entrance examinations. Although this changed system contributed to the temporary reduction of the excess demand, it could not solve the fundamental problems. The

following Table 3-8 shows the seriousness of the situation in which there is a continuously increasing number of repeaters for entrance to college. The proportion of repeaters has already reached one third of the total number of applicants for higher education. Furthermore, for example in 1989, approximately 500 thousand students of a total of 800 thousand applicants failed to be admitted to college, considering the entrance capacity of only 300 thousand.

Table 3-8

Ratio of Repeaters among Applicants
for Entrance to College

Year	Graduates ^{a)}	Repeaters	(%)	Capacity ^{b)}
1970	74,925	45,655	37.9	46,300
1975	156,485	66,674	29.9	57,950
1980	317,606	183,909	36.7	205,835
1985	459,325	266,534	36.7	314,517
1989	528,960	274,180	34.1	307,120

Note: a): Graduates of that year b): including Jr.colleges.

Source: Hankuk Daily News, January 24, 1989.

Meanwhile, as an indicator of the demand for education, the desired levels of schooling for children indicate that 84.5 percent of parents desired college education or higher for their sons and 70.4 percent for their daughters in 1987. These figures show a big jump compared with 56.3 percent and 33.6 percent respectively in 1977 (Table 3-9). Since the educational aspirations of educated and wealthy parents for their children are usually higher, the desired level for

college education will become higher and more people will be willing to act on their desire as economic development proceeds.

Table 3-9

Expected Education for Children by
Educational Attainment of Household Head

(Unit: %)

Schooling of Head	SON				Daughter			
	Mid	High	Col.	Grad.	Mid	High	Col.	Grad.
[1977]	(56.3)				(33.6)			
Total	7.5	36.2	55.5	0.8	23.7	42.7	33.3	0.3
Primary School	13.6	51.0	35.2	0.2	37.6	47.2	14.7	0.5
Middle School	3.2	30.1	66.1	0.6	13.8	48.9	37.2	0.1
High School	0.9	16.8	81.2	1.1	5.4	38.3	55.8	0.5
College & Univ.	0.1	3.3	92.8	3.8	0.8	11.9	85.0	2.3
[1987]	(84.5)				(70.4)			
Total	1.6	13.9	60.5	24.0	4.0	25.6	55.1	15.3
Primary School	4.4	33.1	56.3	6.3	11.4	51.3	34.7	2.6
Middle School	0.3	8.5	74.4	16.8	1.0	23.9	65.6	9.4
High School	0.1	3.4	64.3	32.2	0.2	10.3	68.5	21.0
College & Univ.	-	0.8	39.9	59.3	-	2.7	54.7	42.6

Source: Economic Planning Board, Social Indicators in Korea, 1987.

3.4 Characteristics of the Labor Market in Korea

In this section, the general trends and characteristics of labor force participation (LFP) and the labor market are viewed broadly. Especially, further attentions is paid to the participation of females in the labor market.

3.4.1 Female Participation in the Labor Market

In the traditional society of Korea, the role of the female was limited to the household. Females had learned the Confucian virtues of subordination and endurance. They had refrained from participation in political and social activities. Their major role was to have offspring to continue the family lineage. They also served to maintain the order of the family in the extended family system. Thus, women were inferior to men in both social status and hierarchy. Regardless of the social stratum they belonged to, social institutions and the custom of avoiding the opposite sex did not permit women to become involved in non-family affairs (Korea Overseas Information Service, 1988).

However, in recent times, female participation in social and economic activities has been more active. The rapid economic growth of Korea is often attributed to the young female labor force in the manufacturing sector. Korean females are expected to make an even greater contribution to future economic and social development in view of the changing structure of industry and employment.

The economically active population has continuously increased during the past two decades. But the labor force participation rate (LFPR) of the total population has remained stable (Table 3-10). While the male's participation rate has gradually declined, the female's participation in economic activities has regained a level of 45.0 percent from its decrease in the early 1980s, which was due to the

recession following the second oil shock and to political instability.

The women's participation rate is much greater in rural areas than in urban areas (Table 3-11). In rural areas, not only is the female labor force participation (FLFP) greater than that of urban areas, but also participation of women in the age group of 30s and above has risen rapidly. This means that the rural areas face a shortage in their labor force as the males and young girls migrate to the cities and industrial areas, and this shortage is met by the employment of middle-aged housewives. The participation rate of married women in the urban areas has shown a consistent increase, though that of the 15-19 age group has dropped due to higher school enrollment. On the other hand, the LFPR of men has gradually decreased, with slight fluctuations, mainly caused by the rising school enrollment ratio in the 15-24 age group (Table 3-12).

Table 3-10

Labor Force Participation Rate by Sex

(Unit:1,000 Persons, %)

Year	Pop.of 15 yrs old +	Economically Active Pop.	LFPR		
			Total	Male	Female
1965	15,367	8,754	57.0	78.9	37.2
1971	18,118	10,407	57.4	77.2	39.5
1976	21,630	12,911	59.7	77.4	43.2
1981	25,100	14,683	58.5	75.8	42.3
1987	28,955	16,873	58.3	72.5	45.0

Source: Economic Planning Board, Social Indicators in Korea, 1987, and Korea Statistical Yearbook, 1988.

Table 3-11

Labor Force Participation Rate (By Region)

(Unit: %)

	Farm Households			Non-Farm Households		
	Total	Male	Female	Total	Male	Female
1970	60.9	75.2	48.2	51.5	75.1	29.8
1975	62.7	73.8	51.8	52.5	75.1	31.2
1980	62.5	72.4	53.0	54.4	74.2	36.1
1985	59.7	68.9	50.7	53.1	69.8	37.7
1987	65.3	73.5	57.5	56.5	72.3	41.9

Source: Economic Planning Board, Economically Active Population Survey, 1986 and Korea Statistical Yearbook, 1988.

Table 3-12

Age-Specific Female Labor Force Participation

(Unit: %)

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Female									
1966	36.7	44.3	32.9	34.3	41.6	45.2	44.1	38.2	33.2
1970	38.7	47.3	34.7	38.4	42.7	46.9	46.6	41.1	37.1
1975	36.4	47.3	29.5	37.0	48.0	51.6	50.9	50.8	44.8
1980	29.0	53.5	32.0	40.8	53.0	56.7	57.3	54.0	46.2
1986	20.2	58.2	37.0	45.9	54.2	59.3	60.2	54.2	46.9
Male									
1966	49.5	78.7	90.1	92.5	93.1	92.0	91.0	85.8	75.2
1986	13.6	62.1	90.2	96.2	96.5	95.5	92.7	88.7	75.9

Source: Economic Planning Board, Annual Report on the Economically Active Population Survey, 1986.

3.4.2 The Marital Status of the Labor Force

In the study of female employment, the marital status of women is a very significant determinant because it greatly affects their decision whether or not to enter the labor force. As shown in Table 3-13, we can examine the Korean attitude toward female employment. According to this survey, many Koreans still consider that child-bearing and -rearing, and managing the household is the major role of married women.

Table 3-13

Attitude Ratio Toward Female Employment

	(Unit:%)				
	(A)	(B)	(C)	(D)	(E)
All	27.8	21.6	8.9	18.2	23.5
Urban	25.6	19.9	8.9	20.5	25.1
Rural	31.6	24.6	8.9	14.2	20.7
Single Male	23.5	29.5	6.4	16.0	24.6
Single Female	9.0	24.3	5.1	21.5	40.1
Married Male	37.7	20.1	9.3	15.9	17.0
Married Female	25.8	18.4	12.5	21.2	22.1

Note: (A): Household work only
 (B): Work before marriage
 (C): Work after maturity of children
 (D): Work before marriage and after maturity of infant
 (E): Work under any condition

Source: Economic Planning Board, Social Statistics Survey 1984.

Meanwhile, Table 3-14 indicates the marital status of Koreans who are 15 years old and above. From this, we find that almost Koreans are expected to marry after marital eligible ages and manage very stable couple life. Although, today, the divorce rate is increasing among young couples, the ratio among total population is still insignificant, reporting 0.5-0.6 percent.

Table 3-14

Marital Status of Population
(15 years Old and Over)

(Unit:%)

	Never Married	Married	Widowed	Divorced
[Total]				
1960	29.4	60.5	9.4	0.7
1966	29.7	60.2	9.5	0.6
1970	31.0	59.5	8.9	0.7
1975	34.5	57.0	7.9	0.5
1980	34.5	57.4	7.6	0.5
1985	33.8	58.5	7.1	0.6
[Male]				
1960	36.4	60.1	3.0	0.6
1966	36.5	60.3	2.7	0.5
1970	37.4	59.8	2.4	0.4
1975	40.7	57.0	1.9	0.3
1980	40.4	57.4	1.9	0.4
1985	39.6	58.4	1.6	0.5
[Female]				
1960	22.7	60.7	15.7	0.9
1966	23.0	60.0	16.1	0.8
1970	24.9	59.1	15.2	0.9
1975	28.5	57.1	13.8	0.7
1980	28.7	57.4	13.3	0.6
1985	28.1	58.7	12.4	0.7

Note: Marital Status of the Population = (Pop. by Marital Status) / (Pop. 15 Years old and above)

Source: Economic Planning Board, Population and Housing Census Report

Because, the stigma of divorce is relatively more serious in Korean social life compared with that of Western societies. The never-married group is increasing gradually, largely due to the rise of school enrollment ratio as a result of expanding educational opportunities, and to higher female labor force participation rate. As a consequence of this trend, the mean age at the first marriage shows gradual increase in Table 3-15.

Table 3-15
Mean Age at First Marriage

(Unit:Age)

	Whole Country		Urban Area		Rural Area	
	Male	Female	Male	Female	Male	Female
1960	25.4	21.6	26.8	22.8	24.9	21.0
1966	26.7	22.8	27.7	24.0	26.1	22.0
1970	27.1	23.3	27.5	23.8	26.8	22.6
1975	27.4	23.6	27.6	24.2	27.1	22.9
1980	27.3	24.1	27.4	24.3	27.3	23.5
1985	27.8	24.8	27.8	25.0	27.9	24.0

Source: Economic Planning Board, Population and Housing Census, 1985.

3.4.3 The Wage Structure of the Labor Market

The wage structure of the labor market in Korea has been mainly based on seniority rather than on a merit-reward basis. Thus, the age-earnings profile in the Korean labor market does not show any signs of convexity from below. In other words, earnings show a steep upward progression over the entire working life (Park, 1988). In Korea, the features

of the employed, such as educational attainment, sex and seniority, are very significant in determining wage rates. Generally, schooling and experience are the most significant factors for male workers, while, in the case of female labor, only schooling is a significant determinant, and experience is not such an important factor (Park and Park 1984).

The educational wage differential is a major characteristic of the wage system in the Korean labor market. In most Western developed countries, the wage differential by education is regarded as a productivity gap in the difference of human capital and it has not been managed as an independent factor to be studied (Park, 1984). However, the educational difference in Korea has contributed to the wage gap as a significant determinant, showing that the actual wage differential exceeds the difference of human capital. As shown in Table 3-3 (in 3.1), there is a great wage gap more than double between college graduates and high school graduates, though the ratio has changed with the phases of the business-cycle of the Korean economy.

According to this table (Table 3-3 in 3.1), the wage gap between college graduates and junior college graduates is very large. However, the gaps between junior college graduates and high school graduates, and between high school and middle school graduates are relatively small and moderate. Under the 6-3-3-4 (Primary-Middle-High-College) educational system, the gap of only two years of schooling

between junior college and college education⁴ results in a much greater wage gap in the labor market.

As another important wage differential factor, the wage gap by sex exists in Korea. The average female-male earnings ratio has not displayed much change, staying at about 45 percent since the early 1970s (Table 3-16).

Table 3-16

Earnings Rate of Sex by Level of Education

	Total	Primary School	Middle School	High School	Junior College	College & Univ.
1971	.43	.47	.50	.65	- ^a	.71
1975	.42	.54	.52	.61	.69	.62
1979	.42	.51 ^b	.51	.55	.60	.55
1983	.45	- ^b	.51	.56	.72	.72
1985	.47	-	.52	.56	.75	.73

Note: Earning Ratio of Sex = Female Earnings / Male Earnings
in each schooling level

a): contained in College & Univ.

b): contained in Middle School

Source: Ministry of Labor, Occupational Wage Survey

As shown in Table 3-16, the rate of female earnings to male earnings increases as the level of education is higher. However, we should pay attention to the selectivity of the females employed, particularly among the highly educated group, because we expect a difference of labor quality between the employed and the non-labor force participants

⁴. College graduates receive 16 years of schooling (6-3-3-4), while junior college graduates have 14 years of education (6-3-3-2).

under the unfavorable condition of sexual discrimination, especially for jobs of higher status.

Concerning the fluctuation of the earnings rate between sexes on the business-cycle, first, the earnings rate of female workers to male employed in all graduate groups reported decreases in the economic boom period of the late 1970s. Its fall was sharpest in the case of college graduates who faced an excess demand. In the early 1980s recession period, the rate of female earnings has increased. Trends like this indicate that male earnings have a larger swing than those of females, increasing more in an economic boom period and decreasing more in the recession stage. This status results from the fact that there is little substitution with female labor in boom periods due to gender segmentation in the Korean labor market. As another characteristic, the average earnings ratio of women is lower than any other ratio of each schooling group. This unique profile indicates that the earnings of females employed is skewed fairly to lower wage levels (i.e. lower schooling group) compared with those of males. This interpretation is supported by Table 3-17, showing that the lower schooling group (middle school graduates and under) occupies 71.0 percent among the total females employed.

Table 3-17

Employed Persons and Ratio by
Educational Attainment

(1986)

(Unit: 1,000 persons, %)

	Total	Under Mid. School	High School	Junior College	College & Univ.
[Male]	9,836 (100.0)	4,811 (48.9)	3,493 (35.5)	410 (4.2)	1,122 (11.4)
[Female]	5,610 (100.0)	3,982 (71.0)	1,303 (23.2)	132 (2.4)	193 (3.4)

Source: Economic Planning Board, Employment Structure Survey,
1987

CHAPTER IV. THEORETICAL FRAMEWORK AND FORMULATION
OF EMPIRICAL MODEL

In this Chapter, we try to explain two seemingly disparate phenomena -- the strong desire for female higher education, and the low proportion of highly educated married women who are employed in Korea. For this study, a testable hypothesis is presented to explain this behavior pattern. As the main idea of this hypothesis, the concept of total household income, including the marital output of educational assortative mating, is considered. To test this hypothesis, empirical models and estimation procedures are specified.

4.1 Background

Since the early 1960s, Korea has experienced rapid economic growth, mainly due to the successful utilization of relatively abundant human resources. As a result, Korea has become a promising country of the NICs (New Industrializing Countries) group. However, in order to attain higher-level economic and social development and to enter into the developed country group, Korea has to pay more attention to the efficient use of high quality human resources because she has no other plentiful natural resources.

As a significant source of potential labor supply in Korea, married women, particularly highly educated married women, should be studied. Our task in this study is to analyze the factors affecting the decision to work of married women, especially focusing on the effect of her schooling.

This study is the first economic analysis on the effect of schooling on married females, in the case of Korea, considering not only women's own earnings in the labor market, but also marital output in the marriage market. Since we analyze the relation between the employment decision of married women and their individual and household characteristics at a point in time, this study does not address issues that can be explored with time-series data such as the effect of economic growth.¹ Also, this study reflects only indirectly features of the social structure, such as sexual discrimination in relation to job attainment, through individual and household characteristics. However, the result of this research will be helpful for understanding the investment motives for schooling, and the

¹. In a time-series study, as rapid economic growth allows higher real income than the previously expected permanent income level, a greater negative income effect on the female labor supply is expected. However, Korea has also experienced a fast increase of consumption; this pattern affects female labor supply to supplement the increased family consumption with higher quality. This argument is supported by Brown(1986), explaining that increase in the labor force participation rate of wives is part of a qualitative transformation in consumption that is required and caused by economic growth. But this consideration of time-series research is outside the scope of this paper.

decision-making pattern of employment for married women in Korea.

4.2 Testable Hypothesis

In this section, we attempt to analyze the work decision of married females. The major determinants of employment of married women can be principally divided into the positive wage effect, which is largely decided by a woman's educational attainments and the negative family income effect, which contains the income of the husband as a primary earner. However, in this study, we also take into consideration the relationship between the husband's income and the wife's schooling, through the marital output of educational assortative mating.

For this analysis, let us assume that those who are highly educated have higher potential earning power. This assumption supports positive mating on a predicted market wage rate via educational assortative mating. Based on this assumption, a testable hypothesis is presented as follows: Even though highly educated married females could receive higher wages in the labor market, their actual employment rate may be lower than that of less-educated wives. This is because their decision on working is largely affected by the negative household income effect, which is increased through positive educational assortative mating.

Let me explain this hypothesis in some detail. For convenience of this explanation, we use the simple model of Grossbard-Schechtman and Neuman (1988) which is stated in Chapter II (2.3.3).

(4.1) $G(W, W^*)$: decision of wife to work outside the home

where, W : the expected wage rate

W^* : the value of time in the home

(4.2) $W^* = k \cdot I$

where, I : a vector of household income sources other than that wife's income from work,

k : the portion of such income that wife obtains for her own benefit.

If we assume that the allocated portion (k) of total household income between marital spouses is constant, then, as the husband (usually as principal earner) augments the total household income (I), the amount allocated to the wife will be increased. Thus, the value of her time spent on household production will be raised. While the implicit wage rate of the wife at home increases, the expected market wage rate for her is supposed to be relatively fixed. Thus, if the increased implicit wage rate of the wife at home (W^*) is higher than her expected market wage rate (W), then the married woman will not select outside work. This non-working decision of the married female is caused by the greater negative household income effect, which is expanded through educational assortative mating.

If we find a stronger negative household income effect than positive wage effect from the empirical results, we may not predict the smooth spread of active participation of highly educated married women in economic activities, unless any structural changes occur in the labor market.² In this case, some specific policy alternatives are required to utilize these potential labor forces with high quality.

4.3 Model Specification and Estimation Procedure

4.3.1 Specification of the Used Sample

In this section, an empirical model on the working-decision of a married woman is formulated. Among available observations of married females, we limit this analysis to non-workers and workers with positive earnings in the urban area, excluding non-paid family workers,³ because the decision-making process on working in this family worker group is different from the market mechanism. These samples raise the problem of measurement error. Usually, the earnings of the husband as household head in this group is

². Actually, the magnitudes of income effect and wage effect on labor supply include influences due to unique features of the society, such as sexual discrimination on proper job opportunities and social tradition emphasizing supplementary role of women in family.

³. According to the Employment Structure Survey (ESS, 1986) in Korea, unpaid family workers in all sectors except the primary industry occupy 17.7 percent.

supposed to be overestimated, while his wife is reported as a non-paid family worker.⁴

Therefore, the samples used are classified into two groups; women as non-employed, and those employed with positive earnings. (Here, unemployed wives are included in the non-employed group. They are not treated as an independent group). Also, in order to analyze mating effect and to control a strong fertility effect, the sample used is specified to married women as spouses in the 35-54 age group.⁵ According to the Population and Housing Census (1985) in Korea, the never-married females in 35 and over age group occupy only 0.6 percent. Thus, this restriction of age group as sample used does not raise any serious problem of selectivity bias in studying for the married women.

4.3.2 Estimation Procedures of Three Stages

Before formulating the model in each estimation procedure, it is useful to explain the sample selection bias as a specification error. This bias results from using nonrandomly selected samples to estimate behavioral relationships. The problem of sample selection occurs

⁴. As a consequence of this measurement error, we may expect that while the earnings of husbands in the self-employed households are relatively higher, their wives also show high employment rate, indicating the positive sign between husband's earnings and wife's employment compared with the theoretical negative relation.

⁵. It is necessary to control the fertility effect in this study because the used data (Employment Structure Survey) have not exact information about the number of infants.

because data are missing on the dependent variable of an analysis (Heckman 1979). In this study, to analyze the effect of the wife's education on her employment-decision, we need to estimate the predicted wages of wives, which is regarded as the most important explanatory variable in a labor supply equation. Since, however, wages are not reported for wives who are not working, the predicted wages are estimated based on the information reported by the employed with positive earnings. In this case, wage function fit on the available data generally do not estimate the wage function that characterizes a randomly selected member of the general population, because the employed may be distinguished from non-workers due to various unobserved factors. To correct this selectivity bias problem, we adopt the approach of Heckman (1979) in this study. Heckman proposes a simple estimator, which is known as inverse of Mills' ratio, in his two-step procedure that enables researcher to use ordinary regression methods to estimate models free of selection bias.⁶ After the solution of this

⁶. Assume that the population regression function is:

(1) $Y_1 = X_1\beta_1 + U_1$
 where, X_1 : a vector of independent variables; β_1 : a vector of coefficients; U_1 : random error term with mean zero.

Suppose that some observations are not available. The regression for the subsample of data available is:

(2) $E(Y_1|X_1, \text{sample selection rule}) = X_1\beta_1 + E(U_1| \text{sample selection rule})$
 Generally, since the error term is not expected to be zero, biased estimates result from a regression on the subsample.

Assume the selection rule: data are available for Y_1 and X_1 , if some other variable $Y_2 > 0$ (where, $Y_2 = X_2\beta_2 + U_2$), then

selection problem, we can obtain the predicted wage of all wives in the sample used and estimate the employment probability of married women in the more comprehensive model, including the imputed wife's wage and other explanatory variables. The models with the discrete dependent variable are analyzed by applying the probit and ordinary regression methods.

[1] As the first step of the estimation procedure, the binary-choice probit model⁷ is specified to examine the employment probability of married women as follows:

$$(3) \quad E(Y_1 | X_1, \text{sample selection rule}) \\ = E(Y_1 | X_1, Y_2 > 0) = X_1\beta_1 + E(U_1 | U_2 > -X_2\beta_2)$$

The regression estimators computed on the selected sample omit the last term of equation (3), thus, the selectivity bias results.

The approach of Heckman is to derive a formula for this omitted term so that it can be used as an additional regressor in the selected sample regression. Assuming truncated normal distribution, Heckman proposes that:

$$(4) \quad E(U_1 | U_2 > -X_2\beta_2) = \sigma_{12}/(\sigma_{22})^{\frac{1}{2}} \cdot \lambda$$

where, $\lambda = f(Z) / 1 - F(Z)$, $Z = -X_2\beta_2 / (\sigma_{22})^{\frac{1}{2}}$
 σ_{22} : variance of U_2 ; σ_{12} : covariance of U_1 and U_2 ;
 f : normal density function; F : normal distribution function.

Here, λ (as the inverse of Mills' ratio) can be computed for each observation by estimation of probit equation on the probability (A probit estimation of the factors determining the probability that a woman is employed gives an estimate of $\beta_2/(\sigma_{22})^{\frac{1}{2}}$ which in turn can be used to calculate λ). Then the modified subsample regression is:

$$(5) \quad Y_1 = X_1\beta_1 + \lambda\sigma + e$$

where, σ is an estimate of $\sigma_{12}/(\sigma_{22})^{\frac{1}{2}}$, and e is a random error term with mean zero. (Heckman 1979, Keeley 1981).

7. Here, the binary-choice indicates the decision between two groups of the non-employed (including non labor force participants and the unemployed) and the employed with positive earnings (excluding unpaid family workers).

$$\begin{aligned}
 (4.3) \quad P(\text{Wife's Employment}) &= F(Z) \\
 &= F[\alpha_0 + \alpha_1(\text{Wife's Education}) + \alpha_2(\text{Wife's Age}) \\
 &\quad + \alpha_3(\text{Wife's Age})^2 + \alpha_4(\text{Husband's Education}) \\
 &\quad + \alpha_5(\text{Husband's Earnings}) + \alpha_6(\text{Others Employed}) \\
 &\quad + \alpha_7(\text{Child}) + \alpha_8(\text{Household Type}) + U]
 \end{aligned}$$

where, $P(\text{Wife's Employment})$: Probability that a married woman is employed

F: a cumulative normal distribution (probability) function

Z: index function which is determined by explanatory variables. This is assumed to be a continuous variable which is random and normally distributed.

Education: completed years of education

Earnings: monthly earnings as unit of 10,000 won
(U.S. \$ 15)

Others Employed: number of the employed among other family members except husband and wife.

Child : number of children under 15 years old

Household Type: dummy variable; 1 if household of 3 and more generations; 0 otherwise

U : stochastic error term

Here, the wife's education⁸ and age is used to estimate her potential earnings, and the squared term of the wife's age is added to cover the non-linearity of experience and

⁸. Here, the function of the wife's education is the same as the adjusted one in Bowen and Finegan(1969) in which positive wage effect is included, while family income effect is controlled as another independent variable in the model. Thus, this coefficient(α_1) is different from (β_1) in (4.6), in which wage effect is controlled and reflected in predicted wage(β_4).

life-cycle. Also, the education and earnings of the husband and the others employed are included as explanatory variables, considering negative household income effect. On the other hand, the 'Child' variable is used to check the extent of the fertility effect on labor supply. The household type of three generations is added as another variable for infant care. Since old parents may help with child-rearing at home, the extended family system may encourage outside-working of female spouses.⁹

As predicted signs of these coefficients, posit as follows:

$$\begin{aligned} \alpha_1 > 0, \quad \alpha_2 > 0, \quad \alpha_3 < 0, \quad \alpha_4 < 0, \\ \alpha_5 < 0, \quad \alpha_6 < 0, \quad \alpha_7 < 0, \quad \alpha_8 > 0 \end{aligned}$$

[2] Second, using the results of probit equation as a criterion function, we try to estimate market wage equation through selectivity bias corrected regression. For this, we use the inverse of Mill's ratio (MILLS) which results from the previous probit estimation. We add this estimated MILLS as a regressor in the wage function to correct the selectivity bias.¹⁰ Thus, the specified wage function is as follows:

⁹. In the case of a female household-head (never married, divorced, widowed), we can consider the endogenous aspect of extended family households living with her parents. But, in the case of husband's presence, the households living with the parents-in-law of the male head still occupy a minor portion. Thus, this is used as an exogenous variable.

¹⁰. For detail, refer to footnote 6 in pp. 68-69.

$$\begin{aligned}
 (4.4) \ln (\text{Wife's Wage}) &= b_0 + b_1(\text{Wife's Education}) \\
 &+ b_2(\text{Wife's Current Exp}) + b_3(\text{Wife's Current Exp})^2 \\
 &+ b_4(\text{Wife's Past Exp}) + b_5(\text{Wife's Past Exp})^2 \\
 &+ b_6\text{MILLS} + V
 \end{aligned}$$

where, Wife's Wage: wage rate of the employed as positive earners.

Current Exp : years of experience in the current firm

Past Exp : years of potential past experience
(Age - Education - Current Exp - 6)

MILLS : a measure of "selection bias" variable

V : random disturbance term

Using the estimated coefficients obtained from the estimation of wage equation (4.4), which are free of selection bias, we generate predicted wage rates for all wives in the sample. In order to predict the wage rate for every observations, apply the values of each observation to the independent variables respectively. Then, we can obtain the results from computation of estimated coefficients and the applied values in the equation (4.5).

$$\begin{aligned}
 (4.5) \ln (\text{Wife's Predicted Wage}) &= \hat{b}_0 + \hat{b}_1(\text{Wife's Education}) \\
 &+ \hat{b}_2(\text{Wife's Current EXP}) + \hat{b}_3(\text{Wife's Current EXP})^2 \\
 &+ \hat{b}_4(\text{Wife's Past EXP}) + \hat{b}_5(\text{Wife's Past EXP})^2
 \end{aligned}$$

where, (Wife's Predicted Wage) : imputed wages for all women in sample used.

[3] As the third stage, therefore, containing imputed wages for all married women in the sample, estimate probit

again for the more comprehensive model in the equation (4.6).¹¹ In this model, the occupation of the husbands in professional, administrative and managerial jobs are considered as another factor indicating the social and economic status of the husband. Also, the age-gap of the married couple as a compensating marital trait, and the region as city size are involved.

$$\begin{aligned}
 (4.6) \quad P(\text{Wife's Employment}) &= F(Z) \\
 &= F[\beta + \beta_1(\text{Wife's Education}) + \beta_2(\text{Wife's Age}) \\
 &\quad + \beta_3(\text{Wife's Age})^2 + \beta_4(\text{Wife's Imputed Wage}) \\
 &\quad + \beta_5(\text{Husband's Earnings}) + \beta_6(\text{Other Employed}) \\
 &\quad + \beta_7(\text{Husband's Education}) + \beta_8(\text{Age-Gap}) \\
 &\quad + \beta_9(\text{Husband's Occupation}) + \beta_{10}(\text{Child}) \\
 &\quad + \beta_{11}(\text{Household Type}) + \beta_{12}(\text{Region}) + U]
 \end{aligned}$$

where, P(Wife's Employment): Probability of employment of a married woman

F: a cumulative normal probability function

Z: index function

¹¹. The main idea of these procedures comes from the procedure VIII as an advanced method among alternative procedures for estimating static labor supply models in Killingworth (1983, Labor Supply, refer p.151, Table 4.1).

Procedure VIII: 3-stage method

1st: Fit a probit for the probability of working, and use the coefficient estimates to form a measure of selection bias (inverse of Mills' ratio) for each observation.

2nd: Use data on this measure and on the explanatory variables for workers to estimate the parameters of the wage equation, which are free of selection bias.

3rd: Use an instrumental variable as a measure of wage (that is predicted wage) derived from the second-stage for estimation of the labor supply equation.

Other Employed: number of the employed among other family members except husband and wife.

Occupation : 1 if in professional, administrative and managerial jobs; 0 otherwise

Age-Gap : 1 if (Husband's Age)-(Wife's Age) > 4
0 otherwise

Household Type : 1 if 3 and over generation family
0 otherwise

Region : 1 if large cities; 0 otherwise

With the control of the wife's imputed wage, her education may be explained by some alternative components. Being more highly educated, they may have more positive attitudes to outside work, or, they may prefer a higher quality of household production, such as, training of children and health care for family members. However, as significant factors, this residual effect contains wealth effect¹² and parental background. If this wealth effect is large for the highly educated, the sign of this education is expected to be negative.

Under the control of the husband's earnings, his education and some higher occupations reflect his social status. Thus, these factors may affect the behavior pattern of wives in searching for higher jobs of better conditions or not. The age gap between husband and wife is used to examine whether this differential in marital traits affects the wife's working-decision negatively, in the case of ¹². In this empirical model, only family earnings are controlled and non-labor incomes which come from wealth are not controlled.

Korea.¹³ Since the mean age at first marriage in Korea has shown the positive age gap of males by 3.0 to 3.9 years during 1960-1985 (EPB, 1985), we set the dummy variable of age gap as more than 4 years. Lastly, the city size is thought of as a regional dummy variable, because people may find suitable jobs more easily in large cities.

Thus, the predicted signs of these coefficients are as follows:

$$\beta_1 < 0, \beta_2 > 0, \beta_3 < 0, \beta_4 > 0, \beta_5 < 0, \beta_6 < 0, \\ \beta_7 < 0, \beta_8 < 0, \beta_9 < 0, \beta_{10} < 0, \beta_{11} > 0, \beta_{12} > 0$$

4.3.3 Analysis on the Husband's Earnings and the Wife's Education

Until now, the husband's earnings has been used as an exogenous variable negatively affecting the wife's employment. Here, however, we also try to analyze on the relationship between the wife's schooling and her husband's earnings. From this analysis, we may obtain the effect of the wife's education on her outside-working via her husband's earnings.

¹³. This idea comes from Grossbard-Shechtman et al (1988) in Chapter II. A husband with characteristics which are comparatively unfavorable in comparison with his wife's has to compensate his spouse materially by letting her have a larger proportion of his income or their joint incomes. This affects the value of her time in the household. Thus, they hypothesize that the wife's traits valued in the marriage market, such as considerably younger age, are expected to be associated with lower labor force participation.

First, we may consider direct relationship between the wife's education and the husband's earnings under control of husband's education. For this research, the wife's education as well as the husband's education is included as a regressor in the husband's earnings function as a compound proxy for greater human capital, her ability, favorable social relationship¹⁴ and the parental background. The husband's monthly earnings in logarithm terms is used as a dependent variable in this equation. Also, his experience is divided into the experience in the current firm and potential past experience. This husband's earnings function is depicted as follows:

$$(4.7) \ln (\text{Husband's Earnings}) = c_0 + c_1(\text{Husband's Education}) \\ + c_2(\text{Wife's Education}) + c_3(\text{Husband's Current Exp}) \\ + c_4(\text{Husband's Current Exp})^2 + c_5(\text{Husband's Past Exp}) \\ + c_6(\text{Husband's Past Exp})^2 + U$$

where, Current Exp: years of experience in the current firm

Past Exp: years of potential past experience
(Age - Education - 6)

This function can be explained as cross-productivity effect of the wife's schooling to her husband's benefits. However, the empirical results may be open to alternative interpretation. A major alternative argument to the positive relationship between husband's earnings and wife's schooling

¹⁴. For example, she can be a member of informal alumni groups which are very popular in the Korean society.

is the selective mating hypothesis. This hypothesis maintains that, in a male group of the same formal education, the more productive males marry more highly educated females. However, devising a test which distinguishes the relative importance of selective mating versus household-capital formation is not easy. This problem is very similar to the human capital theory with regard to alternative arguments for the positive relation between education and earnings. Education could either serve a screening function or increase human capital. Though the normative implications of the related theory and hypothesis are different each other, their positive and behavioral effects appear to be identical from individual point of view (Rosen 1977). Since we only focus on the actual extent of positive direct relationship between wife's schooling and husband's earnings, the analysis on the relative importance of the related hypotheses is not attempted in this study.

Meanwhile, this direct educational effect of the wife to the husband's earnings (under control of the husband's education) may underestimate her true schooling effect. Because, we may also consider the indirect aspect of assortative educational mating that highly educated women marry highly educated men as higher potential earners. This mating effect indicates that the wife's education is related to the husband's earnings positively through his education. The approximate estimation of this effect is also tried in Chapter V, using the correlation coefficient of educational

mating and the rate of return to husband's education in his semi-log earnings function.

4.3.4 Overall Educational Effect of Wife on Her Employment

In this part, the equation (4.6) for probit estimation on the wife's employment is applied for ordinary regression method to analyze the wife's overall schooling effect on her employment decision. For convenience of analysis, we assume that the relation of the wife's educational effect on her employment is constant. Thus, the specified model is as follows:

$$\begin{aligned}
 (4.8) \quad (\text{Wife's Employment Rate}) = & d_0 + d_1(\text{Wife's Education}) \\
 & + d_2(\text{Wife's Age}) + d_3(\text{Wife's Age})^2 \\
 & + d_4(\text{Wife's Imputed Wage}) + d_5(\text{Husband's Earnings}) \\
 & + d_6(\text{Other Employed}) + d_7(\text{Husband's Education}) \\
 & + d_8(\text{Age-Gap}) + d_9(\text{Husband's Occupation}) \\
 & + d_{10}(\text{Child}) + d_{11}(\text{Household Type}) \\
 & + d_{12}(\text{Region}) + U
 \end{aligned}$$

In the above equation (4.8), the Wife's Imputed Wage and the Husband's Earnings can be replaced by the reduced form that comes from the wife's wage function and the husband's earnings function respectively. Thus, we may find three components of wife's educational effects on her outside-working, which are direct effect of residual factors (d_1), the positive effect via her own wage and the negative

effect through husband's earnings. We may obtain the overall schooling effect of wife from the results of ordinary regression.

CHAPTER V. ESTIMATION AND EMPIRICAL RESULTS

5.1 Data

In this study the Employment Structure Survey (ESS) is used as primary data. This survey has been conducted every three years by the Economic Planning Board (EPB) of the Republic of Korea, for the purpose of producing information on the regional structure of employment and the mobility of the labor force since 1983, and the data used here is based on the second survey conducted in 1986.

This survey examines approximately 140,000 households and 410,000 persons as family members, covering all persons aged 15 years old and over who usually reside within the territory of the Republic of Korea at the time of enumeration. Only the armed forces, prisoners and foreigners are excluded from the survey. Thus, this data provides useful information about the characteristics of households and the personal features of family members.

The major items collected in this survey are as follows: as household items; number of children under 15 years old, number of the employed, household type (farming or non-farming): and as items of personal data; sex, age, relationship to household head, marital status, educational attainment, industry, occupation, working hours, desire to have an additional job or to change a job, experience in

current firm, number of job-transfers, income, and payment desired for the unemployed.

From the raw data of this survey, we select the sample by 30 percent randomly and reshape this by household unit, in which only necessary variables for this study are contained. Among this selected sample, the observations used are specified to the households of married women in the 35-54 age group, living with husband, to examine the mating effect and to control the strong effect of fertility. Also, the observations used in this empirical work are selected only from the non-farming households in the urban area, excluding the households of wives as non-paid family workers.¹

While this survey provides very broad and useful information, as a limit, the income variable indicates only earnings, excluding the non-labor income which comes from assets. Thus, since this data does not support full information on total household income, the wealth of the household remains uncontrolled residual factor.

¹. Refer to Chapter IV (4.3.1) for detailed reasons.

5.2 Analysis on Characteristics of the Used Sample

As general features of the observations used, we find some interesting traits of the intact households composed of husband as household head and primary earner and wife as spouse from the following Table 5-1. Since the observations used are limited to the households of non-employed wives² and employed wives as positive earners, excluding unpaid family workers, the employment rate of lower schooling groups, (who are supposed to form a much greater proportion of non-paid workers in the family business), is relatively underestimated. Nevertheless, as the education of married females becomes higher, their employment rate tends to decline, from 29.5 percent among graduates of primary school, to 20.4 percent in the group of middle school graduates, and to 13.4 percent in the graduates of high school and above. Among the female graduates of high school and above, the employment rate of college graduates increases again from the lowest level of high school graduates, due partly to greater willingness to do outside jobs for the use of professional skills and knowledge, and partly to the availability of professional jobs, though the opportunities are insufficient.³

². Here, unemployed wives as well as the non-labor force participants are included in the non-employed group.

³. The female employment rate of jr. college graduates (N=84), who are relatively well prepared with professional skills demanded in the society, is higher indicating 29.8% than 25.3% of general college graduates (N=249).

Table 5-1

Household Features of Married Women
by Educational Attainments (1986)

		(Mean Value)					
	N	(ED) _w	(EMP) _w	(AGE) _w	(ED) _h	(EARN) _h	HHTY
Primary	2486	5.47	0.295	43.6	7.99	31.05	0.10
under							
Middle	1855	9.00	0.204	41.3	11.14	39.73	0.10
High +	1796	12.66	0.134	40.8	14.17	53.60	0.15
(High)	1466	12.00	0.106	40.8	13.70	50.09	0.14
(Col.+)	330	15.61	0.261	40.7	16.29	69.17	0.18
Total	6137	8.64	0.220	42.1	10.75	40.27	0.11

Note: Graduate basis: the drop-outs and the enrolled are treated as the graduates of schooling one level below.

High + : graduates of high school and above,

Col. + : graduates of college and above,
(college includes jr. college)

(ED)_w: completed years of education of wife,

(EMP)_w: rate of employed wives as positive earners,

(AGE)_w: wife's age,

(ED)_h: completed years of education of husband,

(EARN)_h: monthly earnings of husband
as unit of 10,000 won (\$ 15),

HHTY: rate of household type with 3 and more generations.

As expected, the schooling and earnings of the husband have consistent positive relationships with the wife's educational attainments. As the schooling of the wife is higher 3.5 years from primary to middle school, and 3.7 years from middle to high school and above, the educational years of her husband also increase by 3.1 and 3.0 years respectively, keeping the positive educational gap 1.5 to 2.5 years. Also, as a consequence, the monthly earnings of husbands show expanding gaps from 8.7 (10,000 won, U.S. \$15) in middle school to 10.4 in high school, and to 19.0 in the college group, compared with those of husbands of women in a schooling group one level lower respectively.⁴

Unexpectedly, the households of three generations occupy a greater proportion of the more highly educated group, though the overall proportions are low. However, these relatively low results may come from the selective sample of the households of middle-aged spouses in the urban area. While young people migrate to the urban area and form their own families, their old parents may live with other offspring in the countryside.

The correlations among a few important variables in Table 5-2 also indicate that the wife's education, and the husband's earnings and schooling, all vary inversely to the wife's employment. The variables of the husband exhibit a stronger negative correlation to the wife's employment

⁴. In terms of the U.S. dollar, the gap in monthly earnings is \$130, \$155 and \$284, respectively.

decision. As an expected, husband's education and wife's education are highly correlated (0.7282). To the husband's earnings, not only his own education, but his wife's schooling also have a strong positive correlation, showing 0.4778, and 0.4357, respectively. Meanwhile, the household of three generations (HHTY) has a positive relation to the wife's employment, though the coefficient is insignificant. In this Table, all correlation coefficients except that between the wife's employment and the household type are very significant.

Table 5-2

Pearson Correlation Coefficients Among Major Variables

	(EMP) _w	(ED) _w	(ED ²) _w	(EARN) _h	(ED) _h	HHTY
(EMP) _w	1.0000 (0.0000)					
(ED) _w	-0.1379 (0.0001)	1.0000 (0.0000)				
(ED ²) _w	-0.1167 (0.0001)	0.9579 (0.0001)	1.0000 (0.0000)			
(EARN) _h	-0.2052 (0.0001)	0.4357 (0.0001)	0.4548 (0.0001)	1.0000 (0.0000)		
(ED) _h	-0.1918 (0.0001)	0.7282 (0.0001)	0.7103 (0.0001)	0.4778 (0.0001)	1.0000 (0.0000)	
HHTY	0.0199 (0.1189)	0.0522 (0.0001)	0.0601 (0.0001)	0.0487 (0.0001)	0.0675 (0.0001)	1.0000 (0.0000)

Note: N=6137, Prob>|R| under Ho: Rho=0 in parentheses
 (EMP)_w: rate of the employed wives as positive earners,
 (ED)_w: completed years of education of wife,
 (EARN)_h: monthly earnings of husband
 as unit of 10,000 won (\$ 15),
 (ED)_h: completed years of education of husband,
 HHTY: household type with 3 and more generations.

5.3 Empirical Results of the Hypothesis

(Employment of Married Women and Schooling Effect)

In this section, a model formulated in Chapter IV about the determinants on the wife's employment-decision, particularly focusing on the effect of the wife's schooling, is empirically tested. To analyze the factors upon her employment, the wages for all wives in the samples need to be predicted. But, these predicted wages are estimated based on the employed wives. Thus, we may expect a selectivity bias because the traits of the employed may be different from the non-employed. To correct this selection problem, Heckman's approach (1979) is adopted. After we obtain the predicted wage from the corrected wage function, we estimate the probability on employment of married women, including wife's predicted wage and other explanatory variables.

5.3.1 Probit Estimation for Employment of Married Women (First Stage)

As the first procedure, the binary-choice probit model is estimated to research the characteristics of employed women and the employment probability of married females. Among the total observations (6,137), the numbers of the non-employed and the employed are 4,785 and 1,352, indicating 78.0 percent and 22.0 percent respectively. Some interesting features of the non-employed groups and the employed groups are obtained in Table 5-3.

The mean of the wife's education in the non-employed group is higher than that in the employed class by 1.1 years. Also, the schooling of the husband as partner of the non-employed wife is higher by 1.7 years and his earnings are more by 112 thousand won (\$ 167) per month than those of the husband of the employed wife. The number of the employed among other family members is indicated as higher in the non-employed class, while the number of children under 15 ages, and the rate of a household with three generations show slightly higher figures in the employed-wife group.

Table 5-3

Means of Major Independent Variables

Variable	Mean For Non-employed	Mean For Employed	Mean For All
Wife's Age	42.21	41.71	42.10
Wife's Education	8.880	7.793	8.641
Husband's Education	11.127	9.435	10.754
Husband's Earnings	42.738	31.548	40.273
Other Employed	0.278	0.256	0.273
Child	1.189	1.251	1.202
Household Type	0.111	0.126	0.115

Note: Observations: 6137

Non-Employed: 4785; Employed: 1352

Education: completed years of education

Earnings: monthly earnings as unit of 10,000 won(\$15)

Other Employed: number of the employed among other family members except husband and wife.

Child: number of children less than 15 years old.

Household Type: household of three and more generation

Meanwhile, the result of probit estimation is shown in Table 5-4. These probit estimates of the parameters determine the probability that a woman will work. The signs of most variables are as expected and their coefficients are significant. The education and earnings of the husband and the number of the employed among other family members all indicate negative signs. Their coefficients are all significant at 5% level. Further, the household of three generations has a positive relation encouraging the participation of married women in job work.⁵

The insignificance of the wife's education results from the compound outcome including positive wage effect and the negative effect of other uncontrolled factors such as family wealth. Also, the insignificance of Child is the reasonable result of limited use of the sample (wife's age: 35-54) to control the effect of fertility. The reason for the restricted use of the sample is that the data used give no information about the number of children under 7 years old, but only about those under 15 years old.

⁵. But, this result becomes different in the probit result of the more comprehensive model. Refer to footnote 9 in 5.3.3.

Table 5-4
 Probit Estimation on Wife's Employment
 (First Stage)
 [Dependent Variable: Employment of Wife]

Variables	Estimated Coefficient	\hat{b} / s
Intercept	-3.51019	(-2.55)*
Wife's Age	0.18663	(2.95)*
(Wife's Age) ²	-0.00231	(-3.17)*
Wife's Education	0.01003	(1.16)
Husband's Education	-0.05451	(-7.00)*
Husband's Earnings	-0.01320	(-11.14)*
Other Employed	-0.08886	(-2.55)*
Child	-0.00534	(-0.26)
Household Type	0.17447	(3.06)*
(-2.0) times Log Likelihood Ratio		415.8

Note: N=6137

Employment of Wife: discrete dependent variable
 (zero for the non-employed, 1 for the employed).

\hat{b} / s = ratio of coefficient to standard error

The definition of independent variables is the same
 as Table 5-3.

* represents significant coefficient at 5% level.

A likelihood ratio test statistic for the null
 hypothesis that all coefficients of the model with the
 exception of the constant term are zero. This has
 a Chi-squared distribution, with degrees of freedom
 equal to the number of independent variables.

5.3.2 The Married Female Wage Function (Second Stage)

As the second stage, we regress the wife's wage equation in the form of Mincer's semi-log function. This wage equation corrects selectivity bias by using the estimated 'inverse of Mills ratio' (MILLS) as a regressor, which comes from the result of probit estimation in the previous stage. All explanatory variables, (the wife's schooling, her current experience and its squared term) indicate all expected signs and their estimated coefficients are all significant.⁶ Particularly, MILLS as the estimated inverse of Mills ratio shows a positive sign and the significance of its coefficient. This suggests that unmeasured factors that raise the probability of outside-working also tend to increase the wage rate of the employed wives. Therefore, if wage equations are not corrected for censoring bias, the potential wages of non-working women will apparently be substantially exaggerated.

From the estimated coefficients in this wage equation, we obtain the predicted value of the wage rate for all wives in the sample. To predict the wage rate, we omit the variable MILLS (as the computed inverse of Mill's ratio)

⁶. Due to the insignificance of coefficients, the wife's past experience and its squared term are dropped and reestimated in Table 5-5. The regression results including these are located in Appendix (Table A-1). As an alternative, refer to Table A-2 (in Appendix) in which the semi-log earnings function is regressed using the monthly earnings of the wife as a dependent variable.

from the wage equation because the estimated coefficients are already consistent through correction of selection bias. And apply the values of each observation to the independent variables. The outcome is obtained from computation on existing estimated coefficients and the applied values.

Table 5-5

Regression of Wife's Wage Equation for
Selectivity Correction

(Second Stage)

[Dependent Variable: ln (Wife's Wage)]

Variables	Estimated Coefficient	T-statistic
Intercept	5.24796	(78.87)*
Wife's Education	0.05078	(10.43)*
Wife's Current Exp	0.05041	(7.13)*
(Wife's Current Exp) ²	-0.00101	(-3.07)*
MILLS	0.61416	(10.00)*
\bar{R}^2	0.3578	

Note: N=1352: number of the employed as positive earners

ln (Wife's Wage): wage rate per hour in logarithm term
Current Exp: years of experience in the current firm
MILLS: estimated Inverse of Mills Ratio

* represents significant coefficient at 5% level

5.3.3 Probit Estimation of Married Female Employment in the More Comprehensive Model (Third Stage)

The predicted wife's wage derived from the previous stage and some other variables are added as new regressors in the more comprehensive equation. Here, the occupation of the husband in professional, administrative and managerial jobs as another factor representing the social status of the husband, and the age-gap between marital couples are added as negative factors, and the region dummy variable as city size coming from difference of job opportunity is also contained in the model.⁷

Based on this model, we estimate the equation using probit analysis to examine the probability of employment of married women. From the results of probit estimation which are summarized in Table 5-6, we find that the wife's education,⁸ the earnings, education and higher occupation of husband, and the employment of other family members indicate completely negative signs to wife's employment and their coefficients are all significant at 5% level. Here, the negative sign of higher occupation of the husband may result from that the Korean family is the major unit of social identity, so that the member of a family customarily share a collective social status devolved from that of their social family head. Thus, the higher social status of family

⁷. About the means of independent variables, refer to Table A-3 in Appendix.

⁸. Here, the wife's education is different from that in Table 5-4 which includes positive wage effect.

affects the behavior pattern of wives on job-search, like looking for higher jobs with better conditions or not. Also, as the expected results, the predicted wage of the wife, and the region variable as large city, represent strong positive signs in relation to the employment of the wife. On the other hand, under the additional control of the wage rate, the sign of household type of three generations changes to negative.⁹ Age-Gap and Child have expected negative signs but both are insignificant, thus the probit equation without them is estimated again and summarized in Table 5-6.

⁹. The household type of three generations in Table 5-4 shows a positive sign under the control of the husband's schooling and earnings, which affect the wife's employment negatively. In this case, this household type encourages the wife's employment and as a consequence, increases experience which is an important component in the wage equation. Thus, as the wage rate through more experience is higher, the employment probability of the wife becomes higher. However, under the additional control of the wage rate excluding this endogenous aspect in Table 5-6, this household type rather seems to be influenced more strongly by wealth coming from the old parents.

Table 5-6

Selectivity Corrected Probit Estimation of the
Probability of Employment

(Third Stage)

[Dependent variable: Employment of Wife]

Variables	Estimated Coefficients	b / s
Intercept	-39.7244	(-16.35)*
Wife's Education	-1.13014	(-30.39)*
Wife's AGE	1.09816	(10.62)*
(Wife's AGE) ²	-0.01227	(-10.22)*
Wife's Predicted Wage	0.08644	(31.24)*
Husband's Earnings	-0.02119	(-10.50)*
Husband's Education	-0.06036	(-5.26)*
Others Employed	-0.18035	(-3.20)*
Household Type	-0.25991	(-2.51)*
Region	0.11825	(2.06)*
Husband's Occupation	-0.59741	(-4.37)*
(-2.0) times Log Likelihood Ratio		3953.57

Note: N=6137

Employment of Wife: discrete dependent variable
(1 for employed; 0 for non-employed)

b / s: ratio of coefficient to standard error

Household Type: 1 if three and more generation family;
0 other wise,

Husband's Occupation: 1 if professional, admin. &
managerial jobs; 0 otherwise,

Region: 1 if large cities; 0 otherwise.

Due to insignificant coefficients, Age-gap and Child are omitted and the equation without them is re-estimated.

Convergence achieved after 7 iterations in probit.
(The default value of convergence: 0.001)

5.3.4 The Husband's Earnings Equation

Until now, we have found that the husband's earnings affect negatively the wife's outside-working. However, in this section, we try to analyze the relationship between the wife's schooling and her husband's earnings. From this result of analysis, we may find the effect of the wife's schooling on her employment through her husband's earnings.

First, we may consider the direct relationship between wife's education and husband's earnings under control of husband's education. For this research, the wife's education is added as a regressor, and the husband's monthly earnings in logarithm terms is used as a dependent variable in the earnings equation.¹⁰ Also, the husband's experience is divided into the experience in the current firm, and the potential past experience.

According to the regression results which are summarized in Table 5-7, all independent variables have the expected signs and their coefficients are all significant at 5% level. In the regression results of (II) without wife's education, the coefficient on the husband's schooling is 6.6 percent. However, in the regression of (I) with the wife's schooling, the independent contribution of the husband's education on his earnings lowers to 4.8 percent. While the

¹⁰. As an alternative, refer to Table A-4 (in Appendix) in which the semi-log earnings equation is regressed using wage rate in logarithm terms as a dependent variable.

Table 5-7

Regression of Husband's Earnings Equation
 [Dependent Variable: ln (Husband's Earnings)]

Variables	Estimated Coefficient	
	(I)	(II)
Intercept	2.4986 (45.47)*	2.6560 (49.33)*
Husband's Education	0.04819 (18.81)*	0.06561 (31.02)*
Wife's Education	0.03085 (11.64)*	- -
Husband's Current Exp	0.02811 (9.44)*	0.02637 (8.77)*
(Husband's Current Exp) ²	-0.00060 (-5.51)*	-0.00064 (-5.79)*
Husband's Past Exp	0.01128 (4.76)*	0.00775 (3.26)*
(Husband's Past Exp) ²	-0.00026 (-5.47)*	-0.00023 (-4.80)*
\bar{R}^2	0.2893	0.2737

Note: N=6137

ln (Husband's Earnings): monthly earnings of husband in logarithm terms (unit: 10,000 won, \$15)

(I): regression containing wife's education as an independent variable.

(II): regression without wife's education

Current Exp: years of experience in the current firm

Past Exp: years of past experience.

(Age - Education - Current Exp - 6)

t-statistic in parentheses

* represents significant coefficient at 5% level

percentage earnings differential to wife's schooling in terms of husband's earnings indicates 3.1 percent. The ratio (rate of the wife's education to rate of the husband's education) in the husband's earnings function reports 64.0 percent. Thus, these regression results show that the wife's education has positive relationship with the earnings of her husband and its relation is very significant.

The positive effect of wife's schooling on husband's earnings can be explained by the cross-productivity effect of the wife's education to the husband's benefit. In Korea, as a possible way in which the wife's education contributes to her husband's benefits, the influence of informal group-meetings among married females may be considered, because the informal group of alumni has become very popular among housewives in cities as we stated in Chapter III (3.2).

A type of informal alumni group is organized by wives whose husbands are members of the same company.¹¹ The primary objectives of this informal group is mutual cooperation among female alumni. However, as wives develop an intimate relationship, the meetings of such an informal

11. Sometimes, these organizations are encouraged by the company, expecting a positive function of informing and promoting better understanding among wives about situations and changed conditions in the firm of their husbands. Through better understanding and recognizing that they are also, in a sense, family members of this company, wives are expected to assist their husbands in encouraging their attainment motives and overcoming difficulties of the company.

group can become a main channel for promoting the interests of their husbands.

In Korean, as compared to Western, society, the participation of a couple in informal or formal parties has not been so popular, though this trend is now changing. Instead, sexually segregated informal meetings of husbands and wives have been very popular. Since the actual influence of a wife on a husband's business is not so trivial traditionally, and still exists today, the lobbying activity among wives through informal group meetings may be an important way for a wife to contribute to her husband's success.

However, the empirical results can be also explained by alternative interpretation. As a major alternative argument, we may consider the selective mating hypothesis. This hypothesis maintains that, in a male group of the same schooling, the more productive men marry more highly educated women. But, it is difficult that comparing the relative importance of selective mating versus household-capital formation. Though the normative implications of the related hypotheses are different each other, the positive effects appear to be identical from personal point of view. Since we only focus on the positive extent of relationship between the wife's schooling and the husband's earnings, the analysis on the relative importance of these hypotheses are not tried in this paper.

On the other hand, the above positive schooling effect of the wife to the husband's earnings (under control of the husband's education) may underestimate its true effect. Because we may also think the positive effect of assortative educational mating that highly educated women are matched with highly educated men as higher potential earners. This mating effect means that the wife's schooling has positive relation to the husband's earnings through his education. In order to obtain an approximate estimate of this wife's schooling effect, considering the assortative mating effect, the correlation coefficient of educational mating (0.7282 in Table 5-2) and the rate of return to the husband's education in his semi-log earnings function (regression II in Table 5-7) are used in the next section.

5.3.5 Analysis of Educational Effect on Employment

In this section, the model of the wife's employment, which was used for the probit estimation in Table 5-6, is applied for ordinary regression to analyze the overall effect of the wife's schooling on her working-decision. For convenience of analysis on the effect of female education, we assume that the relation of effect of wife's schooling to her working-decision is constant. For estimation, two alternative models are regressed. The difference between these is that the imputed wage of the wife and the earnings of the husband in the first model are used as logarithm terms in the second model. The overall features of these two

regression results, except minor difference, are almost same as those of the probit analysis in Table 5-6. Only the different point is that the estimated coefficient of the husband occupation changes to insignificant. Thus, detailed explanations of the results are omitted to avoid redundancy.

Only, the adjusted R^2 as a suitable measure of fitness to the multiple regression model is compared in the result of these two regressions. The adjusted R^2 reports 0.397 in the first regression and 0.501 in the second regression, respectively, indicating that the second model in logarithm terms obtains an improved result on the fitness of the equation. The adjusted R^2 is often used to compare the validity of regression results under alternative specifications of the independent variables in the model. Thus, we select the regression results of the second alternative in logarithm terms to estimate the overall schooling effect of the wife. This regression results are shown in the Table 5-8.

Based on this second model, the specified function of married female employment is rewritten as follows:

$$\begin{aligned}
 (5.1) \quad (\text{Wife's Employment}) &= d_0 + d_1(\text{Wife's Education}) \\
 &+ d_2(\text{Wife's Age}) + d_3(\text{Wife's Age})^2 \\
 &+ d_4[\ln(\text{Wife's Predicted Wage})] \\
 &+ d_5[\ln(\text{Husband's Earnings})] + d_6(\text{Other Employed}) \\
 &+ d_7(\text{Husband's Education}) + d_8(\text{Age-Gap}) \\
 &+ d_9(\text{Husband's Occupation}) + d_{10}(\text{Child}) \\
 &+ d_{11}(\text{Household Type}) + d_{12}(\text{Region}) + U
 \end{aligned}$$

Table 5-8
Regression of Wife's Employment

Variables	Estimated Coefficient	T-statistic
Intercept	-14.04961	(-43.20)*
Wife's Education	-0.11700	(-48.86)*
Wife's Age	0.08460	(6.94)*
(Wife's Age) ²	-0.00094	(-6.69)*
<u>ln(Wife's Predicted Wage)</u>	2.42423	(72.70)*
<u>ln(Husband's Earnings)</u>	-0.08873	(-10.87)*
Husband's Education	-0.00913	(-5.61)*
Other Employed	-0.01875	(-2.72)*
Husband's Occupation	-0.00414	(-0.33)
Household Type	-0.02827	(-2.39)*
Age-Gap	0.00476	(0.61)
Region	0.01521	(1.98)*
\bar{R}^2	0.5020	

Note: N=6137

Employment Rate of Wife: discrete dependent variable
(1 for employed; 0 for non-employed)
Household Type: 1 if three and more generation family;
0 otherwise,
Husband's Occupation: 1 if professional, admin. &
managerial jobs; 0 otherwise,
Age-Gap: 1 if husband's age - wife's age > 4;
0 otherwise,
Region: 1 if large cities; 0 otherwise.

* represents significant coefficient at 5% level

This function can be rearranged in reduced form, replacing Wife's Predicted Wage and Husband's Earnings in logarithm terms by variables which come from the wage function of the wife in Table A-1 and the earnings function of the husband in Table 5-7 (regression II), as follows:

$$\begin{aligned}
 (5.2) \quad (\text{Wife's Employment}) &= d_0 + d_1(\text{Wife's Education}) \\
 &+ d_2(\text{Wife's Age}) + d_3(\text{Wife's Age})^2 \\
 &+ d_4 [b_1(\text{Wife's Education}) + b_2(\text{Wife's Current Exp}) \dots] \\
 &+ d_5 [c_1(\text{Husband's Education}) + \\
 &\quad c_2(\text{Husband's Current Exp}) \dots \dots \dots] \\
 &+ d_6(\text{Other Employed}) + d_7(\text{Husband's Education}) \\
 &+ d_8(\text{Age-Gap}) + d_9(\text{Husband's Occupation}) \\
 &+ d_{10}(\text{Child}) + d_{11}(\text{Household Type}) + d_{12}(\text{Region}) + U
 \end{aligned}$$

Especially, from this (5.2), the overall schooling effect of the wife on her working-decision can be extracted and expressed as (5.3) to obtain an approximate estimation.

$$(5.3) \quad \frac{d(\text{Wife's Employment})}{d(\text{Wife's Education})} = d_1 + d_4 \cdot b_1 + d_5 \cdot c_1 \cdot \delta$$

(1)
(2)
(3)

where, δ : correlation coefficient between educational attainments of marital couple

- (1) : a direct educational effect which includes the wealth effect of her parents and husband as a very significant factor among uncontrolled residual effects.
- (2) : an effect of her own wage
- (3) : an approximate effect through husband's earnings.

The estimated coefficients, d_1 , d_4 , d_5 are obtained from Table 5-8 and b_1 and c_1 come from the regression result of the wife's wage and the husband's earnings equation respectively (Table A-1 and 5-7). Here, b_1 and c_1 represents the rate of return to education of the wife and the husband respectively. The estimated b_1 is supposed to be lower than c_1 . Because the expected earnings of women are lower, due to lower employment rate and less average earnings of the female employed, compared with those of men. The approximately estimated results on decomposition of educational effect are as follows:

$$\begin{aligned}
 (5.4) \quad d_1 + d_4 \cdot b_1 + d_5 \cdot c_1 \cdot \delta &= -0.11700 + 2.42423 * 0.042 \\
 &\quad -0.08873 * 0.06561 * 0.7282 \\
 &= -0.01942
 \end{aligned}$$

This result indicates that negative factors, such as household wealth and the husband's earnings, affect the employment-decision of married females more strongly than the positive wage effect. However, as a limit, since all components are not estimated in an equation at a time, this analytical estimation does not compare the magnitudes exactly; instead, it reflects the relative size of components approximately. Therefore, though each component shows its sign and significant coefficient, the overall results are obtained indirectly from calculation of these parts.

CHAPTER VI. CONCLUSION

6.1 Summary of Major Empirical Results

The main objective in this study is to explain two disparate behavior patterns: the elevated aspiration for female higher education, and the low employment rate of highly educated women in Korea. For this, a testable hypothesis is submitted. The primary idea of this hypothesis is to explain the behavior pattern in terms of total household income, including the marital output of assortative educational mating, instead of using a conventional analysis in terms of individual earnings or wage rate. In the formulated model, the effect of the schooling of a married woman on her employment decision is analyzed. For empirical analysis of this, the 3-stage models to correct the selectivity bias of the employed sample, and to obtain the predicted wages of married women, are presented and estimated.

The major findings of this study are :

(1) Even though the employment of lower schooling groups is relatively underestimated, as the educational level of married women increases, their employment rate tends to decline, from 29.5 percent among graduates of primary school to 20.4 percent in the group of middle school

graduates, and to 13.4 percent among graduates of high school and above. Furthermore, the schooling and earnings of the husband have consistent positive relations to the wife's educational attainments.

(2) In the outcome of the Pearson correlation among major variables, educational mating between marital spouses reveals a very high correlation, reporting 0.7282. And, to the husband's earnings, not only his own education, but the wife's education has also a strong positive correlation, showing 0.4778, 0.4357 respectively.

(3) Comparing the non-employed wife group with the employed group, the mean of the wife's education in the non-employed group is higher than that in the employed class by 1.1 years. Also, the schooling of the husband of the non-employed wife is higher by 1.7 years and his earnings are more by \$167 per month than those of the husband of the employed wife.

(4) As major results of probit estimation of the employment of married women, the schooling and earnings of the husband, and the employment of other family members indicate all negative sign to the work of the wife outside the household, and their coefficients are all significant. The predicted wage of the wife and the region dummy variable as large city represent a strong positive sign.

(5) The regression result of the husband's earnings equation indicates that the wife's education is an especially important component in the semi-log earnings function of the husband. The ratio of the rate of the wife's education to the rate of the husband's education in the earnings function reports 64.0 percent, showing a very high proportion.

(6) The analytical estimation on the overall schooling effect of the wife to her working decision indicates that negative factors, such as a proxy of family wealth and husband's earnings, affect employment more strongly than the positive wage effect.

6.2 Policy Implication

Generally, the remarkable economic growth of Korea owes much to the utilization of the abundant labor force in labor-intensive and export-oriented industries. Nowadays, however, Korea can no longer enjoy such favorable conditions as a sufficient labor supply with lower wage and good quality. Its labor market has already experienced a labor shortage in certain sectors since the late 1970s. Therefore, the Korean government and firms have to pay more attention to the development and maintenance of human resources, as well as investment in new technologies to compete with other countries in the future world market.

As a promising potential labor force, married females, especially highly educated women, may be considered. Their opportunities for outside-work are getting better. They have more leisure time at home due to lower fertility and availability of electronic household appliances, and they wish to use it constructively. Today, in spite of the increase in the number of women engaged in economic and social activities, social and cultural conditions are still unfavorable for women to participate in external activities. In general terms, as the Korean economy develops, more females are expected to be involved in the labor force. However, unless there is an improvement in present institutional environments, we may not expect the rapid spread of active participation of highly educated wives in economic activities. This is because, as we find from the empirical results, highly educated women show a lower employment rate due to the stronger negative effect of household income. They cannot gain easy access to proper jobs for the highly educated under the current institutions, and usually do not have any desperate motive for employment of lower status due to relatively higher household income.

Therefore, we should pay more attention to developing some positive policy alternatives to actively induce these highly educated wives as a large non-labor force to take part in labor market activities. A major problem of working women is the dual work of a job and a house. Married females with infants are more burdened by outside work.

Thus, greater opportunities to take part-time jobs should be developed in society, since these make outside work compatible with household production at home. Also, in order to ease the excessive burden of the women employed, we need to promote some complementary programs such as expansion of nursery facilities, the introduction of a baby care work-suspension system and the development of various job training opportunities.

Meanwhile, the active participation of women in social activities is important, as well as their participation in economic activities. For this, it is necessary to encourage social voluntary activities and expand the atmosphere of noblesse oblige in the society. Especially, the active participation of people of higher social and economic status is desired. The constructive utilization of their leisure time as an alternative to high consumption pattern will be helpful for filling the deep gap of dissatisfaction and disbelief between groups in different social and economic status. If current institutions were actively improved, these married females would be a qualified and stable labor force in wide spheres and make a further contribution to society.

On the other hand, in the view of the private sector, investment in female higher education is a reasonable behavior pattern according to present marital trends. However, in the view of society, this results in over-investment as an inefficient use of the limited resources.

In the long term, therefore, we should exert ourselves to revise the social over-valuation of education, which is at present so widespread. Though education is a good measure of certain aspects of one's ability, such as the ability to acquire knowledge, this is a signal indicating aptitude and not social status itself. In order to change this social value system, we have to develop various ways of representing ability in other aspects and recognize them in our economic and social lives. Only through the improvement of the value system, can the overinvestment in education be cured.

6.3 Suggestions for Further Study

In this study, the samples used are limited to intact households of married females in the 35-54 age group as spouses in the urban area. Also, employed females are defined as positive earners excluding non-paid workers in family business. Thus, we may consider some further possibilities for research by expanding the bounds of the analysis. First, we may include households in the rural area, which are expected to have different features compared with the sample used. Also, it would be interesting to analyze and compare the households with female household-heads, who are showing a much higher employment rate notwithstanding unfavorable conditions of greater age and lower schooling. Using available data with exact information

on infants, the range of the sample analyzed can include younger wives who are affected by a greater burden of infant care. It may also be an attractive idea for analysis to focus on cross-productivity between marital spouses for the households in family business.

Meanwhile, if information on family wealth is available, we can try to analyze the effect of the wealth of parents and husband, as well as earnings, on the education and working-decision of the wife. Also, the consumption pattern of the household may be another important factor in the female labor force participation. As the Korean economy develops, though family incomes have been higher, their consumption level has increased more rapidly due to a strong demonstration effect in the society. Such increased living standards encourage housewives to earn money to supplement their husband's income.

APPENDIX

Table A-1

Regression of Wife's Wage Equation for
Selectivity Correction[Dependent Variable: \ln (Wife's Wage)]

Variables	Estimated Coefficient	T-statistic
Intercept	5.55106	(34.91)*
Wife's Education	0.04211	(6.11)*
Wife's Current Exp	0.04627	(6.16)*
(Wife's Current Exp) ²	-0.00112	(-3.30)*
Wife's Past Exp	-0.01519	(-1.89)
(Wife's Past Exp) ²	0.00021	(1.41)
MILLS	0.62524	(9.80)*
\bar{R}^2	0.3589	

Note: \ln (Wife's Wage): wage rate per hour in logarithm term
 Education: completed years of schooling
 Current Exp: years of experience in the current firm
 Past Exp: years of past experience
 (Age - Education - Current Exp - 6)
 MILLS: estimated Inverse of Mills Ratio

* represents significant coefficient at 5% level

Table A-2

Regression of Wife's Earnings Equation
for Selectivity Correction

[Dependent Variable: ln (Wife's Earnings)]

Variables	Estimated Coefficient	T-statistic
Intercept	1.62650	(9.69) *
Wife's Education	0.04411	(6.06) *
Wife's Current Exp	0.05674	(7.15) *
(Wife's Current Exp) ²	-0.00149	(-4.19) *
Wife's Past Exp	0.00070	(0.08)
(Wife's Past Exp) ²	-0.00010	(-0.64)
MILLS	0.58183	(8.64) *
\bar{R}^2	0.3161	

Note: ln (Wife's Earnings): wife's monthly earnings in logarithm terms.

Current Exp: years of experience in the current firm

Past Exp: years of past experience

(Age - Education - Current Exp - 6)

MILLS: estimated inverse of Mills ratio

* represents significant coefficient at 5% level

Table A-3
Means of All Independent Variables

Variable	Mean For Non-employed	Mean For Employed	Mean For All
Wife's Age	42.21	41.71	42.10
Wife's Education	8.880	7.793	8.641
Husband's Education	11.127	9.435	10.754
Husband's Earnings	42.738	31.548	40.273
Wife's Imputed Wage	293.93	346.50	305.51
Other Employed	0.278	0.256	0.273
Child	1.189	1.251	1.202
Household Type	0.111	0.126	0.115
Husband's Occupation	0.154	0.070	0.135
Age-Gap	0.370	0.419	0.381
Region	0.606	0.571	0.598

Note: Observations:6137
Non-Employed:4785; Employed:1352

Education: completed years of education
Earnings: monthly earnings as unit of 10,000 won(\$15),
Imputed Wage: wage rate per hour (unit:won)
Other Employed: number of the employed among other
 family members except husband and wife.
Child: number of children less than 15 years old.
Household Type: 1 if three and more generation family;
 0 other wise,
Husband's Occupation: 1 if professional, admin. &
 managerial jobs; 0 otherwise,
Age-Gap: 1 if husband's age - wife's age > 4;
 0 otherwise,
Region: 1 if large cities; 0 otherwise.

Table A-4
 Regression of Husband's Wage Equation
 [Dependent Variable: ln (Husband's Wage)]

Variables	Estimated Coefficient	
	(I)	(II)
Intercept	6.0404 (101.01)*	6.1875 (105.91)*
Husband's Education	0.05936 (21.25)*	0.07555 (32.92)*
Wife's Education	0.02883 (9.99)*	- -
Husband's Current Exp	0.03356 (10.36)*	0.03194 (9.79)*
(Husband's Current Exp) ²	-0.00059 (-4.97)*	-0.00063 (-5.22)*
Husband's Past Exp	0.01017 (3.95)*	0.00687 (2.67)*
(Husband's Past Exp) ²	-0.00026 (-3.41)*	-0.00023 (-2.85)*
\bar{R}^2	0.2988	0.2875

Note: ln (Husband's Wage): Husband's wage per hour
 in logarithm term
 Current Exp: years of experience in the current firm
 Past Exp: Age - Education - Current Exp - 6
 t-statistic in parentheses

(I): regression containing wife's education as an
 independent variable.

(II): regression without wife's education

* represents significant coefficient at 5% level

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