Economica (1999) **66**, 297–316

For Love or Money? The Impact of Income Taxes on Marriage

By JAMES ALM and LESLIE A. WHITTINGTON

University of Colorado at Boulder and Georgetown University

Final version received 6 April 1998.

There is a large empirical literature that demonstrates the importance of economic factors in the decision to marry. Taxes, however, have been largely overlooked as a determinant of marriage, even though the tax system in the United States is not marriage-neutral; that is, when two individuals marry, their marital income tax burden is typically different—sometimes higher, sometimes lower—than their combined single income tax obligations. In this paper we explore the impact of the federal individual income tax, as well as other economic and demographic variables, on the marriage decisions of individuals. Using longitudinal data from the Panel Study on Income Dynamics for the period 1968–92, we estimate a discrete-time hazard model of the time to first marriage. We find that the probability of marriage is significantly affected by a range of economic and demographic variables. Importantly, we find that an increase in total income taxes paid by married versus single women has a negative effect on the likelihood of marriage, and that the change in the marginal tax rate is also a significant determinant of marriage in some cases; in contrast, the tax effects are rarely significant in determining marriage probabilities among men, although there are some differential responses by race. In general, the impacts of the income tax variables, even when statistically significant, are small.

'Marriage, as everyone knows, is chiefly an economic matter.'

H. L. Mencken, *Prejudices*

INTRODUCTION

Although marriage has been much romanticized over the years, it is a social institution in which individual decisions are shaped at least in part by economic factors. It is also an institution that has profound implications for such economic issues as family structure, population growth, the economic status of children and women, poverty and income distribution. Because of these connections, marriage has been the subject of numerous—and controversial—public policy debates and decisions. However, despite the increasing attention that the economics of the family has received in recent years, the forces that affect the individual's decision to marry are not yet fully understood. In this paper we examine the impact of the individual income tax, as well as other economic and demographic variables, on the likelihood of marriage.

The underlying premiss of economic models of marriage is that individuals decide to marry if they expect some positive flow of 'benefits' from the union that is greater than what they would receive if they remained single (Becker 1973, 1974). These benefits can be broadly defined, but they are typically seen as economic in nature, taking the form of such things as differential income for married couples versus single individuals, differential home productivity and the like. Taxes also seem likely to enter the marriage calculus. In particular, the individual income tax may affect the marriage decision by its differential tax treatment of married versus single individuals, as suggested—but not

empirically demonstrated—by Espenshade and Minarik (1987) and Cigno (1991), among others.

The large and insightful empirical literature on the determinants of marriage both for the United States and elsewhere often finds that marriage is in fact affected by economic factors such as the relative wages of men and women, macroeconomic conditions, female labour force opportunities and education.[1] However, it is only very recently that empirical work has examined the impact of taxation on various aspects of the marriage decision. Several studies use aggregate data to examine the impact of an average measure of the marriage tax on the level and/or the timing of marriage.[2] Several other studies use individual/household data for the United States to examine the impact of taxation on some marital decisions, such as the likelihood of divorce and the timing of marriage and divorce decisions.[3] Surprisingly, no research to date has explored the impact of the marriage tax/subsidy on the individual probability of marriage. It is largely this issue that we address here. In the process, we are also able to re-examine the impact of economic and demographic factors on the likelihood of the individual marriage decision over an extended period of time.

The neglect of taxes is no doubt understandable, yet it is none the less troubling, for several reasons. As discussed in more detail later, there is much evidence on the actual size of the change in income tax liability at marriage, which can be quite large. Also, the income tax has played an increasingly visible role in public debates on government policies towards the family. Finally, anecdotes abound in the US and foreign press on the effect of taxation on marriage, whereby couples 'live in sin' and individuals divorce in December and remarry in January, in order to avoid the tax consequences of marriage (Cook 1981).

The ways in which US federal tax policies have affected the incentives for marriage over the years seem to have emerged somewhat accidentally (Bittker 1975). The federal individual income tax was established in 1913, and originally used the individual as the unit of taxation. Because taxes did not change significantly with marriage, the tax income tax was largely 'marriage-neutral' during this time. However, income-splitting for couples was introduced in the Revenue Act of 1948, and couples were then allowed to divide their joint income regardless of relative earnings. Because of progressive marginal tax brackets, this change generated a substantial tax reduction (a 'marriage subsidy') for many married couples. Subsequently, a new income tax schedule was adopted in the Tax Reform Act of 1969 that decreased the tax liabilities of single individuals relative to those of married couples. This change created a 'marriage tax' for many couples, especially those in which both spouses had comparable earnings. Changes in the income tax laws since 1969 have altered the magnitude of the marriage tax, and have also maintained the marriage subsidy for some couples. In short, the tax consequences of marriage have been and continue to be substantial and varied.[4]

We use longitudinal data from the Panel Study of Income Dynamics (PSID) to estimate a discrete-time hazard model of the time to first marriage for 1605 individuals aged 18 and older who were unmarried at the beginning of the panel in 1968. Numerous economic and demographic variables are used, including two measures of the individual income tax, and individuals are tracked over the extended period from the beginning of the panel up to 1992.

We find that economic variables play a significant role in the marriage decision. In particular, we find that the tax consequences of marriage have a measurable impact on marriage probabilities, especially for women. However, the effect of the income tax, while statistically significant, is also small, and it differs for men and women.

In the next section we briefly discuss incorporation of income taxes in the Becker (1973, 1974) model of marriage. In Section II we describe the panel data and the estimation methods, and in Section III we present the estimation results. Summary and conclusions are given in Section IV.

I. Marriage, Economic Incentives and Income Taxes

Following Becker (1973, 1974), an individual is assumed to maximize utility by his or her choice of commodities produced in the household using market goods and time inputs. An individual will marry if consumption is greater when married than when single. The likelihood of marriage is then affected by economic and other factors that change the magnitude of household consumption as single versus married.

To be more precise, the household consumption of each individual i can be expressed as a composite commodity Z_i, equal (in the absence of taxes) to

$$(1) \qquad Z_i = [w_i T_i/(a_i p + b_i w_i)], \qquad i = f, m,$$

where the subscript i denotes female or male, w_i is the market wage of individual i, T_i is the time endowment, p is the price of the market good, a_i is the fixed amount of the market good required by individual i to produce one unit of Z_i, and b_i is the fixed amount of time required to produce one unit of Z_i.[5] The numerator of the Z-good measures the 'full income' of the household unit, while the denominator measures the 'full price' (or 'full cost') of the Z-good. This definition is modified for married individuals to reflect the joint time and market good constraints facing a married couple. An individual will marry when his or her consumption of the Z-good increases with marriage, so that the likelihood of marriage is affected by economic and other factors that change the returns to being married or single.

This simple marriage model demonstrates that factors that affect the relative gains to marriage will influence the marriage decision. However, the net impact of many of these variables is uncertain. For example, consider wage opportunities in and out of marriage. Greater individual earning capacity makes one more independent and less likely to have a financial need for marriage, and a higher wage also implies a higher marital search cost. Both of these factors tend to decrease participation in marital search. However, a higher earning capacity makes one a more attractive spouse, thereby increasing the mean offer that a person may receive. These competing effects make the impact of the individual's wage ambiguous. The wage rate of a potential spouse, on the other hand, captures returns to marriage that may not be available in the single state. Higher spouse wages unambiguously increase the potential gains from marriage, and therefore exert a positive impact on the probability of marriage. Other economic factors, such as education and parental contributions, can be similarly analysed (Grossbard-Shechtman 1993).

The basic marriage model traditionally has not considered the potential impact of income taxes on the marriage decision, and we believe that there are good reasons for extending the model in that direction. Foremost among these is the magnitude—positive and negative—of the tax change at marriage for many individuals. In other work (Alm and Whittington 1996), we have calculated the annual value of the marriage tax/subsidy in the United States over the period 1967–94. We find that the average marriage tax has varied substantially over time. For example, in 1967 couples received an average marriage *subsidy* of roughly $600, but in the 1980s couples paid on average a marriage *penalty* of $300. These averages mask much variation, both across couples and across years. Since 1967 there has been a tendency for the average marriage tax to rise, fall and then rise again as tax and demographic changes have occurred. Some couples have at times faced marriage penalties of more than $15,000; others have received subsidies greater than $20,000. In recent years, couples in which both partners have similar incomes generally pay a marriage tax, while couples in which only one individual works receive a marriage subsidy. Feenberg (1983), Feenberg and Rosen (1983, 1995), Rosen (1987) and Brozovsky and Cataldo (1994) also calculate large tax effects of marriage. It is therefore clear that the current individual income tax in the United States is not marriage-neutral because a person's income tax liability depends upon his or her marital status.

It is straightforward to incorporate taxes into the marriage decision. Suppose, for simplicity, that the income tax consists of a constant marginal tax rate and a lump-sum guarantee, where these income tax parameters vary for singles and married couples. The composite good Z_i of a single female and male becomes

$$(2) \qquad Z_i = [(w_i T_i)(1-\tau) + \phi]/[a_i p + b_i w_i (1-\tau)], \qquad i = f, m,$$

where τ is the marginal tax rate facing single individuals and ϕ is the lump-sum guarantee. The composite good Z^{fm} of the married couple can be similarly modified.

It is important to note from (2) that income taxes affect both the full income of the individual and the full price of the household good; that is, in the presence of an income tax, the choice between married and single status depends both on the total amount of taxes paid on full income for married couples versus single individuals and on the marginal tax rates that they face. If marriage increases the total taxes without changing the marginal tax rate, then the gains from marriage will unambiguously decline. However, if marriage increases the marginal tax rate alone, then there are conflicting effects on the gains from marriage. An increase in the marginal tax rate at marriage will increase the taxes paid by married couples, which will reduce the benefits from marriage. However, a higher marginal tax rate will also lower the costs of household production by reducing the opportunity cost of household time, and this will increase the benefits from marriage. The total effect of a marginal tax rate change is therefore ambiguous.

This framework suggests that the gains from marriage depend both on the *total* taxes paid and on the *marginal* tax rates faced by couples versus singles. Specifically, the marriage rate will fall if marriage increases the total taxes, and

may rise or fall if marriage increases the marginal tax rate. An empirical model of the marriage decision that tests these hypotheses is presented next.

II. Data, Estimation and Variables

Data

Our data are drawn from the 1992 Panel Study on Income Dynamics (PSID). The PSID originated in 1968 with 5000 families, of which 3000 represent a random probability sample that we use in this work. In 1985 and 1986 the PSID conducted a retrospective marital history of all current respondents to the survey, in which respondents were specifically asked the year that their first marriage began. This marital history has been subsequently updated. Our data cover the entire period from the beginning of the sample through 1992.[6]

We use an event history (or hazard model) framework to analyse the timing of first marriage. The data are arranged in a person-year format, in separate samples by gender. In our 'base sample', each person faces the risk of first marriage as long as he or she meets two criteria: the individual is at least 18 years old, and the individual has never married. Each year that the individual is in the group at risk (i.e. meets both inclusion criteria) is treated as a separate unit of observation; the year that the individual marries is also included as a unit of observation. Individuals can enter the data set as soon as they meet the inclusion requirement, so that the individual does not have to be in the eligible age range in 1968. After marriage, the individual is no longer at risk of first marriage and so is not included in the sample. We also select a maximum of one male and one female from each 1968 family, so that the unobserved family-specific characteristics of large households do not disproportionately influence the estimation results. As discussed in more detail later, we modify our base sample in some specifications, by restricting the sample to those in the range 21–45 years of age and also by restricting the sample to all age sample members who are either unmarried or report a marriage lasting at least five years.

The base sample contains observations on 1605 individuals, of which there are 777 women and 828 men. These individuals contribute in total 11,622 person-years of information during the sample period. All sample individuals are unmarried at the beginning of the panel in 1968; in fact, some of the individuals are not yet born in 1968. The earliest marriages occur in 1969. Overall, 63% of the females and 61% of the males marry during the period of observation. Marriages occur in just over 8% of the person-years. Descriptive statistics, weighted to make the male and female samples representative of the entire population, are given in Table 1.

Estimation

The data are discrete rather than continuous, and we estimate a discrete-time approximation to a continuous hazard by using a logit model on the pooled sample of observation years (Allison 1984). A reduced-form model of the probability of observing a first marriage for each individual i at time t is estimated as

$$(3) \qquad \text{Prob}\,(M_{it}) = f(\beta X_i + \gamma X_{i,t-1}),$$

TABLE 1

WEIGHTED SAMPLE CHARACTERISTICS

Variable name	Variable definition	Female person-year mean[a]	Male person-year mean[a]
Marriage penalty	Difference between tax on individual's income as a married person and as a single person, in 1982–84 dollars	2619.97 (2289.94)	–429.35 (564.54)
Marginal tax rate difference	Difference between top marginal tax rate on individual's income as a married person and as a single person	10.86 (10.23)	–3.41 (4.44)
Own income	Individual income, in 1982–84 dollars	7791.19 (8802.74)	8876.33 (12807.42)
Married income	Income of the individual as a married person (predicted), in 1982–84 dollars	8025.09 (5333.84)	11011.75 (6526.62)
Spouse income	Income of spouse (predicted), in 1982–84 dollars	21469.61 (13338.30)	3051.24 (2414.07)
Age	Age, in years	29.73 (14.22)	25.86 (9.55)
Rural residence	Variable equal to 1 if individual resides in a rural area, 0 otherwise	0.20	0.22
Black	Variable equal to 1 if individual is black, 0 otherwise	0.10	0.08
Latino	Variable equal to 1 if individual is Latino, 0 otherwise	0.01	0.02
Marriage	Variable equal to 1 if individual marries in a given year, 0 otherwise	0.08	0.08
Year	Variable equal to 1 in 1969 and increasing by one in each subsequent year	14.27 (6.70)	14.51 (6.61)
Sample size (unweighted)		5721	5901
No. of individuals contributing 1–24 years (unweighted)		777	828

[a] Standard deviations are given in parentheses.

where $M_{it} = 1$ if individual i marries in period t and 0 if the individual does not marry. The X_i are explanatory variables that do not change over time (e.g. race), the $X_{i,t-1}$ are time-varying covariates measured in the preceding period (e.g. age, wages, the marriage tax/subsidy, residence), and (β, γ) are the

corresponding coefficient vectors on these variables. Time-varying independent variables are lagged one period because we are looking at marriage that occurred in the period since the previous year, rather than at the exact time that the interview data are collected. This means that, say, the marriage tax/subsidy from 1968 is used as a determinant of marriage in 1969.[7]

Because the dependent variable is discrete, we use a logit transformation of the linear probability function, or

$$(4) \qquad \log((P(M_{it})/[1-P(M_{it})]) = \alpha + \beta X_i + \gamma X_{i,t-1},$$

where $P(\cdot)$ is the probability and α is a constant. Each person-year is treated as a separate observation. The standard logistic likelihood function, or

$$(5) \qquad L = \prod_{i=1}^{N} P_i^{M_i}(1-P_i)^{(1-M_i)}$$

is maximized for all N observations.

Variables

A central issue is the impact of income taxation upon the probability of a first marriage. The conceptual framework suggested that marriage is affected by both the difference in total taxes and the difference in marginal tax rates for married couples versus single individuals.

Calculation of these tax effects is considerably more complicated than might appear. The PSID now provides estimates of the federal tax liability of respondent households. However, it has not made these estimates for all the years that we examine. Moreover, even for those years in which the tax liability is estimated, the PSID can calculate the change in tax liability only for the year in which an individual actually marries, not for other years in which the individual is at risk but does not marry. Consequently, we must construct our own measures of the tax effects of marriage.

The basic elements needed to calculate the change in taxes are obvious: the incomes of the individual and the spouse, the statutory individual income tax rates and brackets, the deductions of the individual and the spouse, and their personal exemptions. Unfortunately, many of these elements are not known. Although the tax code in each year is available, deductions and exemptions are not given in the PSID. The income of the individual is known for each year that he or she is at risk, but we know spouse income only for person-years in which marriage actually occurs. Further, although the data set includes income information on all respondents, many sample members do not have an income in every year that they are observed. Ignoring the income potential, however, many overstate the tax burden of marriage.[8] All of these issues make determining the impact of taxation a challenge.

We use several approaches to calculate these tax effects, as noted below. Although we emphasize only one of these approaches in our following discussion, we have examined the sensitivity of our estimation results to the various approaches, and all results are available upon request.

We calculate the marriage tax/subsidy in several steps. First, rather than using actual own income of the individual, we estimate a predicted own income as a married person for each sample member. We do this by using person-year observations on married individuals in the PSID to estimate the income of

each individual who marries, looking at men and women separately. This gives us coefficient values for use in creating a predicted marital income for each individual. Income is identified in these equations by the inclusion of variables that measure macroeconomic conditions and policy measures, education and experience and by the subsequent exclusion of these variables in the marriage equations, since these variables are obviously related to the individual's income but seem unlikely to be major determinants of the individual's probability of marriage.[9] These results are in Appendix Tables A1 for women and A2 for men.[10]

Second, we estimate a predicted income of the potential spouse for each individual, following the procedure used by Schultz (1994).[11] Again using a sample of married persons, we regress the income of the *spouse* on the characteristics of the *individual*, thereby estimating the impact of the *individual's* characteristics on the *spouse's* level of income. This procedure allows us to calculate a predicted spouse income for all individuals in our sample in every year we observe them, married or unmarried.[12] Note that we calculate nominal income because this is the relevant measure for determining tax liability in a given year. These estimation results are also in Appendix Tables A1 (women) and A2 (men).[13]

We find reasonable correlations between the actual and predicted spouse income in the year the individuals actually marry; these correlations are 0.50 for the spouses of women, and 0.55 for the spouses of men. The correlations between actual own income (for those who report an income) and our predicted measure of married income are also similar: 0.51 for women and 0.46 for men.

Third, the person's single tax liability is generated based on the tax code of that particular year. Following Feldstein and Clotfelter (1976), we estimate the amount of itemized deductions for each individual. This approach assumes that all homeowners in the PSID are eligible to itemize deductions, and then uses averages of itemized deductions by income groups drawn from the Statistics of Income for the relevant year. If our estimate of itemized deductions exceeds the standard deduction, then the individual is assumed to itemize; the individual takes the standard deduction if the standard deduction is larger.[14] Individuals with no children prior to first marriage take a single personal exemption, and we apply the single filer tax rates (and other features of the tax code) in each year to calculate the individual's single tax liability. Individuals with premarital children constitute about 10% of the sample; these individuals take the applicable number of personal exemptions, and we apply the relevant head-of-household tax rates and other tax features (e.g. the Earned Income Tax Credit, or EITC, where appropriate) to calculate the single tax liability. Note that this procedure also generates a measure of the individual's marginal tax rate.

Fourth, we determine how the tax burden of the individual changes with marriage. The marriage tax/subsidy is usually discussed as a well-defined measure, but there are actually a number of reasonable approaches to determining the tax consequences of marriage (Feenberg and Rosen 1995; Alm and Whittington 1996). We apply what might be termed an 'individual approach' to calculate the individual's taxes as married. We designate the member of the potential couple who makes the higher income in the household as the 'primary

earner' and the other as the 'secondary earner', using our estimates of predicted married income for each individual and his or her potential spouse. We assume that the primary earner's income is in some sense taxed first, so that his or her income is taxed at the lower marginal tax rates in the progressive tax schedule. This calculation gives the primary earner's portion of the marital tax liability. Note that the income of the spouse does not affect the primary earner's tax liability (although marital status clearly does). For the secondary earner in the couple, we calculate the tax liability by adding his or her income to the primary earner's income and then taxing it at the resulting higher rates as this person moves through the higher tax brackets. Unlike the primary earner, the secondary earner's tax liability is affected both by the income of the spouse and by marital status. This procedure also generates a measure of the individual's marginal tax rate with marriage.[15]

This individual approach is consistent with the Manser–Brown (1980) and Horney–McElroy (1981) framework of game-theoretic household behaviour. The members of the household are assumed to have individual utility functions rather than the single family (or common preference) utility function used in the earlier, more traditional, approach to household behaviour. Individuals bargain with one another within the household, and family decisions emerge as the outcome of this bargaining game. Anything that influences the opportunities of a member as single versus as married changes his or her 'threat point', or the point at which the member threatens to leave the household, and it is likely that taxes influence threat points. As argued by McElroy (1990, p. 579), 'with a progressive income tax and a husband earning income, the marginal wage rates of many women decrease upon marriage and increase with divorce, systematically deterring labour force participation while married as well as deterring marriage itself'. On the other hand, the higher-earning man may find that his marginal wage actually increases with marriage, although the magnitude of the change in percentage terms might be quite different from what his wife experiences.[16]

The marriage tax/subsidy, then, is simply the difference between the tax burden of the individual as a married taxpayer and as a single taxpayer. The marriage penalty captures the change in income tax liability the individual would incur on his or her own income as a result of marriage to the potential spouse. Also, the change in marginal tax rates with marriage is the difference between the top marginal tax rate of the individual when married versus the top rate when single.

Table 1 demonstrates that the marriage tax/subsidy can be quite large, and can differ for women and men. Women incur an average real marriage penalty of \$2620. There is great variation across women and years, as suggested by the large standard deviation (\$2290), with the penalty ranging from −\$5675 (a large marriage *subsidy*) to \$14,233 (a large marriage *tax*). On the other hand, men incur an average real marriage subsidy of \$429, and they also experience a substantial range of values, from a maximum *subsidy* of \$3997 to a maximum *penalty* of \$3565. These differences between men and women stem mainly from the status of women as so-called secondary earners in the family.[17] Note that these amounts are only the annual changes in the tax liabilities; the present values of the tax impact of marriage are considerably higher.

Table 1 also indicates that women on average experience a large increase of nearly 11 percentage points in the marginal tax rate with marriage. Men experience an average decline of over 3 percentage points in the marginal tax rate. This difference in gender outcomes is again due to women's status as secondary earners. As with the marriage tax/subsidy, there is much variation across individuals and years.

We include a number of additional explanatory variables. The incomes of the individual and the potential spouse are included, calculated using the procedures discussed earlier. In addition to these economic variables, we include demographic controls. There are noted differences in marital probabilities and marital timing across race and ethnicity (Teachman *et al.* 1987). Accordingly, we include a dummy variable equal to 1 if the individual is black, and also a dummy variable equal to 1 if the individual is a Latino; because responses to tax policy variables may not be equal across race and ethnicity, we include interaction terms between the tax variables and the dummy variables for black and Latino. Rural residents may face different marriage and labour markets (and thus single opportunities) from urban residents, so a dummy variable equal to 1 is included for those living in an area with a population less than 50,000. Finally, Thornton (1988) demonstrates that the risk of first marriage is not constant across age, so controls for age are included.

In other specifications, we have included additional variables, such as the income of the individual's parents, education, the state unemployment rate and various regional dummy variables. We have also examined the impact of the Aid to Families with Dependent Children (AFDC) and the AFDC-Up programmes on the likelihood of marriage for women, by including a measure of average benefit payments and a dummy variable equal to 1 if the state of residence has an AFDC-Up programme; these variables are never significant, and their inclusion does not alter our other findings.[18] We have also used log transformations of the income variables, and have substituted wage measures for income. Finally, as noted above, we have examined the sensitivity of our results to alternative procedures for calculating own income, potential spouse income, deductions and taxes as married. These numerous alterations have little impact on our results.

An important issue in the estimation is identification of the separate effect of taxes on divorce, as distinct from the effect of income. Identification is achieved through several channels. One source is the frequent and substantial changes in federal tax policy over the years that we explore, so that the marriage penalty or subsidy has changed independently of income in many of those years.[19] Another means of identification arises because the marriage penalty or subsidy is affected both by the absolute level of single and marital income and, more importantly, by the relative incomes of the husband and wife; that is, the marriage penalty does not simply increase with family income, but depends heavily upon the mix of family income between husband and wife. In fact, the penalty often decreases (or the subsidy increases) with income when there is only one earner in a household, but the penalty typically increases with income when both partners work. In general, the more similar are the incomes of the partners, the greater is the penalty, regardless of the income level.

III. Estimation Results

Maximum likelihood estimation results of logit models that predict the probability of first marriage are presented in Table 2 (for women) and Table 3 (for men). Three different models are presented in each table, according to the specific sample employed: all sample members age 18 or over (the base sample),

TABLE 2

MAXIMUM LIKELIHOOD ESTIMATES OF DISCRETE HAZARD MODELS FOR THE PROBABILITY OF MARRIAGE: WOMEN[a]

Variable name	Aged 18+	Aged 21–45	Marriages <5 years eliminated
Marriage penalty[b]	–0.007*	–0.007*	–0.007^{+}
	(4.29)	(4.22)	(3.01)
Marginal tax rate difference	0.0010	0.0002	–0.0030**
	(1.09)	(0.08)	(9.48)
Marriage penalty × black interaction[b]	–0.009	–0.006	–0.030
	(0.49)	(0.14)	(1.62)
Marriage penalty × Latino interaction[b]	–0.028	0.018	0.035
	(1.85)	(0.51)	(1.81)
Marginal tax rate difference × black interaction	0.027	0.002	0.005
	(0.18)	(1.08)	(2.02)
Marginal tax rate difference × Latino interaction	–0.004	–0.004	–0.009
	(1.39)	(0.81)	(1.64)
Own income	–0.0000	0.0003	–0.0031**
	(0.00)	(0.13)	(7.78)
Spouse income	0.0003	0.0016	0.0040**
	(0.14)	(1.82)	(11.04)
Age	0.035***	0.011	0.009
	(23.82)	(1.02)	(1.12)
Age-squared	–0.0007***	–0.0003^{+}	–0.0001
	(29.10)	(2.89)	(0.46)
Rural residence	0.026**	0.016	0.037***
	(8.49)	(1.91)	(11.19)
Black	–0.130***	–0.109**	0.005
	(13.19)	(8.07)	(0.00)
Latino	0.013	0.062	0.016
	(0.04)	(0.36)	(0.02)
Year	–0.0040^{+}	0.0004	0.0080**
	(3.38)	(0.04)	(8.02)
Chi-square for covariates (14 degrees of freedom)	241.78***	118.66***	73.72***
No. of person-years	5721	3513	1879

[a] Chi-square values are given in parentheses. Logit coefficients have been transformed to partial derivatives evaluated at the mean, so the intercept is not presented.
[b] The marriage penalty is measured in thousands of dollars.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$; $^{+}p \leq 0.10$.

TABLE 3

MAXIMUM LIKELIHOOD ESTIMATES OF DISCRETE HAZARD MODELS FOR THE PROBABILITY OF MARRIAGE: MEN[a]

Variable name	Aged 18+	Aged 21–45	Marriages <5 years eliminated
Marriage penalty[b]	−0.001	−0.005	−0.002
	(0.01)	(0.23)	(0.05)
Marginal tax rate difference	−0.002	−0.002^{+}	−0.001
	(2.01)	(3.42)	(0.39)
Marriage penalty × black interaction[b]	0.100*	0.090*	0.103^{+}
	(4.99)	(4.05)	(2.94)
Marriage penalty × Latino interaction[b]	−0.045	−0.043	−0.006
	(1.35)	(1.15)	(0.01)
Marginal tax rate difference × black interaction	−0.002	−0.001	−0.006
	(0.24)	(0.03)	(1.02)
Marginal tax rate difference × Latino interaction	−0.001	0.001	0.003
	(0.04)	(0.01)	(0.13)
Own income	0.0005	0.0005	−0.0007
	(1.54)	(1.41)	(1.30)
Spouse income	0.005*	0.006*	0.016***
	(3.93)	(4.56)	(18.13)
Age	0.052***	0.027**	0.030***
	(50.60)	(6.45)	(12.80)
Age-squared	−0.0010***	−0.0006**	−0.0004**
	(48.72)	(8.84)	(8.11)
Rural residence	0.046***	0.028**	0.051***
	(28.69)	(7.18)	(24.58)
Black	−0.013	−0.005	−0.006
	(0.61)	(0.08)	(0.01)
Latino	−0.014	−0.025	−0.109*
	(0.11)	(0.30)	(4.24)
Year	−0.005***	−0.005***	0.003**
	(60.45)	(47.23)	(8.52)
Chi-square for covariates (14 degrees of freedom)	191.61***	101.66***	122.84***
Number of person-years	5901	3779	2139

[a] Chi-square values are given in parentheses. Logit coefficients have been transformed to partial derivatives evaluated at the mean, so the intercept is not presented.
[b] The marriage penalty is measured in thousands of dollars.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$; $^{+}p \leq 0.10$.

sample members in the range 21–45 years of age, and all age sample members who are either unmarried or report a marriage lasting at least five years. The second model excludes some person-years at the age extremes, or under 21 and over 45. Individuals under the age of 21 may still be in school, and thus may not be participating fully in the marriage market; older, unmarried individuals

may have unobserved characteristics that make them unlikely to marry.[20] The third model focuses on what might be termed 'permanent' rather 'transitory' marriages. Some marriages may be considered permanent, meaning that the partners remain married for some extended period of time. Alternatively, some marriages might be considered transitory, in that the marriage is of a very short duration. A short marriage is likely to occur because individuals make mistakes, about money as well as about love. Consequently, in the third model we eliminate all 'transitory' (or short-duration) marriages, defined as any marriage that lasts less than five years, and instead focus on the decision to enter a more 'permanent' marriage. Our sample consists of person-year observations on all individuals who enter a marriage that subsequently lasts at least five years (or who do not marry while under observation).[21] All independent variables are identical across models. The coefficients are presented as the partial derivatives of the relevant variable evaluated at the sample mean values.

Consider first the impact of the tax variables on the marriage decision. The marriage penalty exerts a statistically significant impact on the probability of a first marriage for women in all three models (Table 2). Recall that this variable is the increase in tax liability that an individual faces if she marries. The negative coefficients are significant at the 5% level in the first two models and at the 10% level in the third (or permanent marriage) model. These results indicate that the probability of observing a marriage decreases when the tax liability of marriage exceeds that of remaining single. The magnitude of the coefficient is remarkably consistent across samples.

The magnitude of the effect for women is relatively small, with an elasticity of the probability of marriage with respect to the marriage penalty of only −0.23 evaluated at mean values of the variables. This result is not surprising. It seems unlikely the tax policy is the primary reason that women choose to marry, and, even though the probability of first marriage declines somewhat with an increased tax burden, the response is not particularly large. Our finding of a small but significant average impact supports that of Alm and Whittington (1995), who estimate a similar effect of the average marriage penalty on aggregate marriage rates in the United States.

Estimating the elasticity of marriage with respect to the marriage penalty at the mean, however, somewhat hides the differential effect that may be felt at the extremes. For example, the elasticity of marriage with respect to the marriage penalty is −1.25 at the maximum penalty in our female base sample.

The marriage penalty exerts little significant impact on the probability of marriage for white and Latino men, as shown in Table 3. The differential impact for men and women is consistent with our related work on the probability of divorce (Whittington and Alm 1997), where we also find that the marriage penalty affects women's marital decisions much more significantly than those of men.

We find no evidence of significant differences in the response to the marriage penalty by race or ethnicity for women, but some differential for men. The interaction terms between the indicator of race and the marriage penalty suggest that there are some differences in behavioural responses between black men and white men. The probability of marriage for black men actually rises, though only marginally, with the marriage penalty; the combined effect of the marriage penalty on the probability of marriage for black men is quite small

and equals roughly 0.10 across all three models. The marriage penalty–ethnicity interaction terms for Latino men are never significant.

The results in Tables 2 and 3 also identify a slight difference between the impact of the marginal tax rate difference on the marriage probabilities of men and women. Recall that the change in the tax rate has competing effects on marriage incentives. These effects seem to balance in many cases, and thus we frequently discern no statistical relationship between the tax rate change and the probability of marriage. However, a change in the marginal tax rate has a significant negative influence on marriage for women in the permanent marriage sample. This result indicates that the impact of the marginal tax rate on full income dominates its impact via the cost of home production when we eliminate cases of fleeting, perhaps hasty, marriage. The impact is nontrivial in this case, with a marginal tax rate elasticity evaluated at the mean of –0.41. Similarly, we find that men in the age-restricted sample (21–45) also have a statistically significant negative response to the marginal tax rate change, with a much smaller mean elasticity of –0.09. We find no evidence of differences by race or ethnicity in the response to changes in the value of the marginal tax rate, for either women or men.

Although the magnitudes and the elasticities of several other variables are much larger, the tax variables remain of strong interest because they are easily subject to policy manipulation. In fact, recent tax changes have significantly altered the income tax treatment of the family, thereby influencing marriage incentives and marriage rates, at least at the margin. According to E. E. Schultz (1993), the 1993 Clinton administration tax changes increased the marriage penalty of a representative low-income couple by $465, a 13% jump; given our estimates, this would decrease the probability of marriage for women in such a couple by about 3%. Wealthy professionals experienced up to a 99% increase in the marriage penalty, decreasing the average female marriage probability by as much as 23%. 'Traditional' families, or those with a single earner or a marginal secondary earner, saw their taxes fall with the changes by 15%, thereby increasing the average marriage probability by nearly 4%. Still, although government has probably influenced marriage at the margin, tax policy does not appear to be the principal factor for the change in marriage patterns in the United States.

As for other variables, the effects of own market opportunities are measured through own income, but this variable is insignificant in all but the permanent marriage sample for women (Table 2). A higher own earning capacity decreases the relative attractiveness of married versus single status, and this effect creates a disincentive to marry; however, a higher own earning capability also makes one a more attractive potential spouse, which increases the mean value of marriage offers and increases the likelihood of marriage. In fact, empirical findings on the relationship between income and marriage are somewhat contradictory. T. P. Schultz (1994) finds that own wage opportunities lead to a lower probability of residing with a spouse for white women at all ages, but in a higher probability of co-residence for black women at all but the youngest ages (15–24). Avery *et al.* (1992) find that personal income has a positive impact on leaving home for marriage; Keeley (1979) also finds some evidence that higher own income leads to earlier marriage and an overall

higher probability of ever marrying, but he also frequently finds insignificant effects.

The income of the potential spouse always has a positive and statistically significant impact on the probability of marriage for men. For women, the coefficient on the income of the potential spouse is also consistently positive, but is statistically significant only in the permanent marriage sample.

Several of the control variables have a significant impact on marriage. Black women are less likely to marry than white women in two of three models presented in Table 2, a result that is consistent with previous findings (Michael and Tuma 1985; Santi 1990); there is no difference by ethnicity for women. For men (Table 3), there is no significant difference between black and white men, while there is some evidence that Latino men are less likely to marry than white men. Individuals living in rural areas, whether male or female, are more likely to marry than those in more densely populated urban areas. Age has the expected effect, with marriage probabilities initially increasing but at a decreasing rate. Age has a positive effect on the probability of marriage for women up to age 25, and then it begins to decline (model 1); men have a rising marriage probability until age 26 (model 1).

It should be recalled that we have also estimated numerous variants on our basic specification, in which we include different explanatory variables and use different procedures for calculating own income, potential spouse income, deductions and taxes as married. These alternative specifications consistently demonstrate that income tax affects the likelihood of marriage for women and men, although in different ways. As with the results reported in Tables 2 and 3, the marriage penalty emerges as the primary tax deterrent for marriage for women; the marriage penalty is generally insignificant for men.

IV. Conclusions

What factors influence the marriage decisions of individuals? In this paper we used panel data to analyse the marriage decisions of young adults over an extended period using both time-varying and constant characteristics of the individuals. Our results provide empirical support for the theoretical conclusion that economic variables can influence marriage. Our finding that taxes influence marriage is, perhaps, the most intriguing. Anecdotal evidence abounds that individuals consider taxes when weighing the marriage decision, and our estimation results are consistent with this evidence. We do not argue that the federal tax structure is the principal reason why individuals marry; other variables clearly affect, and even dominate, the tax impacts. However, we consistently find across numerous specifications that the value of the marriage tax/subsidy affects the marriage decision of females. We also find some evidence that the change in the marginal tax rate generated by marriage has a significant and negative impact on the probability of marriage. These findings provide the first household-level empirical evidence that the tax code affects marriage decisions.

Still, the appropriate tax treatment of the family is unclear.[22] By choosing the family as the unit of taxation, the United States has chosen to treat families with equal income equally.[23] However, income-splitting necessarily implies that income taxes will change with marriage and divorce. If individuals respond to

these tax effects—and our results indicate that they often do—then marriage decisions will be affected.

It is certainly possible to design a marriage-neutral individual income tax. It may even be desirable to do so. The re-institution of the individual as the unit of taxation or the removal of the progressive rate structure would create an income tax in which liabilities did not change with marriage; changes in specific features of the income tax, such as the rate schedules or tax credits, could also lessen the impact of marriage upon taxes. Our results suggest that any such changes in the federal income tax are likely to have impacts on family structure. Given the growing role of the family in public discussion, these tax impacts merit attention and analysis.

TABLE A1

COEFFICIENT ESTIMATES FOR MARRIED INCOME: WOMEN[a]

	Married income	
Variable name	Own income	Spouse income
Some high school education	180.50 (0.15)	3995.40* (2.10)
High school graduate	498.00 (0.46)	4200.10** (2.48)
College	3113.80** (2.93)	8608.00*** (5.21)
Potential work experience	449.70*** (5.12)	1086.20*** (7.96)
Potential work experience—squared	−6.69* (2.11)	−29.88*** (6.05)
Rural residence	−1681.20*** (3.62)	−980.34 (1.36)
Black	−752.08 (0.76)	−3057.00* (1.99)
Latino	1399.70 (0.84)	9360.80*** (3.61)
Hours of work	4.90*** (18.49)	0.14 (0.35)
State average wage in manufacturing	187.50 (0.84)	1092.20*** (3.18)
Federal minimum wage	−2596.00** (2.60)	2874.50+ (1.85)
State unemployment rate	−101.28 (0.41)	−160.97 (0.89)
Year	578.02*** (3.63)	−120.24 (0.49)
Intercept	−2094.80 (1.37)	−8994.90*** (3.78)
R^2	0.513	0.318

[a] Absolute values of t-statistics are given in parentheses.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$; +$p \leq 0.10$.

TABLE A2
COEFFICIENT ESTIMATES FOR MARRIED INCOME: MEN[a]

	Married income	
Variable name	Own income	Spouse income
Some high school education	621.54	−953.37
	(0.33)	(0.67)
High school graduate	560.21	46.09
	(0.37)	(0.67)
College	5485.90***	3751.20**
	(3.23)	(2.94)
Potential work experience	764.51***	247.89**
	(6.00)	(2.61)
Potential work experience—squared	−12.25***	−3.05
	(4.05)	(1.34)
Rural residence	−3081.00**	−2799.70***
	(4.08)	(4.95)
Black	−2978.40	−788.29
	(1.20)	(0.42)
Latino	−1856.60	9456.80+
	(0.25)	(1.71)
Hours of work	4.41***	1.17***
	(10.35)	(3.70)
State average wage in manufacturing	377.45	439.87+
	(1.11)	(1.73)
Federal minimum wage	−1289.90	−524.09***
	(0.83)	(0.45)
State unemployment rate	296.67+	−495.23***
	(1.70)	(3.78)
Intercept	−10833.00***	3190.50+
	(4.62)	(1.81)
R^2	0.38	0.30

[a] Absolute values of t-statistics are given in parentheses.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$; +$p \leq 0.10$.

ACKNOWLEDGMENTS

We appreciate the helpful comments of Stacy Dickert-Conlin, Daniel Feenberg, Bruce Gardner, Jonathan Gruber, Janet Johnson, Junsen Zhang, and an anonymous reviewer. We also received helpful comments from seminar participants at Georgetown University, the University of Delaware, the University of Maryland–Baltimore County, and Georgia State University. Pat Brogan and Rohit Burman provided valuable research assistance. Please address all correspondence to James Alm, Department of Economics, Campus Box 256, University of Colorado at Boulder, Boulder, CO, 80309-0256 (Alm@Colorado.EDU).

NOTES

1. This literature is vast and growing. Some recent, important studies include Winegarden (1984), Michael and Tuma (1985), Teachman *et al.* (1987), Sander (1992) and T. P. Schultz (1994). Note that variables measuring economic factors are sometimes missing or limited in these

studies; indeed, data limitations sometimes preclude the use of the individual's or the (potential) spouse's income, making it necessary to use education of the individual or of his or her parents as the main economic variable. Note also that with a few exceptions (e.g. Teachman *et al.* 1987), most studies do not track individuals and their decisions over an extended period of time.

2. Alm and Whittington (1995) find that the average marriage penalty has a small, but statistically significant, impact on the percentage of women who are married in the US marriage rate over the period 1947–88. Sjoquist and Walker (1995) use similar aggregate data, and find evidence that couples time their marriages so as to avoid one year of the tax penalty; Gelardi (1996) also uses aggregate data to demonstrate that taxpayers in Canada, England and Wales appear to have timed their marriages to take advantage of tax statutes.
3. Whittington and Alm (1997) show that taxes affect the probability of divorce for women, though not for men; similarly, Dickert-Conlin (1996) estimates that taxes and transfers influence the likelihood of divorce among low-income individuals. Alm and Whittington (1997) find significant effects of taxes on marital timing decisions of men and women.
4. See Bittker (1975) for a more detailed discussion of the history of the income tax treatment of the family.
5. See Becker (1973, 1974) for a complete discussion of the Z-good and its derivation.
6. For more information on the structure of the PSID sample and response rates, see Institute for Social Research (1984) and Becketti *et al.* (1988).
7. We have substituted current for lagged values of the variables where possible, with no substantive difference in our results.
8. Consider someone who does not have any income. This person faces an average tax rate of zero, so that marriage to someone with income will automatically increase his or her tax liability and impose a marriage penalty.
9. See e.g. T. P. Schultz (1994) for a similar approach.
10. We have also estimated these equations using the log of income, rather than the level of income; we then transform the resulting estimates into the level of income in order to calculate the individual's income taxes. Our results are not affected.
11. Remember that we must calculate a marriage tax/subsidy for each year that an individual is at risk of marriage, even though the individual may never marry. Even if he or she does marry, we do not know whom the individual marries until the marriage actually occurs.
12. Hoffman and Duncan (1988) use a similar procedure when they estimate potential spouse wages in their examination of remarriage and welfare choices of divorced and separated women. They have information on previous spouse income, however, that they use with individual characteristics to predict potential new spouse income. Because we are looking at the individual's first marriage, we do not have any information on ex-spousal income or characteristics.
13. As an alternative approach to estimate the income of the potential spouse, we have used data on median income by sex to generate an average male–female and average female–male income ratios for married individuals aged 18–44 over the sample period. These ratios are then multiplied by the predicted income of each individual to derive a predicted income of the potential spouse for each person-year in the sample. This approach assumes positive assortative mating across wages, in which higher-income individuals will have higher-income spouses (Lam 1988). These results are available upon request.
14. We have also used the standard deduction for all taxpayers in lieu of calculating the itemized deductions. These results are consistent with the findings presented here.
15. We have also used another method to calculate the individual's taxes as married, by assigning the individual one-half of the married couple's tax liability as determined by the combined incomes of the individual and the potential spouse. This approach might be termed the 'couple approach' because it utilizes the taxes of the married couple in the calculations. These results are available upon request.
16. See Lundberg and Pollak (1996) for a review of the game-theoretic approach to family decision-making.
17. As noted by Hausman and Poterba (1987) in their discussion of labour supply responses to tax reform, wives are the secondary earners in most households with two potential earners.
18. The lack of significance for welfare is not surprising. Moffitt (1994) points out that recent research often finds that welfare has a 'significant and nontrivial' effect on female household headship, but T. P. Schultz (1994) concludes that there is a stronger relationship between spousal co-residence and Medicaid than AFDC. In results not reported here, we found Medicaid to be insignificant in determining the probability of marriage. We are grateful to Robert Moffitt for providing the benefit data.
19. For example, the introduction in 1971 of a new rate schedule for single persons dramatically changed the relative tax cost of marriage. The EITC was introduced in 1975, the standard deduction (or zero bracket amount) was substantially increased in 1977, and the secondary

earner deduction was adopted as part of the Economic Recovery Tax Act of 1981. Major changes in federal income taxes resulted from the Tax Reform Act of 1986. Also, rate schedules have changed frequently, sometimes just to keep pace with inflation but often as a fundamental shift in tax liability for a given income.

20. In 1987, for example 99.4% of all first marriages for women and 98.9% of all first marriages for men in the United States occurred by age 44 (US National Center for Health Statistics 1991).
21. We are grateful to an anonymous referee for this point.
22. See Bittker (1975), Boskin and Sheshinski (1983), and Apps and Rees (1988) for discussions and analyses of this issue.
23. Many other countries define the unit of income taxation as the individual, not the family; see Pechman and Engelhardt (1990).

REFERENCES

ALLISON, P. D. (1984). *Event History Analysis*. Beverly Hills, Cal.: Sage.

ALM, J. and WHITTINGTON, L. A. (1995). Income taxes and the marriage decision. *Applied Economics*, **27**, 25–31.

—— and —— (1996). The rise and fall and rise . . . of the marriage tax. *National Tax Journal*, **49**, 571–89.

—— and —— (1997). Income taxes and the timing of marital decisions. *Journal of Public Economics*, **64**, 219–40.

APPS, P. F. and REES, R. (1988). Taxation and the household. *Journal of Public Economics*, **35**, 355–69.

AVERY, R., GOLDSCHEIDER, F. and SPEARE, JR, A. (1992). Feathered nest/gilded cage: parental income and leaving home in the transition to adulthood. *Demography*, **29**, 375–88.

BECKER, G. S. (1973). A theory of marriage: Part I. *Journal of Political Economy*, **81**, 813–46.

—— (1974). A theory of marriage: Part II. *Journal of Political Economy*, **82** (2, Part II), S11–S26.

BECKETTI, S., GOULD, W., LILLARD, L. and WELCH, F. (1988). The panel study of income dynamics after fourteen years: an evaluation. *Journal of Labor Economics*, **6**, 472–92.

BITTKER, B. (1975). Federal income taxation and the family. *Stanford Law Review*, **27**, 1392–1463.

BOSKIN, M. J. and SHESHINSKI, E. (1983). Optimal tax treatment of the family: married couples. *Journal of Public Economics*, **20**, 281–97.

BROZOVSKY, J. and CATALDO, A. J. III (1994). A historical analysis of the 'marriage penalty tax'. *Accounting Historians Journal*, **21**, 163–87.

CIGNO, A. (1991). *Economics of the Family*. New York: Oxford University Press.

COOK, P. K. (1981). The frustrations of the marriage tax. *Tax Notes*, 10 August, 265–72.

DICKERT-CONLIN, S. (1996). Taxes and transfers: their effect on the decision to end a marriage. Working Paper, University of Kentucky.

ESPENSHADE, T. J. and MINARIK, J. J. (1987). Demographic implications of the 1986 US tax reform. *Population and Development Review*, **13**, 115–27.

FEENBERG, D. R. (1983). The tax treatment of married couples and the 1981 tax law. In R. G. Penner (ed.), *Taxing the Family*. Washington: American Enterprise Institute, pp. 32–63.

—— and ROSEN, H. S. (1983). Alternative tax treatments of the family: simulation methodology and results. In H. S. Rosen (ed.), *Behavioral Simulation Methods in Tax Policy Analysis*. Chicago: University of Chicago Press, pp. 7–41.

—— and —— (1995). Recent developments in the marriage tax. *National Tax Journal*, **48**, 91–101.

FELDSTEIN, M. S. and CLOTFELTER, C. T. (1976). Tax incentives and charitable contributions in the United States: a microeconometric analysis. *Journal of Public Economics*, **5**, 1–26.

GELARDI, A. M. G. (1996). The influence of tax law changes on the timing of marriage: a two-country analysis. *National Tax Journal*, **49**, 17–30.

GROSSBARD-SHECHTMAN, S. (1993). *On the Economics of Marriage*. Boulder, Colo.: Westview Press.

HAUSMAN, J. A. and POTERBA, J. A. (1987). Household behavior and the Tax Reform Act of 1986. *Journal of Economic Perspectives*, **1**, 101–19.

HOFFMAN, S. D. and DUNCAN, G. J. (1988). Multinomial and conditional logit discrete-choice models in demography. *Demography*, **25**, 415–27.

HORNEY, M. J. and MCELROY, M. B. (1981). Nash-bargained household decisions: toward a generalization of the theory of demand. *International Economic Review*, **22,** 333–49.

Institute for Social Research (1984). *User Guide to the Panel Study of Income Dynamics*. Ann Arbor, Mich.: University of Michigan Press.

KEELEY, M. C. (1979). An analysis of the age pattern of first marriage. *International Economic Review*, **20,** 527–45.

LAM, D. (1988). Marriage markets and assortative mating with household public goods. *Journal of Human Resources*, **23,** 462–87.

LUNDBERG, S. and POLLAK, R. A. (1996). Bargaining and distribution in marriage. *Journal of Economic Perspectives*, **10,** 139–58.

MANSER, M. and BROWN, M. (1980). Marriage and household decision making: a bargaining analysis. *International Economic Review*, **21,** 31–44.

MCELROY, M. B. (1990). The empirical content of Nash-bargaining household behavior. *Journal of Human Resources*, **25,** 559–83.

MICHAEL, R. T. and TUMA, N. B. (1985). Entry into marriage and parenthood by young men and women: the influence of family background. *Demography*, **22,** 515–44.

MOFFITT, R. (1994). Welfare effects on female headship with area effects. *Journal of Human Resources*, **29,** 621–36.

PECHMAN, J. A. and ENGELHARDT, G. V. (1990). The income tax treatment of the family: an international perspective. *National Tax Journal*, **43,** 1–22.

ROSEN, H. S. (1987). The marriage tax is down but not out. *National Tax Journal*, **40,** 567–75.

SANDER, W. (1992). Unobserved variables and marital status. *Journal of Population Economics*, **5,** 217–28.

SANTI, L. L. (1990). Household headship among unmarried persons in the United States, 1970–85. *Demography*, **27,** 219–32.

SCHULTZ, E. E. (1993). Living in sin to cut tax bill would look even better to some under Clinton plan. *Wall Street Journal*, 9 March, C1.

SCHULTZ, T. P. (1994). Marital status and fertility in the United States. *Journal of Human Resources*, **29,** 637–69.

SJOQUIST, D. L. and WALKER, M. B. (1995). The marriage tax and the rate and timing of marriage. *National Tax Journal*, **48,** 550–64.

TEACHMAN, J. D., POLONKO, K. A. and LEIGH, G. K. (1987). Marital timing: race and sex comparisons. *Social Forces*, **66,** 239–68.

THORNTON, A. (1988). Cohabitation and marriage in the 1980s. *Demography*, **25,** 497–508.

US National Center for Health Statistics (1991). *Vital Statistics of the United States*. Washington: US Government Printing Office.

WHITTINGTON, L. A. and ALM, J. (1997). 'Til death or taxes do us part: the effect of income taxation on divorce. *Journal of Human Resources*, **32,** 388–412.

WINEGARDEN, C. R. (1984). Women's fertility, market work, and marital status: a test of the new household economics with international data. *Economica*, **51,** 447–56.