WHY DO MARRIED MEN EARN MORE: PRODUCTIVITY OR MARRIAGE SELECTION?

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Using data from the Current Population Survey March Supplement 1999, this study examines why married men earn more than men who have never married. We find that the marriage wage premium cannot be attributed to the unobservable higher earnings capability of married men. Instead, wage gains from marriage are explained by the degree of specialization within the household. Our findings cast doubt on the argument that the selection of high-ability men into marriage is the cause of the marriage wage premium. (*JEL* J12, J31)

I. INTRODUCTION

Labor economists have devoted considerable effort to explaining why married men earn higher wages than men who have never married. A number of theoretical hypotheses have been advanced to explore the nature of this marriage wage premium. The dominant theory is the productivity hypothesis, which argues that marriage makes men more productive (Becker, 1991). Married men have greater opportunities to specialize in labor market activities when their wives specialize in home production. The marriage wage premium reflects a productivity gap between married and never-married men, stemming from different conditions for human capital accumulation in market work.

A competing argument is the selection hypothesis (Nakosteen and Zimmer, 1987, 1997). This reverses the direction of causality, proposing that men with a higher earnings capability are valued more in the marriage market and are thus more likely to marry. The marriage premium mirrors the marriage selection pattern. Married men are more productive not because they become more productive after marriage, but because they were more productive before marriage.[1]

While there is compelling evidence that married men have higher earnings than never-married men (Hill, 1979), the relative merits of the productivity and selection arguments in explaining the existence of the marriage premium remain to be established. Nakosteen and Zimmer (1987) argue that the marriage premium is a statistical artifact arising from a sorting process in which high-wage males tend to be selected into marriage. When selection effects are accounted for in their wage regression, the marriage premium remains numerically large

1. A possible explanation for the marriage wage premium that is not productivity related is employer discrimination in favor of married men. Employers may be paternalistic in supporting men with families and may be particularly supportive of men whose wives do not work in the labor market. Another argument unrelated to productivity is that the marriage premium arises as a compensating wage differential. Reed and Hartford (1989) show that married men tend to choose jobs with fewer amenities and greater wage compensation. Although we acknowledge that these hypotheses provide consistent explanations for the marriage premium, we do not attempt to test them in this study.

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ABBREVIATIONS

CPS: Current Population Survey
IV: Instrumental Variable
MSA: Metropolitan Statistical Area
NLS: National Longitudinal Survey
NLSY: National Longitudinal Survey of Youth
OLS: Ordinary Least Squares

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but becomes statistically insignificant. However, Korenman and Neumark (1991) show that the selection hypothesis is an incomplete explanation of the marriage premium. They find that less than one half of the marriage premium vanishes when unobservable individual factors affecting both wages and marriage are removed. The remaining premium is interpreted as the productivity-enhancing effects of marriage.

Later studies examine the validity of the productivity explanation. Using measures for the household division of labor, such as a wife's labor market hours and the number of children in the household, the studies investigate the effects of household specialization on a husband's earnings. According to the productivity hypothesis, men whose wives specialize in home production should have a larger premium than men whose wives work in the labor market. The evidence for this is mixed. Daniel (1992) and Gray (1997) find that the marriage premium is negatively associated with the wife's labor market hours, whereas Loh (1996) and Jacobsen and Rayack (1996) find little evidence that the marriage premium is explained by productivity differences.

Past work tries to clarify the relationship between marriage, household specialization, and a husband's earnings, but it does not allow us to reach an empirical consensus about the cause of the marriage premium. In this article we present a new empirical framework to test the relative merits of two competing, but not mutually exclusive, hypotheses.

First, we develop a switching regression model with endogenous marriage selection. The selection hypothesis is founded on the premise that a man's attractiveness as a potential mate depends upon his observed earnings as well as unobservable individual traits that are positively related to his earnings potential. Controlling for these unobservables gives an estimate of a marriage premium, which is different from an estimate of the model where marital status is assumed to be exogenous. Most empirical work makes inferences of marriage selection based primarily on the comparison of the magnitudes of the marriage premiums estimated from alternative models. Their inferences are legitimate but not very persuasive. It would be more convincing to infer marriage selection from parameter estimates that indicate an actual correlation between unobservable marriage-affecting traits and unmeasured abilities. Our model incorporates a covariance structure between unobservable earning capabilities and unmeasured traits that are valued in the marriage market. The covariance estimates are used to test the selection hypothesis.

Second, we decompose the marriage premium into two parts: a potential wage premium and a wage penalty associated with the wife's labor market hours. This decomposition allows us to examine whether the productivity hypothesis is consistent with the observed relationship between the marriage premium and household specialization. We use the wife's labor market hours to measure the degree of specialization within the household. However, there is an endogeneity problem in the wife's labor market hours because the labor supply of a wife is arguably affected by her husband's earnings. An instrumental variable (IV) that is highly correlated with the wife's labor supply and independent of the error term in the husband's wage equation could solve this endogeneity problem. We have, therefore, constructed an IV for the wife's labor market hours.

We have estimated the switching regression model using data drawn from the Current Population Survey (CPS) March Supplement 1999. The estimation results support the productivity hypothesis. Taking selection effects into account, married men still earn higher wages than do never-married men. The decomposition estimates show that there is a potential wage gain from marriage as well as a wage penalty associated with the wives' labor market hours. However, we have found little evidence supporting the selection hypothesis. The marriage selection pattern detected from our data is not consistent with the selection hypothesis.

II. FRAMEWORK

A man's attractiveness in the marriage market depends on his observed earnings as well as individual traits that are not observed by researchers. The selection argument rests on the premise that these unobservable attributes might be associated with unmeasured earning capabilities. For example, a man's physical appearance is an

attribute that is valued in the marriage market but is not recorded in most data sets. Hamermesh and Biddle (1994) show that physical appearance has a significant impact on earnings; plain-looking people earn less than average-looking people, who earn less than the good-looking.

When unmeasured earning capabilities are correlated with unobserved individual traits valued in the marriage decision, conventional least squares estimates of the wage function, in particular the marital status coefficient and its standard error, are biased and inconsistent. Previous studies control for potential correlation either by two-stage regression with endogenous marital status (Nakosteen and Zimmer, 1987; Blackburn and Korenman, 1994) or fixed-effects models (Korenman and Neumark, 1991; Daniel, 1992; Loh, 1996; Gray, 1997).[2] Although the models account for the correlation between marital status and wages, they do not necessarily reveal the underlying marriage selection process. Therefore, we have developed a switching regression model to analyze the structure of the marriage selection process and the resulting marriage premium.

Consider a latent variable, MS_i^*, that denotes an unobservable index of the propensity of individual i to be observed as married at a point in time. The latent index is expressed as

$$(1) \qquad MS_i^* = Y_i'\alpha + \kappa_1 \ln W_{si} + \kappa_2 \ln W_{mi} + u_i^*,$$

where Y_i is a vector of predetermined explanatory variables known to affect marital status, and $\ln W_{si}$ and $\ln W_{mi}$ are the log of hourly wages of individual i in never-married and married states, respectively. In the above specification, α represents an unknown vector of coefficients, while κ_1 and κ_2 are enticements toward marriage of wages received under the alternative marital status. The error term, u_i^*, is assumed to be normally distributed with mean zero and variance σ_u^2.

2. Cornwell and Rupert (1997) point out problems in existing models. Two-stage regression models have difficulty in specifying the process that generates marital status. Most fixed-effects models identify the marriage premium through changes in marital status of individuals during the sample periods. Unless those who marry for the second time are distinguished from those who marry for the first time, the marriage premium captured by the intercept shift may decrease as the proportion of those who have remarried increases.

An individual is married if $MS_i^* \geq 0$ and is not married if $MS_i^* < 0$. The latent variable MS_i^* cannot be observed. Instead, we observe the marital status indicator as

$$MS_i = \begin{cases} 1 & \text{if } MS_i^* \geq 0 \\ 0 & \text{if } MS_i^* < 0. \end{cases}$$

The wage equations have different structures corresponding to each of the mutually exclusive marriage states:

$$(2) \qquad \begin{aligned} \ln W_{si} &= X_i'\beta + \gamma \cdot MS_i + \varepsilon_{si} \\ &\qquad \text{if } MS_i^* \geq 0 \\ \ln W_{mi} &= X_i'\beta + \gamma \cdot MS_i + \varepsilon_{mi} \\ &\qquad \text{if } MS_i^* < 0, \end{aligned}$$

where X_i denotes a vector of explanatory variables consistent with human capital theory and other control variables, and ε_{si} and ε_{mi} denote normal random variables with zero means and variances σ_s^2 and σ_m^2, respectively. The vectors of explanatory variables X_i and coefficients β in each equation are assumed to be identical. Thus, the parameter γ measures the wage premium earned by married men. The structure of the wage equations is analogous to that of the marital status dummy approach. The wage premium obtained in this specification is an average of the marriage wage premium in the sense that the degree of specialization across households is averaged out.

When wives' labor market hours are assumed to be a reasonable approximation of the degree of household specialization, the average marriage premium can be linearly decomposed into a potential wage premium and a wage penalty associated with the wife's working hours such that $\gamma(WH_i) = \gamma_1 + \gamma_2 \cdot WH_i$. The resulting wage equations are expressed as

$$(3) \qquad \begin{aligned} \ln W_{si} &= X_i'\beta + (\gamma_1 + \gamma_2 WH_i) \cdot MS_i + \varepsilon_{si} \\ &\qquad \text{if } MS_i^* \geq 0 \\ \ln W_{mi} &= X_i'\beta + (\gamma_1 + \gamma_2 WH_i) \cdot MS_i + \varepsilon_{mi} \\ &\qquad \text{if } MS_i^* < 0, \end{aligned}$$

where WH_i denotes the working hours of married man i's wife. The productivity hypothesis predicts that γ_1 (the potential wage premium) will be positive and γ_2

(the penalty associated with the wife's labor market hours) will be negative. The obvious problem in equation (3) is the endogeneity between the wife's working hours and her husband's wages. We used the IV estimation to solve this problem. The observed working hours, WH_i, are replaced with their predicted values, $\widehat{WH}_i$, obtained using the Tobit method.

Substituting wage equations (2) or (3) into equation (1) yields the reduced form marriage selection equation:

$$MS_i^* = Z_i'\xi + \nu_i, \tag{4}$$

where Z_i includes Y_i and all the explanatory variables in the wage equations. The error term, $\nu_i (= \kappa_1 \varepsilon_{si} + \kappa_2 \varepsilon_{mi} + u_i^*)$, is normally distributed with mean zero and variance σ_ν^2.

To complete the model, additional assumptions on the error terms of the wage and marriage selection equations are necessary. Since ξ can be estimated only up to a scale factor, we normalize the variance of the error term in the marriage selection equation such that $\text{var}(\nu_i) = 1$. We also assume that, ε_{si}, ε_{mi}, and ν_i follow a trivariate normal distribution, which has a zero mean vector and a covariance matrix:

$$\sum = \begin{bmatrix} \sigma_s^2 & \sigma_{sm} & \sigma_{sv} \\ & \sigma_m^2 & \sigma_{mv} \\ & & 1 \end{bmatrix}. \tag{5}$$

Though it is a rather strong assumption, it does have validity. The parameters of the covariance matrix describe the selection process in the marriage market. If $\sigma_{sv} = \sigma_{mv} = 0$, then we have a switching regression model with exogenous switching (Maddala, 1983). A man's marital status is determined by factors exogenous to earnings, and the marriage premium can be estimated by ordinary least squares (OLS). Otherwise, we have endogenous regime switching, where marital status is determined by a stochastic process whose random unobservable components are correlated with unobservables in the wage equations. If $\sigma_{sv} < 0$ and $\sigma_{mv} > 0$, then unmeasured earning capabilities are positively correlated with unobservable traits that are valued in the marriage market. In this case, as the selection hypothesis proposes, men of high earning capabilities are selected into marriage. The reverse case, $\sigma_{sv} > 0$ and $\sigma_{mv} < 0$, casts doubts on the relevance of the selection hypothesis.

Finally, the likelihood function of the model can be written as

$$\begin{aligned} &L(\beta, \gamma, \xi, \sigma_s^2, \sigma_m^2, \sigma_{sv}^2, \sigma_{mv}^2) \\ &= \Pi \Bigg[\int_{-\infty}^{-Z_i'\xi} f(\ln W_{mi} - X_i'\beta \\ &\qquad - \gamma(\widehat{WH}_i), \nu_i) d\nu_i \Bigg]^{MS_i} \\ &\qquad \cdot \Bigg[\int_{-Z_i'\xi}^{\infty} g(\ln W_{si} - X_i'\beta_i, \nu_i) d\nu_i \Bigg]^{1-MS_i}, \end{aligned} \tag{6}$$

where f and g are bivariate normal density functions of $(\varepsilon_{mi}, \nu_i)$ and $(\varepsilon_{si}, \nu_i)$, respectively. The notation $\gamma(\widehat{WH}_i)$ is used as a compact expression for two specifications to be estimated:

$$\gamma(\widehat{WH}_i) = \begin{cases} \gamma & \text{(7a)} \\ \gamma_1 + \gamma_2 \cdot \widehat{WH}_i. & \text{(7b)} \end{cases}$$

From the likelihood function, we can estimate β. However, we can estimate $\xi, \sigma_s^2, \sigma_m^2, \sigma_{sv}$, and σ_{mv} only up to a constant scale. We cannot estimate σ_{sm}, as it does not appear in the likelihood function. As in the case of OLS, identification of the coefficient of marital status dummy, γ or γ_1, requires equality in the coefficient vectors, β, especially in the coefficient of constant terms. The wage penalty associated with wives' labor market hours, γ_2, is always estimable even without the equality assumption.

III. DATA AND SUMMARY STATISTICS

The CPS March Supplement 1999 is used in this study. The majority of earlier studies have used longitudinal data sets, such as the National Longitudinal Survey (NLS) of Young Men, the National Longitudinal Survey of Youth (NLSY), and the Michigan Panel Study of Income Dynamics. The results from these studies apply mainly to workers interviewed throughout the 1970s and

the 1980s. During the past few decades, age at first marriage has increased and women's labor market participation has risen, which may have caused a decline in the marriage premium (Blackburn and Korenman, 1994; Gray, 1997). The CPS 1999 data show recent changes in marriage formation and household specialization and provide up-to-date information on the marriage premium.

Our CPS sample consists of working males aged 18 to 40 who are not enrolled in school. The NLS surveyed a cohort of men aged 14 to 24 in 1966, and the NLSY is a nationally representative sample of women and men aged 14 to 21 in 1979. The span of ages in our study is wider than any studies using the NLS and NLSY. In particular, we include relatively older males to account for the trend of delayed first marriages (Bloom and Bennett, 1990). The median age at male first marriage was 23.2 years in 1970 and increased to 26.7 years in 1998. A sample restricted to men of younger ages tends to omit men who may postpone their marriage until their education is completed.[3]

To implement our model, we need information on the wife's individual characteristics as well as on other family characteristics. The CPS data are constructed in such a way that multiple families, and even unrelated persons, are intermingled in a household unit. Thus, exact matching of the husband and the wife is required to construct a sample of married individuals. We use household and spousal identification information to match couples. We exclude from the sample individuals with other marital status, such as widowed, divorced, and separated, as it is impossible to recover past family information for these types of men in the CPS data. After imposing restrictions and omitting individuals who do not have relevant information, we obtained 2,686 sample observations.

Table 1 presents some summary statistics of the sample by marital status. Married men are 58.7% of the sample, while 41.3% have never been married. Of the married men, 70.3% have working wives and 29.7% have nonworking wives. The average number of hours worked by a wife is 25.6 hours a week, including 0 hours for nonworking wives. Because we excluded single women and married women with unemployed husbands from the sample, the higher percentage of working wives in the sample does not necessarily imply a higher female labor force participation rate. However, it can be partly attributed to the increased female labor supply in recent years.

The hourly wages calculated from usual weekly earnings and usual weekly working hours show that there is a wage gap between married men and never-married men. The average hourly wage of married men is 29.7% higher than that of never-married men; married men earn $3.81 per hour more than never-married men. The wage gap between these two groups of men is not directly comparable, because they have different characteristics related to earnings, such as age, schooling, and labor market experience. As expected, married men are older than never-married men by about six years and accumulate about five years more labor market experience.[4] Furthermore, married men appear to have higher average schooling attainment than never-married men. Fifty-six percent of married men and 50% of never-married men have at least some college education.

Table 1 also shows the differences in marriage formation across regions and races. A larger percentage of married men live in Southern states, whereas a larger percentage of never-married men reside in metropolitan areas. The proportion of white males is higher in the subsample of married men, whereas the proportion of other races is higher in the subsample of never-married men.

IV. EMPIRICAL RESULTS

Preliminary Findings

We used a standard Mincer-type human capital earnings function to estimate the marriage wage premium and the effects of household specialization. The natural logarithm of hourly wages is regressed on education dummies representing the level of education

3. We thank anonymous referees for pointing out the problems associated with age restrictions.

4. Since the CPS data does not include information on an individual's labor market history, the years of labor market experience are imputed from age and the level of education completed.

TABLE 1
Summary Characteristics of Sample (Men Aged 18–40, CPS March Supplement 1999)

Variables	Whole Sample	Never-Married Men	Married Men
Hourly wage in dollars	15.06	12.82	16.63
	(8.50)	(7.48)	(8.82)
Age	30.70	27.34	33.05
	(5.96)	(5.69)	(4.94)
Education			
High school graduate	0.35	0.38	0.32
Some college	0.27	0.26	0.28
College graduate	0.20	0.20	0.20
Master's degree or more	0.07	0.04	0.08
Experience (years in labor market)	10.96	7.80	13.18
	(5.83)	(5.40)	(5.05)
Lives in South	0.29	0.27	0.31
Lives in MSA	0.79	0.82	0.77
Race			
White	0.87	0.83	0.89
Black	0.08	0.10	0.07
Other	0.05	0.07	0.04
Index of marriage market condition[a]	0.04	0.04	0.04
	(0.02)	(0.02)	(0.02)
Mother's country of birth (= 0 if born in the U.S.; = 1 otherwise)	0.19	0.20	0.18
Wife, weekly working hours	NA	NA	25.64
			(18.82)
Wife, age	NA	NA	32.00
			(5.83)
Wife, education			
High school graduate	NA	NA	0.30
Some college	NA	NA	0.30
College graduate	NA	NA	0.23
Master's degree or more	NA	NA	0.06
Wife, labor market hours (observations)			
Works 30 hours or more a week	NA	NA	912
Works less than 30 hours a week	NA	NA	197
Does not work	NA	NA	469
Number of own children			
Under age 6	NA	NA	0.71
			(0.79)
Between age 6 and age 18	NA	NA	0.82
			(1.01)
Income exclusive of earnings and self-employment income (in thousand dollars)	NA	NA	2.95
			(7.93)

continued

TABLE 1 continued

Variables	Whole Sample	Never-Married Men	Married Men
Lives with relatives (1 = yes; 0 = otherwise)	NA	NA	0.07
Proportion of females in total employment[b]	NA	NA	0.46 (0.01)
Sample size	2686	1108	1578

Notes: Numbers in parentheses are standard deviations of variables.
[a]The index of marriage market condition is defined as the absolute difference between the number of males and number of females divided by total population by state. The index is calculated from the Census of Population, 1990.
[b]The proportion of females in total employment is defined as the number of female employment divided by total number of employment in each state. It is also constructed from the Census of Population, 1990.

completed, labor market experience and its square, a dummy for living in a Southern state, a dummy for residing in a metropolitan statistical area (MSA), and a black race dummy.

Column (1) of Table 2 shows the OLS estimates of the wage regression with a marital status dummy. Wages increase with education level and with labor market experience at a decreasing rate. The estimates of other variables have the expected signs, and all of the estimates are statistically significant at the 1% level. The coefficient of the marital status dummy, γ, is 0.117. Holding other variables constant, this estimate implies that married men earn 12.4% more than never-married men. This is very close to estimates of the marriage premium reported in other recent studies.[5]

Columns (2) and (3) of Table 2 examine whether the marriage premium varies with the degree of household specialization. If the productivity hypothesis holds, we expect the magnitude of the husband's wage premium to decline as the wife works more hours in the labor market. Column (2) reports the estimates of the dummies for the wife's labor market hours. They are 0.138, 0.135, and 0.102 for married men with wives who work in the labor market 30 or more hours a week, less than 30 hours a week, and those not working in the labor market, respectively. These results imply that married men with nonworking wives earn 3.7% more than married men whose wives work more than 30 hours a week. However, married men earn more than never-married men, regardless of the number of hours their wives work in the labor market.

The effects of the wife's working hours on a married man's wages are reexamined in column (3). Instead of using dummies for the working hours of wives as in column (2), we include wives' actual working hours and a marital status dummy. The coefficient of wives' working hours is about -0.001 and is statistically significant at the 10% level. The earnings of married men decrease by about 0.1% for each additional hour worked by their wives in the labor market.

The Marriage Wage Premium and Its Decomposition

The OLS results given in Table 2 are consistent with the productivity hypothesis. However, we need to consider the possible endogeneity problem associated with marital status and the wife's labor supply. If a random component in earnings is correlated with a marital status dummy, the OLS estimate of the marriage premium is biased and inconsistent. In a similar vein, the coefficients of the wife's working hours can also be biased if a husband's earnings affect his wife's hours. Several IVs have been introduced in earlier work to solve this endogeneity problem. In Daniel (1992), the wife's working hours are instrumented by the individual characteristics of the wife and the presence of children. Gray (1997) uses men's attitude toward gender roles in household production together with child dummies.[6]

5. Loh (1996) reports that the OLS estimate of the marital status dummy is 0.091. Gray (1997) finds that the cross-sectional estimate of the marital status dummy is 0.106. See Schoeni (1995) for evidence on the marriage premium among developed countries.

6. However, the presence of infant children as an IV is questionable. Demand for a man's housework may increase with the number of children. Cornwell and Rupert (1997) show that parenthood can affect men's earnings.

TABLE 2
Preliminary Results: OLS Estimates of Marriage Wage Premium and Effects of Wife's Labor Market Hours

Independent Variables	**(1)**	**(2)**	**(3)**
Constant	1.844**	1.841**	1.841**
	(0.035)	(0.035)	(0.067)
Education			
High school graduate	0.168**	0.171**	0.171**
	(0.026)	(0.026)	(0.026)
Some college	0.326**	0.330**	0.330**
	(0.027)	(0.027)	(0.027)
College graduate	0.616**	0.619**	0.620**
	(0.028)	(0.029)	(0.029)
Master's degree or more	0.787**	0.787**	0.789**
	(0.038)	(0.038)	(0.038)
Experience	0.046**	0.046**	0.046**
	(0.005)	(0.005)	(0.005)
Experience-squared/100	−0.118**	−0.117**	−0.117**
	(0.024)	(0.024)	(0.024)
Lives in South	−0.081**	−0.082**	−0.081**
	(0.017)	(0.017)	(0.017)
Lives in MSA	0.073**	0.074**	0.073**
	(0.019)	(0.019)	(0.019)
Black	−0.105**	−0.101**	−0.101**
	(0.029)	(0.029)	(0.029)
Marital status	0.117**		0.140**
	(0.018)		(0.022)
Dummies for wife's labor market hours			
Works 30 hours or more a week		0.138**	
		(0.024)	
Works less than 30 hours a week		0.135**	
		(0.032)	
Does not work		0.102**	
		(0.020)	
Wife's actual labor market hours			−0.0009+
			(0.0005)
Adjusted R^2	0.355	0.366	0.356
Sample size	2,686	2,686	2,686

Notes: Column (1) reports the OLS estimation results of wage equation with a marital status dummy. Column (2) reports the OLS estimation results of wage equation with three dummies for the wife's labor market hours. Column (3) reports the OLS estimation results of wage equation with a marital status dummy and the wife's actual labor market hours. For all columns, dependent variables are the log of hourly wages in dollars. Numbers in parentheses are standard errors of variables.

+Significant at the 10% level.

*Significant at the 5% level.

**Significant at the 1% level.

Following Jacobsen and Rayack (1996), we use the wife's predicted working hours as an IV. We estimate the wife's predicted hours as a function of the characteristics of both the wife and the household, using the Tobit method. For the wife's predicted hours to be qualified as an IV, the wife's labor market hours equation has to contain at least one exogenous variable that is not correlated with unobservables in her husband's wage equation. Two exogenous variables are contained in the labor market hours equation. The first is a dummy variable indicating whether a couple lives with relatives other than their own children. The presence of relatives may affect a wife's labor supply by lowering the costs of child rearing, but it is not likely to affect her husband's wages. The second exogenous variable is the proportion of female employment, which is defined as the number of female employment divided by the total number of employment in each state, calculated from the 1990 Census of Population. This variable reflects the relative availability of jobs for females. It is reasonable to assume that variations in the wages of married men are not driven by interstate variations in female job ratios.

Tobit estimation results of the wife's labor supply equation are shown in Table 3. A wife's labor market hours increase with her level of education and her age at a decreasing rate. The presence of children, especially children under age six, and higher nonlabor income both reduce the wife's labor market hours. The coefficient estimates of the two exogenous variables are positive and statistically significant. A wife living with other relatives and facing a favorable labor market is likely to work more hours in the labor market than her counterpart.

After replacing the actual values of the wife's working hours with the predicted hours, we estimate switching regression models with endogenous marital selection. To identify wage equations in two distinct regimes, we have to specify the process of marriage formation. The marriage selection equation contains all the variables in the wage equations plus other explanatory variables that are assumed to affect marital status. The index of marriage market condition by state and a dummy for the mother's country of birth are included in the marriage selection equation as identifying explanatory variables. The index of marriage market condition is defined as the absolute difference between the number of adult males and number of adult females divided by total adult

TABLE 3
Predicted Working Hours of Wife: Tobit Estimation Results

Independent Variables	Estimate
Constant	−76.800**
	(27.968)
Wife, age	2.778**
	(0.976)
Wife, age-squared/100	−4.374**
	(1.480)
Wife, education	
High school graduate	10.022**
	(2.383)
Some college	13.945**
	(2.392)
College graduate	16.355**
	(2.523)
Master's degree or more	19.938**
	(3.279)
Number of own children	
Under age 6	−10.524**
	(0.846)
Between age 6 and age 18	−2.501**
	(0.689)
Income exclusive of earnings and self-employment income (in thousand dollars)	−0.122+
	(0.083)
Lives with relatives	3.436+
	(2.503)
Proportion of females in total employment	0.901*
	(0.526)
Wife, white	11.498**
	(3.275)
Wife, black	20.871**
	(3.929)
σ^2	23.406**
	(0.543)
Log-likelihood	−2.053
Sample size	1,578

Notes: Numbers in parentheses are standard errors of variables.
+Significant at the 10% level.
*Significant at the 5% level.
**Significant at the 1% level.

population by state. The index is obtained from the 1990 Census of Population, and it measures the tightness of the regional marriage market. The higher the index, the lower the chances of finding a spouse in the regional marriage market. The dummy variable for the mother's country of birth is intended to reflect the marriage pattern of men whose mothers were born in foreign countries. A significant proportion of these men marry members of the same ethnic group, which implies that they may face different marriage markets.[7]

Table 4 presents the estimation results of the models. Column (1) presents the estimates of the marriage wage premium in equation (7a), and column (2) presents the estimates of the decomposition specification in equation (7b). Each column also reports the estimates of the covariance matrix of marriage and wage equations described in equation (5). All estimates of the wage equation are consistent with those given in many other studies. The control variables in the marriage selection equation have significant coefficients with the expected signs. Higher education, being black, and residing in an MSA turn out to be deterrents to marriage. Tight marriage markets exert a negative impact on the propensity to marry. The positive estimate of the dummy variable of the mother's country of birth implies that men whose mothers were born in the United States are less likely to marry than men with mothers born elsewhere.

The most striking result is that our covariance estimates cast doubt on the relevance of the selection hypothesis. Table 4 shows that the error terms in the marriage equation are negatively correlated with the error terms in the wage equation of married men. The covariance estimates, σ_{mv}, presented in columns (1) and (2) are -0.053 and -0.265 with significance at the 10% and 1% level, respectively.[8] For never-married men, the covariance estimates, σ_{sv}, are 0.023 and 0.015, but they are not statistically different from zero. The estimated covariance structure reveals that the selection of high-ability men into marriage is unlikely to be the cause of the marriage premium.

According to the covariance structure, the OLS estimate of the marriage premium is underestimated. The estimate of the marriage premium, γ, in column (1) of Table 4 is 0.120, which is slightly larger than the OLS estimate of 0.117 in column (1) of Table 2. This contrasts with previous studies that reported a decrease in the marriage premium after correcting for endogeneity in marital status. Their results imply a positive correlation between unmeasured earning capabilities and unobserved traits that are valued in the marriage market. There are at least two possible explanations. The first is that the nature of the marriage selection process may have changed over the last decade. The second is that time-invariant unobservables in fixed-effects models do not fully capture the marriage selection process, making reexamination with an explicit marriage selection process necessary.

To test the productivity hypothesis, the marriage wage premium is decomposed into a potential gain from marriage and a wage penalty associated with the wife's labor market hours in column (2) of Table 4. The results show that the productivity-enhancing effect of marriage is strongly affected by the degree of specialization within a marriage. The estimate of the potential marriage premium, γ_1, is 0.273 and is significant at the 1% level. Men whose wives specialize in home production and do not work in the labor market potentially earn 31.4% more than never-married men do. The gain that is actually realized depends on the wife's working hours. The estimate of the working wife penalty, γ_2 , is -0.006 with significance at the 5% level. The gain from marriage is diminished by 0.6% for each additional hour per week that a wife works in the labor market. We can compare these estimates with the OLS estimates in column (3) of Table 2. After correcting for the endogeneity problem of marital status and wives' labor market hours, we find a larger productivity gain from marriage and a larger wage penalty.

7. The CPS data has included questions on parents' place of birth since 1994. Using the CPS data, Card, et al. (1999) find that one-third of second-generation men of immigrants marry within their own ethnic group.

8. Since variances (σ_s^2 and σ_m^2) and covariances (σ_{mv} and σ_{sv}) are normalized by the variance of error terms in the marriage selection equation, the estimates are scaled up to a constant. The size of variance and covariance estimates in columns (1) and (2) of Table 4 are not comparable because decomposition affects the residuals in wage equations.

TABLE 4
Decomposition of Marriage Wage Premium: Switching Regression Estimates

	Marriage Wage Premium (1)		Decomposition of Marriage Wage Premium (2)	
Independent Variables	**Marriage**	**Wage**	**Marriage**	**Wage**
Constant	−1.779**	1.852**	−1.927**	1.846**
	(0.254)	(0.035)	(0.281)	(0.035)
Education				
High school graduate	−0.650**	0.162**	−0.629**	0.171**
	(0.141)	(0.026)	(0.148)	(0.026)
Some college	−0.615**	0.318**	−0.597**	0.326**
	(0.152)	(0.027)	(0.159)	(0.027)
College graduate	−0.979**	0.605**	−0.897**	0.618**
	(0.177)	(0.029)	(0.188)	(0.030)
Master's degree or more	−0.731**	0.777**	−0.758**	0.788**
	(0.248)	(0.038)	(0.261)	(0.039)
Experience	0.255**	0.048**	0.272**	0.047**
	(0.040)	(0.006)	(0.043)	(0.006)
Experience-squared/100	−0.757**	−0.125**	−0.829**	−0.125**
	(0.175)	(0.024)	(0.187)	(0.025)
Lives in South	0.171+	−0.083**	0.148	−0.085**
	(0.117)	(0.017)	(0.124)	(0.017)
Lives in MSA	−0.281**	0.073**	−0.282*	0.076**
	(0.120)	(0.019)	(0.122)	(0.019)
Black	−1.450**	−0.110**	−1.477**	−0.087**
	(0.367)	(0.029)	(0.404)	(0.031)
Predicted working hours of wife	0.211**		0.223**	
	(0.009)		(0.013)	
Index of marriage market condition	−0.048*		−0.048+	
	(0.028)		(0.031)	
Mother's country of birth	0.292**		0.219*	
	(0.120)		(0.132)	
Marital status (γ)		0.120**		
		(0.020)		
Marital status (γ_1)				0.273**
				(0.070)
Marital status × predicted				−0.006**
working hours of wife (γ_2)				(0.002)
Covariance matrix				
σ_s		0.389**		0.389**
		(0.008)		(0.008)
σ_{sv}		0.023		0.015
		(0.027)		(0.037)
σ_m		0.397**		0.404**
		(0.007)		(0.009)
σ_{mv}		−0.053*		−0.265**
		(0.038)		(0.103)
Log-likelihood		−0.648		−0.648
Sample size		2,686		2,686

Notes: Column (1) presents the estimation results of the marriage wage premium in equation (7a). Column (2) presents the estimation results of the linear decomposition specification in equation (7b). Marriage columns report the estimates for marriage selection equation. Wage columns report the estimates for wage equation along with the estimates for covariance matrix. Numbers are in parentheses are standard errors of variables.

+Significant at the 10% level.

*Significant at the 5% level.

**Significant at the 1% level.

With these two estimates, we can calculate the marriage premium corresponding to the wife's labor market hours, $\gamma_1+\gamma_2\cdot\widehat{WH}_i$. The calculated marriage premium varies from 31.4% to 3.4%, depending on the wife's labor market hours. Since married men with nonworking wives do not incur any loss in the potential gain from specialization, they earn about 31% more than never-married men. Married men whose wives work 40 hours a week in the labor market have wage gains of 3.4%. For the representative man whose wife works the average predicted hours a week (21.3 hours), the marriage premium is 15.6%. When the actual average working hours of wives (25.6 hours) are used, the marriage premium is 12.6%.

V. CONCLUSION

Using the CPS March Supplement 1999, we test the validity of the selection hypothesis and the productivity hypothesis as explanations of the source of the marriage wage premium. Our study yields two important findings. First, we find no evidence to support the selection hypothesis. The results from the switching regressions with endogenous marital selection show that unmeasured earning capabilities are not positively correlated with unobservable traits valued in the marriage process. Examination of the estimated covariance structure reveals that the selection of high-ability men into marriage is unlikely to be the cause of the marriage premium. Second, this article also shows that the gains from marriage are positively associated with the degree of specialization within the household. Wage gains from marriage are decreased by 0.6% for each additional hour per week that a wife works in the labor market. The significant negative effect of the wife's labor market hours confirms the productivity hypothesis.

Throughout the article we have emphasized the role of marriage selection in the determination of the marriage wage premium. The pattern of marital selection found in this study warrants more attention and should be reexamined in different data sets. The framework in this article can also be extended to analyses of the marriage wage premium associated with individuals having different types of marital status, such as separated or divorced. By incorporating a separation or divorce process, we could ask whether married men with low ability are more likely to separate or divorce. The covariance structure would unveil the selection patterns for marital dissolution. We have not considered the dissolution patterns in this study due to the cross-sectional nature of the CPS data. We intend to address these issues in future work.

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