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Marriage penalties, marriage, and cohabitation

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Abstract

I examine the effect of marriage penalties in the US income tax system on marital status. I construct a simulated instrument that exploits variation in the tax code over time and between US states to deal with potential endogeneity between the marriage penalty a couple faces and their marital status. I find that a $1000 increase in the marriage penalty faced reduces the probability of marriage by 1.7 percentage points, an effect four times larger than previously estimated. Those in the lowest education groups respond by as much as 2.7 percentage points, with the average response declining as education increases.

JEL classification: H31, J12, J18

Keywords: marriage, cohabitation, marriage penalty

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1 Introduction

The structure of the American family has changed substantially since the 1960s. One important trend is the decline in marriage and concurrent increase in cohabitation (Kennedy & Bumpass 2008). This transition is a source of concern for many commentators since there is a substantial body of research relating marriage to better health, more wealth and fewer social problems (Waite & Gallagher 2000). As a result, substantial federal funds have been devoted to marriage promotion, often specifically targeted at unmarried cohabiting parents.[1]

It is well documented that the US personal income tax system is not neutral to marriage: there are both marriage penalties and subsidies (Alm, Dickert-Conlin & Whittington 1999). The extent of these penalties and subsidies has changed significantly with changes in federal and state income taxes and the Earned Income Tax Credit (EITC), and they can be a large proportion of income, especially for low income couples (Eissa & Hoynes 2000*a*).

Marriage taxes have been linked to various choices, including decisions about partnering and partnership type.[2] Individuals facing a marriage penalty are less likely to be married (Alm & Whittington 1995, Alm & Whittington 1999), more likely to delay marriage (Sjoquist & Walker 1995, Alm & Whittington 1996*a*), and more likely to divorce (Whittington & Alm 1997, Dickert-Conlin 1999), although the effects found are modest. Much of this work has focused on the margin between being single and being partnered. However, with substantial concern about the higher instability and poorer outcomes of unmarried couples, the margin between cohabitation and legal marriage is of interest. Two papers have directly addressed this margin. Alm & Whittington (1999) find that a higher marriage penalty reduces the probability of a cohabiting couple making the transition to marriage, whilst

[1]The Healthy Marriage Initiative (HMI) has $150 million per annum to devote to marriage promotion. One key programme supported, Building Stronger Families, is specifically directed at unmarried parents in romantic relationships. The HMI programmes have been accused of promoting legal marriage over all other relationship types, regardless of the consequences (Furstenberg 2007).

[2]Marriage penalties in the tax system have also been linked to female labour supply (LaLumia 2008, Crossley & Jeon 2007), the allocation of unearned income between spouses (Stephens & Ward-Batts 2004) and fertility (Whittington, Alm & Peters 1990, Dickert-Conlin & Chandra 1999).

Eissa & Hoynes (2000*b*) report that a $1000 increase in the marriage penalty is associated with a 0.4 percentage point reduction in the probability of marriage relative to cohabitation.

However, these estimates treat a couple's marriage penalty as exogenous. If the marriage penalty experienced is correlated with unobserved characteristics which also affect the marriage decision, these estimates may be biased. The results presented in this paper directly address this issue by exploiting the variation in marriage penalties between states and over time resulting from changes to federal and state income taxes, including the EITC.

Using data from the Current Population Survey (CPS) from 1984 to 2008, I find that a $1000 increase in the marriage penalty causes a 1.7 percentage point fall in the probability of marriage. This response is more than four times greater than previous estimates. This masks heterogeneity: for those in the lowest educational groups the fall is as much as 2.7 percentage points, with the response declining as education increases. This suggests that a financial incentive for marriage might be more successful at increasing marriage rates than previously thought.

The paper proceeds as follows. Section 2 describes the interaction of marital status with the income tax system and explains how this might affect marital status decisions. Section 3 describes my data and sets out my empirical strategy, including construction of the simulated instrument. Results are presented in section 4, and section 5 concludes.

2 Marriage and the tax system

The US federal personal income tax system is not neutral towards marriage as it combines a progressive income tax schedule and taxation on the basis of family income. This means that, when married, a couple's tax liability is based on its combined income. Where only one partner works, this might lead to a subsidy to marriage since the worker's income falls into a lower tax bracket than if he were single. However, the federal tax code also leads to marriage penalties for some

couples, since the tax brackets in the married schedule are less than twice as large as those in the single schedule: if a couple earn equal incomes, their combined income will be in a higher married tax bracket than their tax brackets on the single schedule. The more equal a couple's incomes, the more likely they will experience a marriage penalty in the federal income tax system.

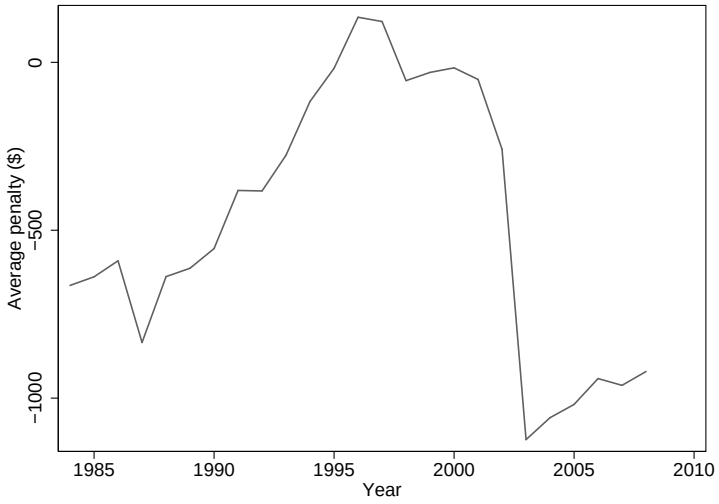
Crucially for this study, it is the *legal* marital status which determines whether a couple files their tax return as married or single.[3] This means that a cohabiting but unmarried couple can avoid a marriage penalty by remaining unmarried, whilst still gaining the economies of scale and other benefits of living in one household.

The magnitude of marriage penalties and subsidies in the federal income tax system has varied substantially over time. This can be seen in figure 1, which shows the average marriage penalties faced by couples in a sample from the CPS (described below) from 1984 to 2008. On average, a marriage subsidy existed in the mid 1980s, which steadily increased through the 1990s. The impact of the Bush tax cuts of 2001 and 2003, which eliminated marriage penalties resulting from differences in the lowest two tax brackets, are clearly reflected in the large fall in the average penalty faced at this time. However, this discussion obscures substantial heterogeneity. In 1994, the average marriage penalty was \$350 per annum, but 60% of couples suffered an average \$1200 tax penalty, whilst 30% of couples enjoyed an average subsidy of \$1100 (Alm & Whittington 1996*b*).

There are two main factors driving changes in the marriage penalty over time. First, there are changes to the tax code. These include the Tax Reform Act of 1986 (TRA86), which reduced the progressivity of the income tax system and so reduced average marriage penalties, and the tax acts of 1990 and 1993 (OBRA90 and OBRA93) which extended the EITC and increased the progressivity of the tax system, especially amongst those with low incomes. This drove the increase in average experienced penalties through the 1990s. In addition to changes in the tax code, demographic change, namely the increasing labour market participation of

[3]A married couple may choose to file jointly or separately. The rate schedule for married filing separately is exactly half that for married filing jointly, so filing separately does not reverse the marriage penalty.

Figure 1: Average marriage penalties over time



Average marriage penalties by year for the CPS sample. The average penalty increases due to the expansion of the EITC. The Bush tax cuts in 2003 dramatically reduce the marriage penalties

women, contributes to the upward trend in average marriage penalties through the 1980s and 1990s. Eissa & Hoynes (2000*a*) estimate that from 1984 to 1997, changes to the tax code explain 55-60% of the change in the average marriage penalty, with the remainder explained by female labour force participation. It is the changes in penalties caused directly by changes to the tax code that I exploit in this paper.

In addition to the marriage penalties and subsidies created by the federal income tax system, there is further variation in the marriage penalties faced by couples generated by state income tax systems. Whilst some states have no income tax or a flat rate income tax at the individual level and so do not create any additional marriage tax or penalty, other states have a code which either amplifies or mitigates the federal marriage penalty. For example, California has a state income tax system in which the tax brackets for married couples are twice those for singles, and so only marriage subsidies are possible. These can mitigate the federal penalty. In contrast, other states have tax brackets when filing as married which are less than twice those for singles, and so can add to the federal marriage penalty (see appendix B of Congressional Budget Office (1997) for more information).

In addition to state income tax systems, some states also apply their own Earned Income Tax Credit, typically as a proportion of the federal EITC. These are at varying levels and have been introduced and changed at different times in different states (see Leigh (2010) for more information). Since filing as single or married can change tax liabilities by the full amount of EITC, this adds to the variation in the marriage penalty between states in a given time period, and to the asymmetry of changes in the penalty between states and over time.

2.1 Marriage penalties and marital status

Whilst couples with higher income generally experience higher absolute marriage penalties, penalties as a percentage of income are higher for low income couples: on average 7.6% of income for couples with less than $20,000 per annum income (Eissa & Hoynes 2000*a*). The lower income couples are also those who have been most affected by expansions of EITC (Holtzblatt & Rebelein 2000). The decision to marry is more commonly associated with factors other than taxes, but with potentially large tax implications of the choice of marital status, the marriage penalty may well feature in people's decisions about the legal status of their relationship.[4] There are several mechanisms through which this might work.

First, the prospect of a marriage penalty may discourage an individual from entering into a cohabiting relationship regardless of its legal status. Various studies have suggested that this is the case, although the effect is modest (Alm & Whittington 1995, Alm & Whittington 1999). In the shorter term, a couple may merely delay their marriage until the following tax year in response to the marriage penalty faced: again this effect is thought to be modest (Sjoquist & Walker 1995, Alm & Whittington 1996*a*).

Second, a couple may decide to forego legal marriage in order to minimise tax liabilities, yet still live together in unmarried cohabitation. Alternatively, it might be the case that a couple's transition from cohabitation to legal marriage is influ-

[4]Similar penalties exist in the benefits system. There is an extensive literature considering the impact of such penalties on the prevalence of single parent families. See Dickert-Conlin (1999) and Moffitt (1998).

enced by the marriage penalty they face: the higher the penalty, the longer they remain unmarried. Alm & Whittington (2003) address these two mechanisms using the Panel Study of Income Dynamics (PSID) and find that whilst the initial choice between marriage and cohabitation is not affected by the magnitude of the marriage penalty faced, the choice to make the transition from cohabitation to marriage is modestly influenced by the marriage penalty faced. Eissa & Hoynes (2000*b*) use CPS data and find that a $1000 higher marriage penalty is associated with a 0.4 percentage point lower probability of marriage relative to cohabitation.

Finally, the presence of a marriage penalty may influence relationship breakdown: facing a large marriage penalty might make a married couple more likely to divorce and the couple either become single, or repartner without remarrying. On the other hand, a cohabiting couple who would face a marriage subsidy if married might be more likely to separate and find partners who they can marry to gain that subsidy.

With the exception of the choice to remain single or enter a coresidential relationship, all of these mechanisms suggest that when a couple faces a larger marriage penalty, we are more likely to observe them as unmarried cohabitants than as a married couple: they may simply not marry, spend more years cohabiting than they otherwise would, or may divorce. So, in states and time periods where marriage penalties are higher, we should observe a higher proportion of cohabiting couples than in states and time periods where marriage penalties are lower.

3 Data and Empirical Strategy

I use the March supplement of the Current Population Survey (CPS) from 1984 to 2008. The CPS interviews around 50,000 households each month, collecting the income data I require in the March survey. This provides a large repeated cross section. If a couple's choice between marriage and unmarried cohabitation is influenced by the marriage penalty faced, the penalty of interest should be the expected marriage penalty at the time of the decision. Unfortunately my data do not al-

low me to observe transitions, or to observe the length of relationships. I instead observe the stock of married and cohabiting couples at each point in time. This approach would be valid if all individuals reoptimize in each period, with the option of separating and entering an equivalent relationship where legal status could be freely chosen.[5] Also, as argued above, the mechanisms by which marriage penalties discourage marriage will affect the stocks of married and cohabiting couples in a consistent manner.

My sample consists of individuals in coresidential relationships where both partners are between 18 and 50 years old. A couple is married if both partners report being married and residing with a spouse. Other individuals are classified as unmarried cohabitants.[6] Prior to 1993 the CPS does not record which couples are unmarried cohabitees. I infer cohabitation by considering non-relative partners and roommates where there are just two opposite sex adults in the household. Once it is possible for respondents to declare themselves to be unmarried partners, the number of cohabitors inferred in this way falls dramatically. So overall my data suggest a smooth upward trend in the proportion of my sample cohabiting, as shown in figure 2, reflecting previous research.

In addition to individual level data, I use census data and projections from the Bureau of Labor Statistics to calculate sex ratios. These are grouped by year, state, age and race, and are used in my analysis to control for local marriage market conditions.[7] A higher value of this sex ratio indicates better odds on the relationship market.

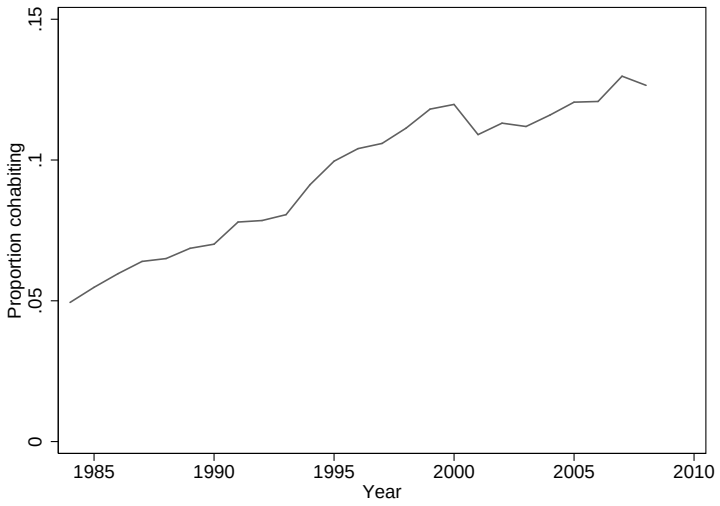
Some measure of social norms for marriage should be included as a control variable in my estimation. Unfortunately the CPS does not provide a rich set of potential controls (for example, religion is not recorded). I proxy social norms using a couple's location: living in a metropolitan statistical area (MSA), or a city within

[5]Whilst there is anecdotal evidence of couples divorcing and subsequently cohabiting (Waite & Gallagher 2000), it seems more reasonable to imagine couples separating and repartnering with another (similar) partner.

[6]Those not residing with a partner are discarded, including those reporting being married with spouse not present.

[7]Prior to 1990 my data is grouped into five-year age groups.

Figure 2: Proportion of CPS sample cohabiting



Proportion of selected sample of couples who are cohabiting. In line with reported trends, the proportion of my CPS sample cohabiting rises steadily over the period. There is no spike in this proportion in 1993 when it became possible for couples to report being unmarried cohabitants.

an MSA. It is expected that more traditional values will hold outside of large cities.

After eliminating observations with missing data, I am left with a sample of 570,751 couples, of whom 54,758 are unmarried. Average characteristics by sex and marital status are given in table 1. Cohabitees are on average younger, slightly less educated, more likely to be nonwhite and have fewer children than those who are married. Whilst married men have higher income than their cohabiting counterparts, the opposite is true for women.

3.1 Calculation of marriage penalties

I calculate marriage tax penalties for all couples in my sample using the NBER TAXSIM program[8] A couple's marriage penalty is the difference between their tax liabilities when married and when cohabiting. It is not immediately obvious how to calculate these tax liabilities: a married couple's liability is only observed when they are married, and so assumptions must be made about how their income and

[8]See http://www.nber.org/∼taxsim/ and Feenberg & Coutts (1993) for more details.

Table 1: Descriptive statistics

	Married		Cohabiting	
Men				
Age	37.54	*(7.45)*	32.22	*(8.05)*
Education *(years)*	13.23	*(2.57)*	12.70	*(2.30)*
Non white	0.12	*(0.32)*	0.18	*(0.39)*
Earnings *($000)*	41.14	*(40.08)*	25.61	*(26.78)*
Sex ratio *(women/men)*	1.00	*(0.07)*	0.99	*(0.08)*
Women				
Age	35.62	*(7.48)*	30.57	*(8.18)*
Education *(years)*	13.23	*(2.47)*	12.91	*(2.25)*
Non white	0.12	*(0.32)*	0.17	*(0.38)*
Earnings *($000)*	16.75	*(21.98)*	17.03	*(19.17)*
Sex ratio *(men/women)*	1.01	*(0.07)*	1.02	*(0.09)*
Household				
Household earnings *($000)*	61.04	*(52.85)*	44.57	*(40.12)*
Dependent children	1.46	*(1.20)*	0.79	*(1.09)*
Marriage Penalty *($)*				
Total	-567.8	*(2977)*	-64.3	*(1845)*
Low education	-728.4	*(2472)*	-252.6	*(1874)*
Medium education	-528.7	*(2841)*	52.8	*(1721)*
High education	-343.5	*(3737)*	356.2	*(1862)*
Observations	516003		54748	

1. Calculations from 1985-2008 CPS
2. Standard deviations in parentheses
3. Dollar amounts in 1997$
4. Low education - no college; medium education - some college; high education - advanced degree

dependents would be split between them if they are unmarried.

I assume that if a married couple were unmarried, the wife would have custody of any children, and so would file as head of household, whilst the husband would file as a single. Any unearned income is split equally. This method follows Eissa & Hoynes (2000*b*) and Alm et al. (1999).

Other approaches taken in calculating the marriage penalty are to assume that the couple arranges their affairs so as to minmise their tax liability (Feenberg & Rosen 1995), and to assume that the higher earner files as head of household (Holtzblatt & Rebelein 2000). My choice reflects the empirical method, as discussed by Holtzblatt & Rebelein (2000): since women generally take primary custody of children on relationship breakdown, I assume that it is the female who will claim the child exemption.[9]

I calculate marriage penalties using actual earnings and numbers of children reported in the CPS: this assumes that a couple's behaviour does not change with its marital status. Whilst this is a strong assumption, it seems reasonable to assume that cohabiting individuals change their behaviour less on getting married than those who were previously single and living alone. TAXSIM calculates federal and state tax liabilities, including the EITC. All transfers are assumed to be zero.[10]

Table 1 reports the average marriage penalties by marital status. A negative number indicates a marriage subsidy. Married couples face an average marriage tax subsidy of \$568, with the lowest educational group having a subsidy of \$728 and the highest educational group at \$344.[11] In contrast, cohabiting couples face an average subsidy of just \$64 per year. This disguises substantial variation between educational groups: whilst the lowest education couples have an average subsidy of \$253, the highest educational group suffer an average penalty of \$356. Large standard deviations for all of these estimates reflect substantial variation in the

[9]Replicating the results in this paper with marriage penalties calculated assuming that children are allocated to minimise total tax liability does not change the conclusions reached.

[10]This will affect the results of those on low incomes. See Eissa & Hoynes (2000*b*) for some suggestive results when transfers are included.

[11]Average subsidies here are driven by the inclusion of years after the Bush tax cuts: before 2002 married couples had an average subsidy of \$373, whilst cohabiting couples faced an average penalty of \$170.

subsidies and penalties faced.

3.2 Empirical strategy

A couple chooses to marry, rather than to cohabit, if the expected joint utility from marriage exceeds that from cohabitation. Since joint utility is assumed to be increasing in income, a couple is less likely to be married as their marriage tax penalty increases. I model the expected excess joint utility from marriage over cohabitation as an index function M^*_{ist}, indexed by individual (i), state of residence (s) and year (t):

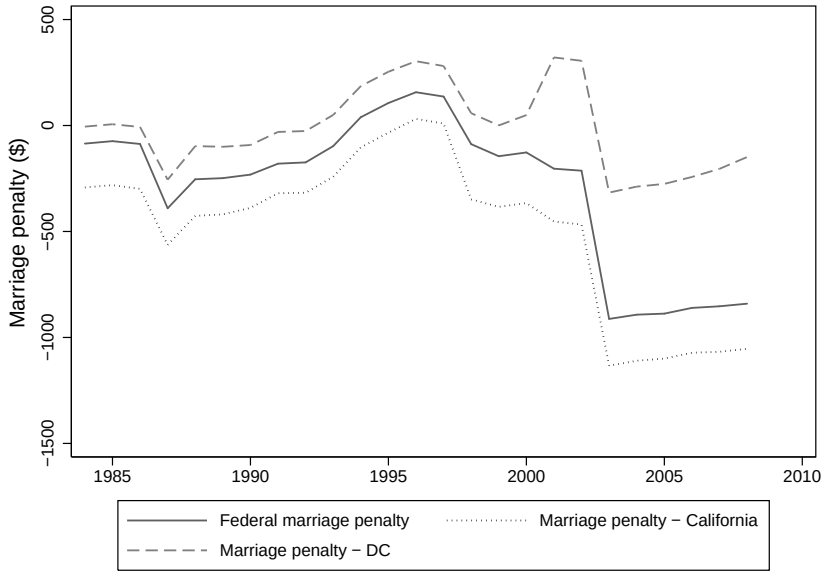
$$M^*_{ist} = \alpha Penalty_{ist} + \beta X_{ist} + \varepsilon_{ist} \tag{1}$$

where $Penalty_{ist}$ is the marriage tax penalty faced by the couple, X_{ist} is a vector of covariates affecting marriage probability, and ε_{ist} is an iid error term. M_{ist} is an indicator variable representing whether a couple is married or not:

$$M_{ist} = \begin{cases} 1 & \text{if } M^*_{ist} > 0 \\ 0 & \text{if } M^*_{ist} \leq 0 \end{cases} \tag{2}$$

I begin by assuming that the marriage penalty a couple faces is exogenous from their marital status, and estimate a probit model. However, these probit estimates are potentially subject to bias. The marriage penalty a couple experience might be correlated with other characteristics which influence the marital status choice. For example, highly educated couples may be more likely to experience a marriage penalty, as both may be more likely to work. Highly educated couples may also be more likely to marry as a result of their social background. This might lead to underestimation of the extent to which marriage is discouraged by a marriage penalty. To address this endogeneity of marital status and the marriage penalty faced, I also present instrumental variables estimates. I use simulated instruments: I simulate the marriage penalty in every state and year for a random sample of couples, and so calculate an average marrige penalty for each state and year which

Figure 3: Instrument – penalties based on policy



Graph shows average marriage penalty from federal income taxes for same random sample of 500 couples in each year. Also shown are the average marriage penalties for these couples if they are in California (smallest average penalty over the period) or DC (largest average penalty over the period).

reflects the tax code and not the economic or demographic characteristics of the state and year.[12] I therefore exploit the variation in marriage penalties resulting from tax code changes and between-state variation in income taxes and the EITC.

Figure 3 illustrates the instrument. The middle line shows the federal marriage penalty for a constant sample. The policy changes can be seen, but the pattern is less pronounced than in figure 1, since there the policy changes are reinforced by demographic change (see Eissa & Hoynes (2000*a*)). I also include the instrument for California and DC, with these two regions having the highest and lowest average marriage penalty over the period respectively. This shows the variation between states. Whilst states' total marriage penalties mostly move in line with the federal

[12]I randomly select 500 couples from my 1998 sample. I then find the average penalty for this selected group in each state and for each year. I take the average penalty in each state and year, giving a set of 1275 state-year averages which capture the policy variation in marriage penalties over the period. This is a similar strategy to that used by Currie & Gruber (1996) who capture differences in children's Medicaid eligibility between states using just one sample of children.

penalty, there is some variation in the extent of the changes.

Whilst this strategy deals with the endogeneity problem described above, and with the problem of individual-level omitted variable bias, there is still concern over omitted variables which are correlated with changes in state and federal marriage penalties and differences in the probability of being married. I include state fixed effects and state specific time trends in order to capture difference levels and trends in marriage between states.

In my instrumental variables estimates the marriage penalty faced is a modelled as a function of the simulated instrument $\overline{Penalty}_{st}$:

$$Penalty_{ist} = \gamma \overline{Penalty}_{st} + \delta X_{ist} + \eta_{ist} \tag{3}$$

I estimate the model by assuming that ε_{ist} and η_{ist} are jointly normally distributed with covariance ρ and using full information maximum likelihood. This effectively instruments the marriage penalty faced with the average penalty in the relevant state and time period. X_{ist} is a vector of individual and local characteristics which influence the choice between marriage and cohabitation including demographic characteristics, income measures, the sex ratio, size of town or city and state fixed effects and time trends.

4 Marriage penalties and marital status

Estimates of the effect of marriage penalties on marital status, split by sex, are presented in table 2. The dependent variable is equal to one if the individual is married or zero if cohabiting.

Column 1 shows the association between the marriage penalty faced and marital status without controlling for observable characteristics. A $1,000 increase in the penalty faced is associated with a 0.6 percentage point fall in the probability of being married. Columns 2 and 4 introduce a set of controls including state fixed effects and state time trends. This reduces the correlation between the marriage penalty

Table 2: Effect of the marriage penalty on marital status

		Men		Women	
	Raw	Probit	Probit (IV)	Probit	Probit (IV)
Marital status	(1)	(2)	(3)	(4)	(5)
Penalty ($000)	**-0.0058**	**-0.0023**	**-0.0167**	**-0.0023**	**-0.0170**
	(0.0003)	*(0.0003)*	*(0.0013)*	*(0.0003)*	*(0.0014)*
Education		**-0.0157**	**-0.0143**	**-0.0170**	**-0.0151**
		(0.0009)	*(0.0009)*	*(0.0013)*	*(0.0010)*
Education^2		**0.0009**	**0.0008**	**0.0009**	**0.0008**
		(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
Age		**0.0095**	**0.0099**	**0.0113**	**0.0118**
		(0.0007)	*(0.0007)*	*(0.0005)*	*(0.0006)*
Age^2		**-0.0001**	**-0.0001**	**-0.0001**	**-0.0001**
		(0.0000)	*(0.0000)*	*(0.0000)*	*(0.0000)*
Black		**-0.0514**	**-0.0490**	**-0.0376**	**-0.0347**
		(0.0040)	*(0.0040)*	*(0.0040)*	*(0.0040)*
Other race*		-0.0111	-0.0094	-0.0077	-0.0063
		(0.0092)	*(0.0096)*	*(0.0073)*	*(0.0077)*
Children		**-0.0027**	**-0.0080**	-0.0011	**-0.0065**
		(0.0013)	*(0.0015)*	*(0.0012)*	*(0.0014)*
Children under 17		**0.0355**	**0.0379**	**0.0337**	**0.0361**
		(0.0013)	*(0.0015)*	*(0.0013)*	*(0.0014)*
Sex ratio		-0.0205	-0.0153	**0.0383**	**0.0324**
		(0.0117)	*(0.0105)*	*(0.0098)*	*(0.0097)*
Own wages		**0.0012**	**0.0007**	**-0.0005**	**0.0010**
		(0.0000)	*(0.0001)*	*(0.0000)*	*(0.0001)*
Partner's wages		**-0.0001**	**0.0013**	**0.0014**	**0.0009**
		(0.0001)	*(0.0002)*	*(0.0000)*	*(0.0001)*
Time trend		**-0.0044**	**-0.0052**	**-0.0047**	**-0.0055**
		(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
Joint estimation	No	No	Yes	No	Yes
Test of instrument			**2795**		**2819**
Estimated ρ			**0.2199**		**0.2248**
Mean of married			0.90		0.90

1. Table reports marginal effects from probit estimation. Standard errors clustered by state in parentheses
2. Other controls: quadratic and interaction terms in wages, dividend, property and unemployment income, size of city (3 dummies), state dummies, state time trends
3. Other race: not white or black
4. Bold indicates significance at 5% level
5. Joint estimation denotes joint estimation of marriage equation and penalty equation. Estimation from penalty equation available on request
6. Test of instrument gives chi-squared statistic from test that the instrument's coefficient is equal to zero in the marriage penalty equation
7. 570751 observations

experienced and marital status: the estimated fall in the propensity to marry for a $1000 increase int he penalty faced is reduced from 0.6 to 0.2 percentage points for both men and women.

In columns 3 and 5, I present estimates which control for the potential endogeneity between marital status and the experienced marriage penalty. When I instrument for the penalty experienced with my simulated instrument, I find a much larger effect: a 1.7 percentage point reduction in the probability of marriage for a $1000 increase in the penalty. This suggests that the marriage penalty and marital status are indeed endogenous. There is selection into marriage on unobservable characteristics which also influence the marriage penalty. The correlations shown in columns 2 and 4 underestimate the magnitude of the true effect. This is in contrast to selection on observable characteristics (seen by the change in coefficients moving from column 1 to columns 2 and 4): for example, older people are more likely to be married and to have a smaller marriage penalty, so merely controlling for age reduces the estimated effect of the marriage penalty.

To be confident that the identification achieved is due to variation in the simulated instrument, it is important to consider the significance of the instrument in the penalty equation (equation 3 above). The simulated instrument is strongly positively correlated with the actual penalty faced: the chi-squared statistics from the tests of the significance of the coefficient on the instrument are reported in table 2. Both are far in excess of 10[13] and so I conclude that the average marriage penalty is a strong instrument for the actual penalty faced.

The joint estimation of the two equations also allows for a test of the exogeneity of the actual marriage penalty faced. The correlation between the error terms (ρ) in the two equations is estimated to be significantly positive (around 0.22), supporting the hypothesis that there are unobserved characteristics which increase the likelihood of marriage and the size of the penalty faced.

Throughout this estimation I control for demographic characteristics including

[13] Angrist & Pischke (2009) suggest an F-statistic in excess of 10 is sufficient to be confident of a strong instrument.

Table 3: Effect of the marriage penalty on marital status: by education

Education group	N	Raw (1)	Probit (2)	Probit (IV) (3)	Inst. (4)	ρ (5)	Mean (6)
Men							
Low	268021	**-0.0082**	**-0.0027**	**-0.0265**	**1733**	**0.2460**	0.881
		(0.0006)	*(0.0005)*	*(0.0027)*			
Medium	142081	**-0.0069**	**-0.0021**	**-0.0122**	**1374**	**0.1515**	0.903
		(0.0005)	*(0.0005)*	*(0.0028)*			
High	160649	**-0.0038**	**-0.0017**	**-0.0065**	**2749**	**0.1911**	0.944
		(0.0003)	*(0.0002)*	*(0.0015)*			
Women							
Low	265410	**-0.0097**	**-0.0023**	**-0.0220**	**1746**	**0.2219**	0.892
		(0.0005)	*(0.0005)*	*(0.0022)*			
Medium	155509	**-0.0090**	**-0.0034**	**-0.0164**	**2061**	**0.1874**	0.900
		(0.0004)	*(0.0004)*	*(0.0028)*			
High	149832	**-0.0025**	**-0.0011**	**-0.0048**	**2001**	**0.1368**	0.935
		(0.0002)	*(0.0002)*	*(0.0013)*			

1. Table reports marginal effect of marriage penalty ($1000) on marriage probability from probit estimation. Standard errors clustered by state in parentheses
2. Other controls as in table 2
3. Bold indicates significance at 5% level
4. Column 5 gives chi-squared statistic from test of coefficient on the instrument being equal to zero in marriage penalty equation
5. Low education: no college education; medium education: some college education; high education: 4 years of college education or more
6. Column 6 shows mean of married dummy for each group

education, age, race, children and the sex ratio faced. Controlling for income is important since the actual marriage penalty faced is a function of income, albeit highly nonlinear. Table 2 reflects previous literature in finding that being older, white, having more dependents and having a higher income is associated with a higher probability of marriage. Marriage rates have also been falling over time. Women are more likely to be married given a favourable marriage market, whilst men do not appear to exploit a strong marriage market to choose a particular relationship status (given that they are in a coresidential relationship).

Table 3 presents results from separate regressions within three educational groups: those with no college education (low), those with some college education (medium) and those with 4 years or more college education (high). This allows us to consider the differential effects at different socioeconomic levels. This table reinforces the findings from the full sample, but highlights heterogeneity. Columns 1 and 2 show that the marriage penalty is more strongly correlated with marital status for the low and medium education groups than for the highest education group. The differences between groups are even more pronounced in the causal effects shown in column 4: low education individuals are 2.7 (men) or 2.2 (women) percentage points less likely to marry if their marriage penalty increases by $1000 (around 2.5% of their household earnings), whilst the response for the highest educational group is 0.7 (men) or 0.5 (women) percentage points (where $1000 is around 1.2% of their household earnings). These results together show that the potential for financial incentives to induce more marriages is much larger than previously thought.

5 Conclusion

This paper estimates the extent to which marriage penalties discourage marriage in favour of unmarried cohabitation. It explicitly deals with the potential endogeneity between marital status and the marriage penalty experienced by using a simulated instrument. I find that a $1,000 increase in the marriage penalty reduces the

probability of marriage by around 1.7 percentage points. This estimate is more than four times greater than that found in the existing literature, and is the first estimate to deal with endogeneity. Providing financial incentives can affect marital status decisions and so increase the marriage rate.

This result has strong implications for policy in the context of concern about declining marriage rates and family values. Although there are many more personal and probably more important reasons for getting married, there is real potential for increasing the marriage rate through the provision of financial incentives. However, this paper does not provide evidence to suggest whether the additional marriages caused by a financial incentive are desirable. Whilst there is a wealth of evidence suggesting strong correlations between marital status and various beneficial outcomes (Waite & Gallagher 2000), the causality is often not clear (see Ribar (2004) for a survey of some evidence). There should be particular concern about the marriages induced by financial incentives since they will be marginal marriages: a couple motivated by the financial incentive may not change any behaviour beyond gaining the marriage certificate and the tax benefit. On the other hand, if the process of getting married is of itself transformative, either to the individuals involved or to the attitudes they encounter from others, then a direct financial subsidy to marriage may have desirable outcomes.

A further issue raised by the analysis in this paper is that couples are able to, and choosing to, alter their legal marital status to affect their tax liabilities. It is widely agreed that the tax code should treat families with equal income equally to achieve horizontal equity (Eissa & Hoynes 2000*a*). With the increasing prevalence of cohabitation, using legal marriage as the marker by which families are defined may no longer achieve this goal.

References

Alm, J., Dickert-Conlin, S. & Whittington, L. A. (1999), 'Policy watch: The marriage penalty', *Journal of Economic Perspectives* **13**(3), 193–204.

Alm, J. & Whittington, L. A. (1995), 'Income taxes and the marriage decision', *Applied Economics* **27**(1), 25–31.

Alm, J. & Whittington, L. A. (1996*a*), 'Income taxes and the timing of marital decisions', *Journal of Public Economics* **64**(2), 219–240.

Alm, J. & Whittington, L. A. (1996*b*), 'The rise and fall and rise... of the marriage tax', *National Tax Journal* **49**(4), 571–589.

Alm, J. & Whittington, L. A. (1999), 'For love or money? the impact of income taxes on marriage', *Economica* **66**(263), 297–316.

Alm, J. & Whittington, L. A. (2003), 'Shacking up or shelling out: Income taxes, marriage and cohabitation', *Review of Economics of the Household* **1**(1), 169–186.

Angrist, J. D. & Pischke, J.-S. (2009), *Mostly Harmless Econometrics*, Princeton University Press.

Congressional Budget Office (1997), For better or for worse: marriage and the federal income tax, Technical report, CBO.

Crossley, T. F. & Jeon, S.-H. (2007), 'Joint taxation and the labour supply of married women: evidence from the canadian tax reform of 1988', *Fiscal Studies* **28**(3), 343–365.

Currie, J. & Gruber, J. (1996), 'Health insurance eligibility, utilization of medical care, and child health', *The Quarterly Journal of Economics* **111**(2), 431–466.

Dickert-Conlin, S. (1999), 'Taxes and transfers: their effects on the decision to end a marriage', *Journal of Public Economics* **73**(2), 217 – 240.

Dickert-Conlin, S. & Chandra, A. (1999), 'Taxes and the timing of births', *Journal of Political Economy* **107**(1), 161–177.

Eissa, N. & Hoynes, H. (2000*a*), 'Explaining the fall and rise in the tax cost of marriage: the effect of tax laws and demographic trends, 1984-1997', *National Tax Journal* **53**(2), 683–712.

Eissa, N. & Hoynes, H. (2000*b*), Tax and transfer policy and family formation: marriage and cohabitation.

Feenberg, D. R. & Coutts, E. (1993), 'An introduction to the taxsim model', *Journal of Policy Analysis and Management* **12**(1), 189–194.

Feenberg, D. R. & Rosen, H. S. (1995), 'Recent developments in the marriage tax', *National Tax Journal* **48**(1), 91–101.

Furstenberg, F. F. (2007), 'Should government promote marriage?', *Journal of Policy Analysis and Management* **26**(4), 951–964.

Holtzblatt, J. & Rebelein, R. (2000), 'Measuring the effect of the eitc on marriage penalties and bonuses', *National Tax Journal* **53**(4), 1107–1134.

Kennedy, S. & Bumpass, L. (2008), 'Cohabitation and children's living arrangements: new estimates from the united states', *Demographic Research* **19**(47), 1663–1692.

LaLumia, S. (2008), 'The effects of joint taxation of married couples on labor supply and non-wage income', *Journal of Public Economics* **92**, 1698–1719.

Leigh, A. (2010), 'Who benefits from the earned income tax credit? incidence among recipients, coworkers and firms', *The B.E. Journal of Economic Analysis & Policy* **10**(1 (Advances)), article 45.

Moffitt, R. A. (1998), *The effect of welfare on family and reproductive behaviour*, National Research Council, chapter The effect of welfare on marriage and fertility: what do we know and what do we need to know?

Ribar, D. C. (2004), What do social scientists know about the benefits of marriage? a review of quantitative methodologies, Discussion Paper 998, IZA.

Sjoquist, D. L. & Walker, M. B. (1995), 'The marriage tax and the rate and timing of marriage', *National Tax Journal* **48**(4), 550–564.

Stephens, M. & Ward-Batts, J. (2004), 'The impact of separate taxation on the intrahousehold allocation of assets: evidence from the uk', *Journal of Public Economics* **88**, 1989–2007.

Waite, L. J. & Gallagher, M. (2000), *The Case for Marriage*, Broadway Books.

Whittington, L. A. & Alm, J. (1997), ''til death or taxes do us part: the effect of income taxation on divorce', *Journal of Human Resources* **32**(2), 388–412.

Whittington, L. A., Alm, J. & Peters, H. E. (1990), 'Fertility and the personal exemption: Implicit pronatalist policy in the united states', *American Economic Review* **80**(3), 545–56.