ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station
New Haven, Connecticut

CENTER DISCUSSION PAPER NO. 351

DETERMINANTS OF AGE AT MARRIAGE IN MALAYSIA AND JAPAN

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June 1980

Notes: Center Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the author to protect the tentative character of these papers.

This research was supported by postdoctoral fellowhsips from the National Institute of Health. Additional funding was provided by the William and Flora Hewlett Foundation grant to the Yale Economic Demography Program.

Abstract

The paper discusses recent trends in age at marriage for women in Malaysia and Japan. Age at marriage is hypothesized to respond significantly to changes in male and female wage rates, schooling, unearned wealth, and family background. Using household data from Malaysia and Japan, age at marriage is regressed on these socioeconomic variables and an exogenous time trend variable. We find considerable support for the relevance of economic variables and family background on age at marriage as well as evidence of a strong exogenous positive trend over time in age at marriage in both countries.

Age at marriage is one of the most important life-cycle decisions that men and women in all cultures face. Where pre-marital sexual relationships are taboo or infrequent, marriage--or socially sanctioned cohabitation--signifies the beginning of a woman's exposure to pregnancy risk; changes in nuptiality patterns are often associated with changes in population growth. In most countries, marriage patterns have been changing quite markedly over the last thirty years; in general, a downward trend in the percentage of the population married at every age and an upward trend in age at marriage have been discerned. In Asia, for example, Malaysia and Japan experienced significant changes in both age at marriage and the proportion of women ever-married. The 1966 and 1974 Malaysia Fertility and Family Surveys (MFFS) present striking differences in age at marriage patterns. The mean age at marriage rose from 16.6 to 17.9 for the cohort of 15-24 year old married women, from 17.8 to 19.5 for the cohort of 25-34 year old women, and from 17.5 to 18.8 for the cohort of 35-44 year old women. Comparing Census data and the Fertility Survey from 1947 to 1974, clear declines in proportions of women ever-married or currently married are indicated in every age group. Table 1 presents these data. Table 2 presents comparable information for Japan. In Japan as in Malaysia, the proportion marrying has declined for the younger cohorts of women. For the youngest cohort, 15-19 years old, the percentage ever married has fallen from 3.4 in 1940 to 1.4 in 1975. For women 20 to 25, this percentage has dropped from 45 in 1940 to 31 in 1975. The change is much less significant in the older cohorts, with a decline from 85 percent to 79 percent of all 25-29 year olds ever-married during this period. Also, in contrast with Malaysia, the proportion ever-marrying by age 39 has changed very little; the shift in Japan is characterized by a change in the timing of marriage

rather than the choice to ever-marry. Although the proportion of women 25-29 who are ever married is the same in both countries, there are marked differences between the countries, in the fractions of younger women married. Eight times as many Malaysian women 15-19 and nearly twice as many Malaysian women 20-25 are married relative to their counterparts in Japan. One would not be surprised then to find that the mean age at marriage for all women marrying in 1977 in Japan is 25 (increasing from 24 in 1970) while the mean age at marriage for all women in Malaysia in 1974 is 18.

Two approaches commonly explain these marriage patterns. The first the demographic approach--isolates a trend line in the data, and mathematically fits marriage patterns to a "standard" curve (Coale, 1971). This approach assigns little role to changing socioeconomic conditions in determining age at marriage and the proportion ever-married. The second approach--the behavioral approach--emphasizes the role of socioeconomic conditions in explaining the observed behavior, while virtually ignoring historical trends in the data. Hogan (1978), Keeley (1977, 1979), and Becker (1973, 1974) have contributed significantly to this approach by offering alternative explanations of marriage behavior.

Hogan analyzes data on United States males. His results reject the theory that characteristics of the family of origin (family structure, father's education and income) are important determinants of age at marriage. He does find that age at marriage is significantly related to participation in time-intensive activities such as the military, college, and the labor force. Cohort and race variables are also important in measuring differences in marriage. Hogan fails, however, to adequately specify a model which explains why these

TABLE 1. EVER-MARRIED AND CURRENTLY MARRIED WOMEN AS A PROPORTION OF ALL WOMEN, BY FIVE-YEAR AGE GROUPS: MALAYSIA, 1947-1975

(percent)

	MFFS 1974		1970 Census		1957 Census		1947 Census	
Current Age	Ever-Married	Currently Married	Ever-Married	Currently Married	Ever-Married	Currently Married	Ever-Married	Currently Married
15-19	11	10	16	15	37	35	42	38
20-24	50	48	57	55	79	75	87	79
25-29	79	76	86	83	94	90	96	88
30-34	90	85	94	90	98	91	98	87
35-39	94	82	98	86	99	81	98	77

Source: Malaysian Fertility and Family Survey - 1974: First Country Report, 1977.

TABLE 2. EVER-MARRIED AND CURRENTLY MARRIED WOMEN AS A PROPORTION OF ALL WOMEN, BY FIVE-YEAR AGE GROUPS: 1950-1975

(percent)

Current Age Group	1975		1960		1950	1940
	Ever-Married	Currently Married	Ever-Married	Currently Married	Ever-Married	Ever-Married
15-19	1.4	1.3	2.1	1.8	1.3	3.4
20-24	31	31	28	28	32	45
25-29	79	78	82	80	79	85
30-34	92	90	93	90	90	94
35-39	95	91	94	90	94	97

Source: The Population Census of Japan, 1940, 1950, 1960, and 1975. Japan. Prime Minister's Office. Bureau of Statistics.

variables are important to the marriage decision, and his estimation procedure is ad hoc for this reason. In addition, Hogan's conclusion that family background can be ignored in further analysis is not entirely supported by his data and is not supported in other cultures. In his analysis of whites, he does find that father's participation in the labor force, mother's education, and farm origin are significant determinants of age at marriage.

The theoretical work by Keeley and Becker views marriage as a choice variable and can, therefore, offer some insight into why socioeconomic variables are important in the marriage decision. Keeley models the process of searching for a mate, emphasizing the costs of search. His model predicts that the net gain to marriage for women will fall and the age at marriage will rise with increases in the female wage relative to the male wage. With higher wages, the cost of searching for a mate increases as more time is devoted to search rather than to market work. Search is prolonged and less intensive so that marriage is delayed.

Becker's theory of marriage predicts that marriage occurs if the benefits from marriage exceed the costs. The economic gains accruing to marriage derive from the production of "household commodities" such as meals, companionship, and children. If married households can produce these commodities at a lower cost than single households, then individuals will choose to marry. The gains from marriage, therefore, depend on wage and non-wage income when married and single, the prices of purchased inputs used in the production of household commodities, and the efficiency of household production. Becker does not empirically test his model, but Friedan (1974) does and finds some support for the importance of economic variables in determining the proportion of females married. In particular, if the difference in the male and female wage rates is large, the proportion of women marrying increases. In addition,

an increase in wealth or a technological change in the home results in an increase in the proportion of women married.

The Becker model is not a model of the age at marriage but of the decision to ever marry. The Becker model was extended to incorporate the age at marriage by Anderson and Hill (1980). In this case, if marital dissolution is rare or remarriage after divorce is common and preceded by a short lag, then the fraction of the lifetime married represents the probability of ever-marrying. Age at marriage is, therefore, a decreasing function of the probability of ever-marrying; any variables which increase this probability of marrying decrease the age at marriage and vice versa.

In this paper, we use data from Tokyo, Japan and Peninsular Malaysia to estimate the determinants of age at marriage. Our approach is based on the model developed by Anderson and Hill (1980). Marital dissolution is rare in Japan with fewer than three percent of all married women over thirty ever divorcing; the model is appropriate. In Malaysia, divorce is unusually common for an Asian country, but remarriage after divorce is the norm and the lag between divorce and remarriage is short. (See the Malaysian Fertility and Family Survey, 1974, for more detailed information on marital dissolution.) Although the age at marriage model is less appropriate in this setting, the speed at which women remarry very likely mitigates any inconsistencies.

We view marriage as a choice variable which we expect to respond significantly to changes in wages, income, and other socioeconomic characteristics of the populations. In particular, we expect that the wife's wage and the husband's wage will be positively related to her age at marriage. As the wife's wage increases, her market earning power increases. At the same time,

this change will make time in the home more expensive. If wives spend relatively more time in the home than the market compared to single women, rising wages will result in delayed marriages. An increase in the husband's market wage has two effects. First, it raises the cost of the husband's time in the home proudction. This increase will raise the cost of goods produced with the husband's time, reduce the benefits to marriage, and consequently increase the age at marriage. Second, the wage increase will provide more income to the household. This effect will lower the age at marriage since the gains to marriage will rise. The net effect of an increase in the husband's wage will depend on the relative strength of these two effects.

The unearned income of both spouses will also significantly influence the age at marriage. If the wife has independent wealth from an inheritance, for example, her own resources increase, and she may choose to delay marriage. Conversely, the husband's unearned income will raise marital income relative to the income of the single woman and make marriage a more desirable alternative. Schooling is closely associated with wealth accumulation, tastes, and efficiency in both the home and in the labor market. Schooling may also represent an intergenerational transfer of wealth. An increase in the wife's or husband's schooling may raise or lower the age at marriage. We are also interested in testing for the presence of an exogenous trend in age at marriage as hypothesized by demographers. The estimating equations incorporate both the relevant socio-economic variables and the trend over time. Significance of these variables lends support to both approaches to analyzing changing marriage patterns.

Data And Methodology

The data for this analysis are obtained from two surveys. The 1976 Malaysian Family Life Survey collected by the Rand Corporation is used for the Malaysian estimation. The survey includes 1262 households in Peninsular Malaysia, each containing at least one ever-married woman younger than age 50. The sample is representative of the Malaysian population; thirty-nine percent of the households are Chinese, 12 percent are Indian, 48 percent are Malay, and the remaining one percent are of other indigenous groups. The sample used in this study is restricted to those households in which the husband is present. The Japanese data are drawn from a 1975 survey of 1405 women aged 20 to 29 in the Tokyo Metropolitan Area. The data were collected by the Japanese National Institute for Vocational Research and include information on family background and socioeconomic characteristics as well as marital status.

Our estimation procedure uses ordinary least squares regressions of the age at marriage of women on socioeconomic variables and an exogenous time trend. The socioeconomic variables are the wage rates of the husband and wife, unearned income, schooling, and family background characteristics. Table 3 presents the means and standard deviations of these variables. As expected from the discussion of aggregate trends in both countries, the mean age at marriage in Japan is much higher than in Malaysia: 24 versus 19.

For the Malysian and Japanese data, the wage rates of the wives and husbands are imputed from estimating equations. For the husbands and the working wives, the wage rate is imputed from earnings functions in which the

TABLE 3. SAMPLE MEANS AND STANDARD DEVIATIONS OF AGE AT MARRIAGE, SOCIO-ECONOMIC, AND FAMILY BACKGROUND VARIABLES: MALAYSIA AND JAPAN[a]

	Malaysia	Japan
Age at marriage	18.7 (4.02)	23.8 (3.06)
ln Wife's value of time[b] (Malaysian dollars per hour and yen per hour)	1.51 (0.62)	5.70 (0.21)
Wife's years of schooling	3.84 (3.93)	11.24 (2.27)
ln Husband's earnings (Malaysian dollars per hour and yen per year)	2.29 (0.57)	14.27 (0.21)
Husband's years of schooling - Malaysia	5.71 (4.09)	-
Husband's schooling - Japan (Dummy variable =1 if completed junior high school)	-	0.72
Present value of wealth - Malaysia (Malaysian dollars)	440.62 (2345.18)	-
ln Father's income - Japan (yen per year)	-	14.67 (0.24)
Mother's schooling - Japan (Dummy variable =1 if completed junior high school)	-	0.31
Malaysian wife is Chinese (Dummy =1)	0.38	-
Malaysian wife is Indian (Dummy = 1)	0.12	-
Market center residence - Malaysian (Dummy = 1)	0.20	-
Other urban area residence - Malaysian (Dummy = 1)	0.22	-
Year of marriage	1961	1961

[a]Standard deviations in parentheses.

[b]The 1975 exchange rate was 293.8 yen per dollar in Japan and 2.59 Malaysian dollars per U.S. dollar.

log of earnings is regressed on characteristics of the individual reflecting the amount of human capital accumulated: experience, schooling, and for Malaysia, ethnic and location characteristics. Due to unfortunate differences in the employment status question in the two surveys, we could not define the labor force in Japan and Malaysia identically. Therefore, the Malaysian labor force is defined to include anyone regularly working for money or in-kind wages and may comprise women working in family businesses. For Japan, the labor force is defined in this study as the formal sector; a housewife producing home handicrafts is not included in our definition of the Japanese labor force. The estimating procedure the the estimating equations for husbands and working wives are presented in the Appendix.

The wage rates of non-working wives are not imputed from the earnings functions of working wives. In Malaysia, 46 percent of the women are not regular workers; in Japan, 85 percent of the women manufacture home handicrafts or do not work. It is likely that these groups of women are non-randomly drawn from the sample of all women so that sample censoring is suspected if wages are imputed from a sample of workers only. We choose to estimate the value of non-market time for these non-working women separately. First, labor force participation is regressed on all variables determining the value of market time and the value of non-market time: experience, schooling, wealth, ethnic characteristics, location, and characteristics of the husband. From these estimates, the value of non-market time is easily derived. The description of this procedure and the results of the estimation are presented in the Appendix. The value of time for non-workers is imputed from these equations.

To measure family background in Malaysia, we include variables on ethnicity and urban or rural residency. The data set includes no data on characteristics of the wife or husband's family before marriage. The Japanese data, however,

provide detailed information on income of the wife's father and schooling of parents. The father's income is imputed from an estimating equation given in the Appendix; income is a function of education and occupation. The imputed income of the father and the mother's schooling are included in the regressions to capture differences in family background.

The schooling variables of the husband and wife are included to measure the intergenerational transfer of human capital wealth and the efficiency of household production. For Malaysia, the variables are the number of years of schooling completed by the husband and the wife, with means of 5.7 and 3.8 respectively. Japanese women completed an average of 11.2 years of schooling. Actual years of schooling were unavailable for Japanese husbands; a dummy variable equal to one if he graduated from junior high school serves as a proxy. The year of marriage measures the time trend in age at marriage. The mean year for both countries is 1961.

Empirical Results

Table 4 presents the empirical results of OLS regressions of age at marriage in Malaysia using four specifications of the model. In the first regression, the husband's and wife's values of time are imputed from estimating equations given in the Appendix. Variables for the schooling of the husband and wife are also included. In the second equation, the wife's schooling is omitted. In the third regression, the imputed wage variables are omitted because of a possible high correlation between the wage and schooling. In the fourth equation, the schooling variables are omitted.

The effect of an increase in the wife's wage on her age at marriage is negative and significant; the elasticity evaluated at the mean in regressions (1) is -.01 and -.008 in regressions (2) and (3). (The wage elasticity is the ratio of the percentage change in age to the percentage change in the

wage.) Contrary to our expectations, as the value of the wife's time increases, for example, due to more schooling and labor market experience, she marries earlier. As the husband's wage, an increase in the wife's wage has two effects. First, her wage increase raises the cost of her time spent in home production. The effect will tend to increase her age at marriage if she spends more time in the home as a married woman than as a single woman. Second, the wage increase will raise her lifetime income. This effect will increase the benefits of remaining single and increase her age at marriage unless her contribution to household income is much higher when she is married than when she is single. The net wage effect is theoretically ambiguous. Our estimated wage effect is negative, although it is not large; doubling the value of time decreases the age at marriage by less than one year.

The wife's schooling is also a positive determinant of her age at marriage. This variable represents an intergenerational transfer of human capital as well as efficiency in production outside of marriage. The elasticity of age with respect to schooling evaluated at the sample means is approximately .02 in regressions (1) and (3). If schooling were to double from the sample mean of 3.8 years, age at marriage would increase by an average of approximately eight months.

The husband's wage has a positive effect on the wife's age at marriage. The elasticity evaluated at the sample mean is .66 in regressions (1) and (2) and .10 in regression (4). If schooling is included, a one percent increase in husband's wage reduces the age at marriage by .66 percent. The sign of the coefficient is as expected if the negative substitution effect of an increase in the value of the husband's time in his household activities outweighs the gain that his higher purchasing power will bring to marriage.

The husband's schooling is a negative determinant of age at marriage if the wage variable is included and a positive determinant if it is excluded. The elasticity in equations (1) and (2) is -.22, and the elasticity in equation

TABLE 4. EMPIRICAL RESULTS FOR AGE AT MARRIAGE IN MALAYSIA

(1025 observations)[a,b]

Independent Variable	(1)	(2)	(3)	(4)
Intercept	-.996	-1.319	7.488	5.547
	(-.389)	(-.514)	(10.751)	(7.984)
ℓn Wife's value of time	-.227	-.147	-	-.149
(imputed)	(-1.859)	(-1.231)	-	(-1.243)
Wife's schooling	.102	-	.081	-
	(2.727)	-	(2.217)	-
ℓn Husband's hourly wage	12.116	11.720	-	1.742
(imputed)	(3.359)	(3.242)	-	(4.211)
Husband's schooling	-.749	-.678	.064	-
	(-3.063)	(-2.778)	(1.968)	-
Residence in market	-3.760	-3.536	.930	.450
center dummy	(-2.541)	(-2.386)	(3.230)	(1.205)
Residence in other	-4.153	-3.987	.225	-.204
urban area dummy	(-2.967)	(-2.843)	(.869)	(-.605)
Wife of Chinese	-2.458	-2.320	2.772	1.968
origin dummy	(-1.569)	(1.477)	(12.384)	(6.704)
Wife of Indian	-1.476	-1.466	.449	.156
origin dummy	(-2.202)	(-2.179)	(1.376)	(.467)
Year of marriage	.148	.159	.150	.161
	(12.304)	(14.053)	(12.555)	(14.237)
F - Statistic	72.26	79.86	89.76	89.59
R - Square	.38	.38	.38	.38

[a] t-statistics in parentheses

[b] The wife's age is set equal to zero in the inputed value of time equation. (See DaVanzo, Detray, and Greenberg, 1976).

(3) is .02. In the first case, schooling is measuring a wealth and efficiency effect separate from the wage effect; an increase in the wealth that he brings to the marriage or his efficiency in household production encourages an earlier marriage. In the second case, education is capturing the effect of wealth and efficiency as well as the wage effect.

Age at marriage differs according to area of residence and ethnic background. Age at marriage is lower in a market center or urban area than in a rural community and is lower for Chinese and Indian women than for Malay women, if wages and education are held constant. If wages are not controlled for, however, as in equation (3), rural residents and Malays have the lowest age at marriage, confirming results obtained in the 1974 Malaysian Fertility and Family Survey. Controlling for economic variables is important in interpreting the effects of residence and ethnicity. These results indicate that age at marriage is lower for Malay and rural women because they have a lower value of time than non-Malays and urban women.

Finally, the trend variable--year of marriage--is positive and significant. Age at marriage in Malaysia has been increasing over time, controlling for changes in wages, wealth, and other socioeconomic variables.

Table 5 presents the empirical results of OLS regressions for age at marriage in Japan using four specifications of the model. The wife's and husband's schooling alternate with their wages as measures of the value of time. (The wife's schooling was not included with her wage since the two variables are highly collinear.) First, the effect of a change in the wife's value of time, measured as her wage or schooling, on age at marriage is positive and significant--the elasticities evaluated at the mean are approximately

.04 in each regression. As in Malaysia, as her time becomes more valuable, the gains from marriage decrease, and she substitutes time in the market for time that she would spend working in the household.

Second, when the husband's schooling is included as a regressor, his income increases the age at marriage. This variable is not a predicted wage or value of time but predicted annual earnings and, therefore, includes an endogenous labor supply effect which cannot be separated from the wage effect. The effect of a change in the husband's level of schooling on age at marriage is negative and significant. The elasticity evaluated at the mean is -.02. The husband's schooling variable probably captures an efficiency effect as well as the negative wealth effect. An increase in his level of schooling, will raise his efficiency in household production and unambiguously increase the gains to marriage.

Third, the proxies for the wife's family background--father's income and mother's schooling--are positive and significant determinants of the age at marriage; the elasticity of age with respect to mother's schooling and the elasticity of age with respect to father's income, evaluated at the sample means, are .005 and .035 respectively. These results are as expected; the more wealthy the home environment, the later the age at marriage.

Fourth, the year of marriage is a positive determinant of the age of marriage. The trend in age at marriage is significantly upwards if we control for individual variation in wages and wealth.

The regression samples used in estimating the age at marriage equations include only those women who are currently married. We obviously do not know

TABLE 5. EMPIRICAL RESULTS FOR AGE AT MARRIAGE IN JAPAN (1110 observations)[a]

Independent Variable	(1)	(2)	(3)	(4)
Intercept	-119.706 (5.31)	-86.442 (-4.12)	-115.601 (-4.98)	-96.029 (-4.66)
ln Wife's value of time (imputed)	.908 (1.64)	.745 (1.40)	-	-
Wife's schooling	-	-	.078 (1.59)	.098 (2.03)
ln Husband's Income (imputed)	.801 (1.28)	-.369 (0.66)	1.060 (1.84)	-
Husband's schooling	-1.001 (-3.87)	-	-1.059 (-4.00)	-.817 (-3.56)
Mother's schooling	.260 (1.23)	.222 (1.04)	.241 (1.13)	.288 (1.36)
ln Father's Income (imputed)	.843 (2.14)	.850 (2.14)	.832 (2.11)	.919 (2.34)
Year of marriage	.059 (5.89)	.050 (5.13)	.057 (5.59)	.054 (5.36)
F-statistic	10.26	9.24	10.23	11.57
R-square	.05	.04	.05	.05

[a] t-statistics in parentheses.

the age at marriage for never-married women. Young women who are currently married are not a random sample of their cohort. They have a higher probability of ever-marrying then their counterparts; their inclusion in the sample may lead to selectivity bias in our results. For the Malaysian sample, no correction for selectivity bias can be performed because only ever-married women were included in the survey. For the Japanese sample, however, we can test for the presence of selectivity bias by analyzing the decision to marry itself. The test procedure is outlined in Heckman (1979); we estimate a logit model of the decision to marry rather than a probit model. (See Hay (1979). Inclusion of the adjustment for selectivity bias results in a slight decrease in overall significance of the estimates (e.g. the F-statistic for the first specification in Table 5 drops from 10.26 to 9.35). The coefficient for the selection variable is itself insignificant, and the remaining coefficients change very little. Since there is virtually no evidence of selectivity bias, we chose to present the most significant results--those uncorrected for this bias--and to ignore the sample selection issue.

Conclusions

It is apparent from these regression results that age at marriage in Japan and Malaysia does respond significantly to changes in socioeconomic variables and that it has been following an exogenous time trend. We found a marked difference in the response of age at marriage to changes in the value of a woman's time in the two countries. In Malaysia, a higher value

of time encouraged an earlier marriage while in Japan a higher value of time encouraged a later marriage; both effects were quite small. However, the responses to changes in male and female schooling and the husband's wage were very similar in both countries; increases in the wife's schooling and the husband's wage resulted in later marriage but increases in the husband's schooling resulted in earlier marriage. These similarities in response appear even more significant given the cultural and developmental diversity between Japan and Malaysia.

There is a significant upward time trend, in both countries. For Malaysia, however, this time trend is much steeper than for Japan, with coefficients of about 0.15 and 0.06 respectively. This disparity may result in part from the very different pace at which these countries are undergoing economic development. Rapidly changing social attitudes toward single women may also steepen this time trend in Malaysia relative to Japan.

Characteristics of the wife's background (available for Japan only) increase the wife's age at marriage. If her mother has accumulated human capital or her father has a large income, income outside of marriage rises, reducing the need to marry at an early age. Rural residents experience later ages at marriage than urban women, and Malay women experience later ages at marriage than Chinese or Indian women (available for Malaysia only).

We conclude that an understanding of changing social conditions is equally important in explaining marriage patterns as isolating an exogenous time trend. Increasing labor force participation of women and changing attitudes towards the employment of married women have made alternatives to marriage much more attractive. We do agree with Hogan that participation in time intensive activities--such as regular full-time employment--is a key

determinant of marriage but find his contention that family background can be ignored as unsuitable among Japanese and Malaysian women. Our results also support the work of Keeley and Friedan; the value of time and the availability of alternative income sources are crucial in determining changes at age at marriage.

APPENDIX

ESTIMATING WAGE AND INCOME VARIABLES

As discussed in the text, estimation of the marriage model requires measures of the value of the wife's time, the value of the husband's time and the female's transferred endowment as proxied by her father's income. The procedure for measuring the lifetime value of the female's time takes into consideration the censoring error of predicting a wage for all women based only on the working sub-sample. Since income information was reported for the husband and the father only if they were the primary income earner, we use instrumental variables predictions for these two income measures. Each predicting equation is discussed in turn.

WIFE'S WAGE

The measured market wage may understate the true value of time for non-working women. Hence the predicted value of the female's time is set equal to an instrumental value of the market wage if they are working in the paid labor force and to their predicted reservation wage if they are not working in the paid labor force. This procedure is based on work by Cogan (1975). The lifetime offered wage W_o is a function of each woman's level of schooling and her labor market experience :

$$W_o = f_o \text{ (schooling, experience)} \qquad \text{(A.1)}$$

Following Mincer (1963), we define the experience variables as :

$$\text{Experience} = \text{Age} - \text{Schooling} - 6. \qquad \text{(A.2)}$$

The reservation wage is defined as:

$$W_R = f_R \text{ (schooling, husband's income, family business, home ownership).} \quad \text{(A.3)}$$

The choice to participate in the paid labor force in the current period relies on a comparison of the reservation wage with the offered wage. In order to estimate the parameters of the participation and wage functions, we must first specify functional forms and stochastic structures:

$$\ln W_o = \beta_{o1} + \beta_{o2} \text{ Schooling} + \beta_{o3} \text{ Experience} + \varepsilon_o \quad \text{(A.4)}$$

$$\ln W_R = \beta_{R1} + \beta_{R2} \text{ Schooling} + \beta_{R3} \text{ husband's income} + \beta_{R4} \quad \text{(A.5)}$$
$$\text{family business} + \beta_{R5} \text{ home ownership} + \varepsilon_R$$

where ε_o and ε_R are independent and identically distributed Weibull errors. The probability of labor force participation (P_i) is then:

$$P_i = \Pr (\ln W_o - \ln W_R > \varepsilon_R - \varepsilon_o) = \frac{1}{1 + e^{-(\beta_o X_o - \beta_R X_R)}} \quad \text{(A.6)}$$

The parameters of the participation function may now be estimated with a logit technique since $\varepsilon_R - \varepsilon_o$ has a logistic distribution (McFadden (1975)). Given the parameters of the market wage, estimated by OLS, we may then identify the reservation wage function. These estimates are presented in Table A.1 for Malaysia and A.2 for Japan.

Table A.1. Estimated Equations for Predicting the Value of Time: Malaysia (t-statistics in parentheses)[a]

Independent Variable	Means	Labor Force Participation[b,c]	Market Wage	Reservation Wage
Intercept		-.824 (2.105)	-.177 (.0705)	.589
Years of Wife's Schooling	3.771	.0489 (1.947)	.142 (9.913)	.096
Years of Husband's Schooling	5.709	-.026 (-1.442)	-	.024
Wife's Experience	23.917	.066 (2.352)	.062 (3.433)	-
Wife's Experience Squared	628.261	-.747D-03 (1.362)	-.718D-03 (-2.078)	-
Unearned Wealth	390.703	.376D-05 (.134)	-	-.350D-05
Family Business Dummy	.337	.439 (3.119)	-	-.378
Home Products Dummy	.011	.673 (.987)	-	-.625
Urban Dummy	.214	-.906 (5.570)	.175 (1.688)	1.018
Market Center Dummy	.197	-.997 (-5.558)	-.113 (-1.046)	.814
Wife of Chinese Origin Dummy	.391	.217 (1.529)	.205 (2.321)	.009
Wife of Indian Origin Dummy	.117	.440 (2.136)	.431 (3.499)	.022
χ^2_{11}		101.27	-	-
-log likelihood		755.537	-	-
F statistic		-	20.08	-

[a]Sample size is 1170 households.

[b]t-statistics are asymptotic

[c]Fifty-four percent of all women are working.

Table A.2. Estimated Equations for Predicting the Value of Time: Japan

(t-statistics in parentheses)[a]

Independent Variable	Means	Labor Force Participation[b,c]	Market Wage	Reservation Wage
Intercept	--	13.5054 (2.20)	4.7038 (19.16)	2.9168
Years of Schooling	10.72	.01105 (.75)	.08528 (4.90)	.08250
Experience	19.60	.03092 (4.03)	.003835 (1.05)	--
Home Ownership Dummy	0.60	-.7538 (-4.39)	--	.09091
Family Business Dummy	0.22	.7562 (-3.74)	--	.1291
ln Husband's Predicted Income	14.56	-1.05 (-2.47)	--	.1247
χ^2_5	--	64.37	--	--
-log likelihood	--	474.53	--	---
F-statistic	--	--	13.60	--

[a] Sample size is 1110 households.

[b] t-statistics are asymptotic

[c] Fifteen percent of all women are working.

HUSBAND'S INCOME

The predicting equation for the husband's income is based on a linear model in which the dependent variable, the natural logarithm of annual earnings, is regressed on three dummy variables indicating the highest level of schooling which the husband completed, and a set of dummy variables describing the husband's occupation. Since the husband's age is not reported, the wife's age serves as a proxy. A dummy variable, equal to one if the husband has ever been unemployed represents disruption in work experience. Table A.3 presents the results for Malaysia and Table A.4 contains the results for Japan.

FATHER'S INCOME

The father's income is reported only for those Japanese women whose fathers are the primary income earner. Table A.5 presents the predicting equation based on the available sample information. The model for the Japanese father is similar to that for the husband. A variable equal to one if the father completed college represents the father's schooling. Dummy variables for seven occupational categories are also included.

Table A.3. Estimates for Predicting the Husband's Value of Time: Malaysia (882 observations)

Independent Variables	Means	Coefficient	t-statistic
Constant		.876	5.164
Husband's Experience	27.217	.029	2.999
Husband's Experience Squared	883.92	-.000373	-2.360
Huband's Schooling	5.776	.106	12.036
Husband of Chinese Origin-Dummy	.384	.434	7.266
Husband of Indian Origin-Dummy	.123	.164	1.920
Urban Dummy	.213	.382	5.473
Market Center Dummy	.210	.405	5.481
F-statistic			66.59
R-Square			.346

Table A.4. Estimates for Predicting the Husgand's Income: Japan

(918 Observations)

Independent Variables	Means	Coefficient	t-statistic
Intercept	--	13.9613	232.26
Ever unemployed (yes=1)	0.06	-0.1494	-2.91
High School	0.38	0.1558	4.88
Technical School or Junior College	0.11	0.2006	4.31
College	0.24	0.3291	7.76
Wife's Age	37.23	0.007744	5.59
Occupational Variables			
Self-employed	0.19	.3033	8.46
Professional	0.09	.1238	2.38
Manager	0.07	.4282	7.75
Salary man, large firm	0.16	.2125	5.09
Salary man, small firm	0.11	.1371	3.06
Blue collar, large firm	0.09	.07063	1.51
F-statistic		29.34	
R-square		.26	

Table A.5. Estimates for Predicting the Father's Income: Japan

(72 Observations)

Independent Variables	Means	Coefficient	t-statistic
Intercept	--	14.9156	75.24
College	0.17	.1768	1.01
Farmer	0.14	-.5442	-2.25
Self-employed	0.24	-.09706	-0.45
Manager	0.07	-.1705	-0.63
Salary man, large firm	0.14	-.3225	-1.42
Salary man, small firm	0.07	-.1919	-0.69
Blue collar, large firm	0.11	-.3936	-1.57
Blue collar, small firm	0.15	-.6054	-2.55
F-statistic		2.66	
R-square		.25	

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