ISER Working Paper Series

Women's Economic Gains from Employment, Marriage and Cohabitation

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No. 2008-23
July 2008

INSTITUTE FOR SOCIAL & ECONOMIC RESEARCH

www.iser.essex.ac.uk

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Non-technical Summary

U.S. public policy promotes both marriage and labor market participation as strategies for improving the economic welfare of low-income women and their children. Earlier research has focused on economic gains from marriage and cohabitation for women. However, the target group of these public policies is not all women but those who are predisposed towards poverty (and are welfare recipients or most likely to become one). None of these papers have estimated these gains for this target group. Also none of these papers compare predicted gains from marriage/cohabitation to the gains from employment although employment has been cited in the welfare reforms as the other mechanism for moving out of poverty. In this paper, I examined which of these mechanisms (marriage, cohabitation or employment) leads to greater economic gains – especially for those women who are predisposed towards poverty.

I find that single, non-employed women who at some point received welfare benefits (but may not be receiving currently), are likely to gain more economically if they get full-time employment than if they were to cohabit or marry. This would be consistent with women marrying (or cohabiting with) men who have similar incomes as they do. When I consider transitions of women who are already employed part-time, I find that the opposite is true. Their expected gains are similar to that of the whole sample of women. This reflects that as these economically disadvantaged women participate in the labor market more, their economic disadvantage becomes less severe and their marriage market (and to a lesser extent labor market) opportunities are quite similar to the rest of the sample.

When I consider all women, as has been done in existing literature, I find that the expected gains from marriage, cohabitation or employment are higher than the women who have been welfare recipients at some point in time. Hence economic gains estimated for all women cannot be used to predict gains for women in the policy target group.

Women's Economic Gains from Employment, Marriage and Cohabitation[#]

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September 2006

This version: December 2006

Abstract

U.S. public policy promotes both marriage and labor market participation as strategies for improving the economic welfare of low-income women and their children. Here I compare women's economic gains from marriage, cohabitation and employment. Using data from the NLSY79, I estimate a fixed-effects model of household income (adjusted for household composition). I find that among "poor" women (those who ever received welfare), the log household income of single, nonemployed women would increase by 0.80 if they enter a cohabiting union, 1.04 if they marry, 0.76 if they work part-time (1000 hours/year), and 1.16 if they work full-time (2000 hours/year).

Keywords: marriage, cohabitation, employment, race, welfare, gains
JEL Codes: J12

[#] I am indebted to my supervisor Audrey Light for her help in every step of this work. I am also grateful to Stephen Cosslett and Randall Olsen for their insightful comments and suggestions. I thank the Ohio State University and the Center for Human Resource Research for providing me research facilities and financial assistance.

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I. Introduction

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) emphasized participation in the labor force and marriage as mechanisms to improve the economic condition of women and their children. In this study, I assess the relative effectiveness of these mechanisms. In light of the dramatic rise in cohabitation in recent years, I also include cohabitation as a third mechanism for improving economic well-being. Specifically I ask the following. What are the economic gains that *any* “poor” single woman would experience if she were to cohabit, to marry or change her employment intensity? Would these gains vary by her initial hours worked? How would the gains experienced by poor women compare to those for nonpoor women?

Existing studies document that married and cohabiting women have higher household incomes than single women. Most of these studies do not control for the endogeneity of marital status variables and in essence measure the correlation between marital status and household incomes. Only two studies use estimation methods (first-difference and switching regression) to control for selection on unobservables and estimate the causal effect of marital status on needs-adjusted household income. Light (2004) finds that entering into marital or cohabiting unions does entail economic (similar) gains measured in terms of needs-adjusted household income for women and Smock *et al.* (1999) find that divorcing entails economic loss for women.

Although welfare policy promotes employment as the primary mechanism and marriage as a secondary mechanism for exiting poverty (as mentioned in PRWORA) there has been no attempt to compare gains form marriage and cohabitation with gains from employment (*e.g.*, nonemployment to part-time employment or part-time employment to full-time employment).

The belief of PRWORA as well as marriage promotion policies is that marriage has a positive effect on the economic well-being of women and their children. Again there are no studies that estimated these gains specifically for the policy target group—poor women. Poor, single women are likely to face different marriage market opportunities than nonpoor, single women because they and their potential spouses, on an average, have lower schooling, lower employment levels, lower labor market experience. This implies that gains from cohabitation, marriage and employment estimated for the general population may not be the same for poor women.

Using data from the 1979 National Longitudinal Survey of Youth (NLSY79), I estimate a first-difference model of household income to assess the within-person gains associated with changes in employment and marital status; I allow the effects of employment on household income to differ for single, cohabiting, and married women.

Focusing first on "poor" women (those who ever received welfare), I predict that the log household income of single, nonemployed women increases by 0.79 if they enter a cohabiting union, 1.04 if they marry, 0.76 if they work part-time (1000 hours/year), and 1.16 if they work full-time (2000 hours/year). The finding that the biggest predicted gain is from entering full-time employment (while remaining single) reflects the fact that the expected earnings of these low-wage women exceed the share of adjusted earnings that they can be expected to gain by marrying a (typically low-wage) man. When I use a sample of poor and nonpoor women, the estimated gains from cohabitation, marriage, part-time employment and full-time employment for single, nonemployed women are 0.91, 1.14, 0.83 and 1.27, respectively. Each estimated gain is larger than the corresponding estimate for poor women. This is not surprising given the higher earnings potential of nonpoor women as well as that of their spouses and partners. When I consider transitions of women who are already employed part-time, I find that their expected gains from cohabitation and marriage are virtually identical (0.48 and 0.47, respectively) and that union formation now has a greater expected benefit than moving to full-time employment, which I predict raises log income by 0.41. These are not very different from those estimated for all women.

II. Background

It is well established that the household income of married women is greater than that of single women. This serves as the primary justification for public policies that promote marriage with the aim of improving the economic well-being of women and their children. In 1999, 5.5% of married-couple families and 13.8% of families with a single female adult were below the poverty line (U.S. Census Bureau 2003). The positive correlation between marriage (and cohabitation) and family income is corroborated by various empirical studies as well (Duncan and Hoffman 1985, Bianchi *et al.* 1999, Smock *et al.* 1999, Thomas and Sawhill 2002, Lichter, Graefe and Brown 2003 and Light 2004). This positive correlation, however, is not conclusive evidence that changing marital status will lead to changes in family income. Only two of these studies use appropriate empirical methods to estimate the causal effect of marital status on family income (Smock *et al.* 1999 and Light 2004). To understand why this correlation does not necessarily mean causality we need to look into the determinants of marital status.

An individual's marital status (marriage, cohabitation or single) depends on a number of factors some of which may not be observable, such as innate ability, motivation, "spunk" and perseverance.[1] If any of these factors also affects household income then OLS estimates of the coefficients of marital status for a household income equation will not identify the effect of marital status on household income. These estimates will capture the effect of marital status as well as these unobserved factors. For example, persons with qualities like motivation, perseverance and "spunk," are more likely to search intensively and find suitable mates and marry or cohabit. These qualities may also be qualities attractive to high earning prospective partners and spouses and so we would find women selecting high earning spouses. A number of estimation procedures are available to correct for this selection on unobservables or the omitted variable bias but none offer the perfect solution.

The most widely used technique to correct for omitted variable bias is the IV (instrumental variable) method. The idea is to find instrumental variables (IVs) which are variables that are correlated with the endogenous regressors (*i.e.,* regressors that are correlated with the unobservables) but not the dependent variable. Next we could either substitute the endogenous regressors with the IVs or we could regress the endogenous variables on the IVs and then substitute the endogenous regressors with their estimated values. The problem with this method is that of finding suitable instruments.

A vast literature exists that examines the effect of marital status on men's and women's wages (the marital wage premium) and many of these studies have used different estimation methods to correct for selection bias. Although marriage-wage premiums are not the same thing as gains from marriage the estimation of marriage-wage premiums involve similar issues of selection bias as estimation of gains from marriage. A review of this literature would thus help

[1] The underlying behavioral model is that individuals choose marital status in order to maximize their lifetime expected utility.

in understanding selection issues and the estimation methods to eliminate selection bias.[2] Nakosteen and Zimmer (1987) and Chun and Lee (2001) directly modeled selection of men into marriage as being determined by their earnings. Depending on the particular marital status that men self-select themselves into a different earnings equation is estimated (switching regressions). The selection effect is incorporated into this model by assuming that the unobservables or the error terms of the earnings equations are correlated with that of the marital status choice equation. By estimating this three-equation model, wages for married and not married men, free of selection bias, can be estimated. However, for reasons of logical inconsistency this method cannot be used to estimate a marriage-wage premium.[3]

With the availability of longitudinal data other estimation methods such as fixed effect methods became available. Numerous studies (Korenman and Neumark 1991, Daniel 1992, Loh 1996, Gray 1997, Stratton 2002) modeled unobserved factors that affect both marital decisions and men's (and women's) wages as individual-specific, time-invariant factors and then used first-differencing to weed out these fixed effects and estimate marriage-wage premiums devoid of selection effects.

This method, while simple to understand and estimate, does not eliminate any selection effects arising from correlation between marital choice and time-varying, individual-specific unobservables. Also, identification of the marital status dummy is conditional on there being within-person variations. The advantage of the fixed effects methods over the others is perhaps that they are easier to implement because we do not need to specify the distribution of the fixed effect, which variables are endogenous or find suitable instruments for the endogenous regressors.

Now turning back to the topic of the effect of marital status on a woman's economic well-being, I find that very few studies have attempted to eliminate selection effects and estimate the causal effect of marital status on economic well-being. One of the two studies that have done

[2] While wages of men may increase and that of women may decrease after they enter into a marital or cohabiting union a woman's share of total family income (gains from marriage) may increase or decrease.

[3] In order to include a marital status dummy in the wage equation (and thus estimate the marriage-wage premium), the estimated coefficients in both wage equations should not be statistically different from each other. Even if this is the case and a single wage equation can be used instead of two, the more serious problem is that such a model would be logically inconsistent (see Maddala 1983, pp. 117-119).

so has used switching regressions (Smock *et al.* 1999) and the other first-difference estimator (Light 2004).

Smock *et al.* (1999) jointly model the decision to divorce or stay married, an income equation for divorced women and one for women who stay married. They assume the unobserved terms in the three equations are correlated and distributed as a trivariate normal. They use the estimated coefficients from the switching regressions and the sample means for divorced and married women to construct counterfactuals; *e.g.*, the expected income-to-needs ratio of a divorced woman had she stayed married and the expected income-to-needs ratio of a married woman had she divorced.[4] They find that the income-to-needs ratio of both married and divorced women is expected to fall to 1.6 if they were to get divorced. Although this method is quite effective in eliminating selection effects and estimating the causal effect of marital status on household income it requires strong distributional assumptions of the error terms.

Light (2004) avoids this problem and computes the first-difference estimator. She differences out the individual fixed effects and estimates the effect of marital status on needs-adjusted family income. She finds that single women gain 55% in terms of needs-adjusted family income from marriage or cohabitation.

We learn from these studies (Smock *et al.* 1999, Light 2004) that entering into marital and cohabiting union increases needs-adjusted family income for women and for obvious reasons we know that increasing hours worked increase her income as well. Despite the thrust of PRWORA on employment and marriage as different mechanisms to move out of poverty there has been no attempt to compare gains form marriage with gains from increasing hours worked.

The focus of some public policies such as PRWORA is to improve the economic well-being of poor women and their children. Neither of the two studies (Smock *et al.* 1999, Light 2004) that estimate income gains from marriage and cohabitation or income loss from divorce do so for the policy target group—poor women. The labor market and marriage market opportunities that poor women face may be different from nonpoor women. If that is the case then gains from cohabitation, marriage and employment estimated for the general population would not be the same as that for poor women.

[4] Note although they use switching regression techniques the method they use to estimate the economic losses experienced by a woman when she divorces avoids the problems that plagued the studies of Nakosteen and Zimmer (1987) and Chun and Lee (2001).

A caveat to this entire discussion on the income gains to marriage, cohabitation and employment is that there are other (non-financial) gains associated with these transitions. Becker (1973) postulated that joint household utility is derived by individuals in marital and cohabiting unions from tangible and intangible goods produced by them using as inputs their time and goods purchased in the market with their joint earnings. Economies of scale, benefits of companionship and enjoyment of joint activities allow two persons to derive more utility when living together than when living separately even if both have equal single incomes which do not change after union formation. The joint utility can also be increased by specialization within the household (one partner specializing in labor market activities and the other in household activities).

III. Empirical Model

In this section I explain the estimation method that I use to identify causal effects of marital status and employment status on economic well-being (measured by the household income with certain adjustments as detailed in the following section) and why I am justified in doing so. I characterize a woman's household income as follows:

(1) $\ln Y_{it} = \alpha_0 + \alpha_1 A_i + \gamma STATUS_{it} + \beta X_{it} + \theta_i + \varepsilon_{it}$,

where $\ln Y_{it}$ is the natural logarithm of family income for individual i at time t and $STATUS_{it}$ represents the vector of marital and employment status variables (the exact specification to be discussed later) for individual i at time t. Other observed, time-varying variables that determine family income (such as whether she is living with her parents or not, her schooling, number of children, age) are included in X_{it} and time-invariant ones (such as race and ethnicity, family structure during childhood) are included in A_i. Individual-specific time-invariant unobserved factors affecting $\ln Y_{it}$ are represented by θ_i and individual-specific time-varying unobserved factors by ε_{it}.

If these unobserved factors, θ_i and ε_{it}, are correlated with $STATUS_{it}$ then the OLS estimator, $\hat{\gamma}_{OLS}$, from (1) will not identify the *causal* effect of the $STATUS$ on $\ln Y_{it}$. If there are within-person variations in $STATUS_{it}$ and ε_{it} is not correlated with $STATUS_{it}$ then the first-difference estimator, $\hat{\gamma}_{FD}$, will identify the causal effect of $STATUS$ on $\ln Y_{it}$. The first-difference estimator is the OLS estimator from the following equation,

(2) $\Delta \ln Y_{it} = \gamma \Delta STATUS_{it} + \beta \Delta X_{it} + \Delta \varepsilon_{it}$.

To test the exogeneity condition (*i.e.*, conditional on θ_i, $STATUS_{it}$ is not correlated with ε_{it}) I use a test suggested by Wooldridge (2002). It is an F test or a Wald test (to make the test robust to heteroskedasticity) of the hypothesis, $H_0 : \rho = 0$, in the following equation,

(3) $\Delta \ln Y_{it} = \gamma \Delta STATUS_{it} + \beta \Delta X_{it} + \rho STATUS_{it} + \pi W_{it} + \Delta \varepsilon_{it}$

where W_{it} consists of all variables in X_{it} excluding the age or time dummies.

Including marital and employment status variables without including any interaction terms would imply imposing the restriction that the effect of a woman's marital status on her family income is independent of the effect of her employment status and vice versa. In this study I use the following specification of $STATUS_{it}$,

$$STATUS_{it} = [MARRIED_{it}, COHABIT_{it}, HOURS_{it}, HOURS_{it}^2, MARRIED_{it} \times HOURS_{it},$$
$$COHABIT_{it} \times HOURS_{it}, MARRIED_{it} \times HOURS_{it}^2, COHABIT_{it} \times HOURS_{it}^2]$$

where $MARRIED$ and $COHABIT$ variables represent married and cohabiting marital status and $HOURS$ represents the annual hours worked.[5] Gains from marriage, cohabitation, hours worked may also change with time spent in that particular state and so to capture those gains, duration of marriage and cohabitation and work experience should be included in (2). However, because these duration effects are not as important within persons as they are across persons, I am not including these.

Estimating one model for the entire sample would imply restricting the slope coefficients to be the same for all—both poor and nonpoor women.[6] The discussion in the previous section points to why that may not be the case and so I estimate the model using interaction terms to identify the difference in slope coefficients between women who are "poor" and those who are not,

(4) $\Delta \ln Y_{it} = \gamma \Delta STATUS_{it} + \beta \Delta X_{it} + \tilde{\gamma}(D_i \times \Delta STATUS_{it}) + \tilde{\beta}(D_i \times \Delta X_{it}) + \Delta \varepsilon_{it}$

[5] I report the results of the tests that I perform to choose this particular form in section V.

[6] Definition of poor and nonpoor will be discussed in the following section.

where D is the dummy indicating "poor" women. The slope coefficients for those who are "poor" would be $\gamma + \tilde{\gamma}, \beta + \tilde{\beta}$ and for those who are not these would be γ, β, respectively.

IV. Data

A. Survey

To estimate the economic gains from employment, marriage and cohabitation for women, I use data from the 1979 National Longitudinal Survey of Youth (NLSY79). The NLSY79 is a study of 12,686 respondents. The interviews were conducted annually from 1979 to 1994 and biennially from then on. I use data from 1979 to 2002 interview years. The respondents were interviewed for the first time when they were between 14 to 22 years old. Women constitute around 50% of the entire sample. This sample also has an over-sample of black, Hispanic and poor whites.[7] This is of particular importance to my study because I use race as one of the indicators of being poor. Information collected on welfare participation and fertility also help me in identifying women as poor (discussed in detail later). Another advantage of using this survey is its low attrition rates. A longitudinal data set with high attrition rates would lose its advantage as a longitudinal data set as there will be fewer observations per respondent. The low attrition rate is primarily achieved by attempting to re-interview respondents who missed an interview in subsequent interview years. Efforts are made to interview them in future rounds. Finally, and most importantly, this dataset is very useful because it contains detailed information on marital and employment histories and comprehensive information on the different sources of income.

B. Sample Selection

I restrict the sample to women who were never married or who were in their first marriage when they were interviewed for the first time in 1979. Also, I do not include women who were less than 18 years old when they were last interviewed. This reduces the number of women in the sample from 6,283 to 6,006. I also drop nine women with missing information for a number of background characteristics such as race and ethnicity, mother's schooling and

[7] The NLSY79 cohort comprises of a nationally representative sample of 6,111 respondents, a military sample of 1,280 respondents and an over-sample of 5,295 non-Hispanic blacks ("blacks"), Hispanics, and economically disadvantaged non-black non-Hispanics ("poor whites"). 1,079 respondents of the military sub-sample were dropped after 1984 and all 1,643 poor whites in the over-sample were dropped after 1990.

family structure at the age of 14. Next I exclude those women for whom we cannot determine whether they ever participated in any of the government welfare programs (AFDC, WIC, Food Stamps, SSI, etc.) or if I could not determine whether they were teenage single mothers. This eliminates 44 respondents and the sample size drops to 5,953.

I retain only those yearly observations for these 5,953 women which satisfy the following criteria. I drop observations where the woman was enrolled in regular school for at least a month during the interview year as I do not want to estimate women's income gains when they are making the school-to-work transitions. I also eliminate person-year observations when the annual household income was greater than one million dollars as these few observations (around 35) with extremely high incomes could distort the results.[8] I exclude observations for years with bad data on income, hours worked and when a woman reports that she worked for some hours in that year but does not report any income from wages. For those interview years when the number of children born to a woman or her highest grade completed could not be determined, the yearly observation is also dropped. Finally, observations for interview years when a woman did stay in the same marital status for 10 or more months in a year are not included (the reason for this criterion is described in detail in the following sub-sections). These criteria are satisfied by 73,175 person-year observations for 5,912 women.

To use the first-difference estimator I require at least two observations per woman. Because interviews were conducted every year until 1994 and every other year from then on, I use person-year observations two years apart to maintain uniformity across the years. This results in 30,078 person-year observations in the differenced data, 39,904 person-year observations in un-differenced data and 4,541 women in the final sample. The number of observations per woman ranges from two to 19 (See Table 1). The highest fractions of women contribute two yearly observations.

[8] Estimation results are almost the same (up to two decimal places) if I do not eliminate these observations.

Table 1: Distribution of Observations Per Woman

Number of observations per woman	Full-sample	Ever received welfare	Teenage, single mother	Black	Hispanic	White
	Fraction of the samples					
2	0.12	0.12	0.13	0.10	0.13	0.14
3	0.03	0.02	0.02	0.02	0.03	0.03
4	0.08	0.08	0.06	0.07	0.08	0.09
5	0.08	0.08	0.09	0.08	0.07	0.07
6	0.06	0.07	0.07	0.05	0.06	0.07
7	0.06	0.06	0.05	0.06	0.06	0.07
8	0.07	0.07	0.07	0.08	0.07	0.07
9	0.06	0.06	0.06	0.06	0.06	0.07
10	0.06	0.06	0.07	0.07	0.06	0.06
11	0.06	0.06	0.07	0.06	0.07	0.06
12	0.05	0.05	0.05	0.06	0.06	0.04
13	0.06	0.06	0.06	0.07	0.07	0.05
14	0.05	0.05	0.05	0.07	0.06	0.04
15	0.05	0.05	0.06	0.06	0.05	0.04
16	0.03	0.03	0.04	0.04	0.03	0.03
17	0.03	0.03	0.04	0.03	0.03	0.04
18	0.02	0.03	0.03	0.03	0.01	0.02
19	0.02	0.01	0.02	0.02	0.01	0.02
Number of women	**4,541**	**2,085**	**636**	**1,166**	**716**	**2,659**
Number of person-year observations	**39,904**	**18,531**	**5,822**	**11,008**	**6,274**	**22,622**

C. Dependent Variable

The dependent variable that I use in this study is an indirect measure or proxy of a woman's economic-well being. Loosely interpreted, economic well-being is the utility that a person derives from consuming goods and services that can be purchased in the market. Assuming positive prices of goods and services and no change in preferences, if the nominal income of a utility maximizing person increases then so will her potential economic well-being (or at least will not decrease).[9] A few adjustments need to be made to a woman's household nominal income before it can be used as a proxy measure of her economic well-being.

[9] The implicit assumption that economists always make about individual behavior is that individuals choose actions to maximize their utility.

First, if I use observations from different years, then the nominal income must be deflated by some measure that reflects the change in prices for that particular year relative to a base year. I use the implicit Gross Domestic Product price deflator to deflate the nominal income.[10]

Second, if the household composition changes as it does when a woman enters a marital or cohabiting union, then the utility that a woman derives from one dollar of household income also changes. This is because of the presence of additional household members, economies of scale, public goods and complementarity in consumption. The existing literature on this issue offers two solutions—equivalency scale and indifference scale. I will get back to this issue after I discuss how I compute the household nominal income.

At each interview respondents report the amount of income that they and their partners or spouses received from various sources such as wages, business, farm, pensions and public assistance programs (AFDC/TANF, Food Stamps, unemployment compensation) during the previous year. They are asked to report their partners' or spouses' income only if the latter were living with them at the time of the interview. Some of the sources of income such as veterans' benefits, public assistance, child support, inheritances etc., are not reported separately for the respondent and the spouse/partner in some or all of the interview years. Only wages, salaries, tips, income from businesses and farms, military income and unemployment compensation are always reported separately. I add the values of these items up to compute the annual household income for a particular year. Note the income for any particular interview year would be reported in the following year.

Information on income for calendar years 1994, 1996, 1998 and 2000 is not available for any respondent because although interviews were conducted biennially from 1994 onwards, respondents were still asked to report the income earned during the previous year. This means income is available for the years 1995, 1997, 1999 and 2001 instead. I impute the income for 1994 by taking the average income of 1993 and 1995. Similarly I impute the incomes for 1996, 1998 and 2000.

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[10] The implicit GDP deflator is the ratio of the current-dollar value of GDP to its corresponding chained-dollar value, multiplied by 100 (see Glossary of the Bureau of Economic Analysis at http://www.bea.gov). The implicit GDP deflator that I use is based on the "current-dollar and "real" GDP" file of 12/23/03 (gdplev.xls) obtained from (http://www.bea.gov/bea/dn/home/gdp.htm). I normalize 2000 prices to 100.

In years when a woman transitions from being single to cohabiting or from being single to being married there are a few difficulties in computing her household income. First, suppose a woman was cohabiting with a partner or spouse during a particular year, YR, but was not interviewed the next year, YR+1, or even if she was interviewed the following year (YR+1) she was not cohabiting with that same person. In such a case I will not be able to compute the annual income for the spouse or partner for the year YR because respondents are asked to report their current spouse or partner's income in the past year. The second problem arises if the respondent cohabited with her current spouse or partner for only part of the previous year. Should this person be considered to be cohabiting and their joint annual incomes used, or should this person be considered to be single for the preceding year and her own annual income be used? I use the criterion specified in Light (2004) to define the marital status in such cases—the marital status that is prevalent for nine or more months is taken to be the marital status for that year.[11] Also, person-year observations where the person was not in one particular marital status for nine or more months are dropped (details in the following sub-section). Using this criterion if a woman is considered to be single for the preceding year then there is an additional problem. Should income items reported jointly be included or excluded when computing her income? I decided to choose the former option.

Finally, I impute the real annual household income (adjusted for household size) of the top 2% with mean of the top 2% (and similarly for the lowest 2%).

D. Dependent Variable and Adjustment Factors

Next I return to the issue of adjusting household income for household size. A large range of equivalence scales and indifference scales are available but none offer the ideal solution which makes the task of choosing one of these a very difficult one. I am interested in estimating a woman's expected economic gains that would arise if she were to change her employment intensity, marry or enter a cohabiting union because of any changes to her own income and the addition of the income of her spouse or partner. That is why I included only the income of the woman and her spouse or partner in my computation of the household income. For similar reasons when adjusting the household income for household composition I consider the presence of her spouse or partner only.

[11] I use a nine month rule while Light (2004) uses a 10 month rule.

The *equivalence scale* of a two-adult household with respect to a single adult household is computed as the expenditure or cost of living of the former divided by that of the latter such that both enjoy the same standard of living (or economic well-being). All equivalence scales assume an equal intra-household sharing rule. Thus with no economies of scale the equivalence scale for a two-adult household with respect to a single adult household would be two. The higher the degrees of economies of scale, the lower is the equivalence value.

The earliest evidence of equivalence scales are the ones that are implicit in the U.S. Census Bureau's poverty thresholds recommended by Orshansky (pp.162-166 of Citro and Michael 1995) for different household compositions. The purpose of these thresholds was to determine whether any given family's income level was adequate to provide some basic minimum standard of living.[12] It follows that if a single adult family requires x dollars to achieve the minimum standard of living and a two-adult family requires y dollars to do the same then the implicit equivalence scale is y/x. However this does not necessarily mean that the economic well-being of a two-adult family with an income of z dollars is the same as that of a single adult family with an income of z/(y/x).

A second set of equivalence scales consist is based on Engel and other "iso-prop" methods where the basic idea is that the standard of living of each family can be determined by the proportion of their budget that is devoted to food and/or other necessities (pp.162-166 of Citro and Michael 1995). The equivalence scales prescribed by the Bureau of Labor Statistics and Canadian Low Income cut-offs (LICO) are based on these principles. These assumptions are difficult to justify.

A third set of equivalence scales are simple formulas based mostly on expert opinion. Citro and Michael (1995) recommend using the equivalence scale, $(A+0.7K)^x$ which they report is similar to the one that OECD recommends— [1+0.7(A-1)+0.5K] where A is the number of adults in the family, K the number of children in the family and x lies between 0.65 and 0.75. The Citro and Michael (1995) equivalence scale is a modification of the equivalence scales that Betson and Michael (1993) estimate based on the Rothbarth method which assumes that the

[12] Orshansky computed the threshold for different households from the dietary needs of adults and children as suggested by the USDA Economy Food Plan and the proportion of a family's budget that is spent on food items. The implicit equivalence scale of a woman in a two-adult household with reference to a single adult household is 1.29 (Citro and Michael 1995).

expenditure on adult goods is an indicator of the standard of living.[13] The standard criticism of this method is that the preferences of adults may change with the arrival of a child in the household (Citro and Michael 1995).

The next approach is the revealed preference approach. This approach assumes that the preferences of all households are the same and that the shadow price of market goods is different for households of different sizes because of the different rates of transformation of market goods into goods and services for household consumption. Using this approach and data from the 1960-61 BLS Consumer Expenditure Survey, Lazear and Michael (1980) estimate the equivalence scale of a person in a two-adult household family with respect to a single adult family to be 1.06. While this method is better than the earlier methods in terms of being a more direct measure of relative economic well-being of individuals living in different households, Pollak and Wales (1979) show that it is not possible to identify the equivalence scale from household expenditure data. This problem arises because individuals and household are different decision making units and so any comparison between their utility levels would require interpersonal utility comparisons (Browning, Chiappori and Lewbel 2004). Also, they point out that individuals—not households—have preferences.

Browning, Chiappori and Lewbel (2004) propose an alternative to the equivalence scale—an *indifference scale*—to address the problems associated with equivalence scales. An *indifference scale* of a woman measures the proportion of joint income that she would require to achieve a level of utility while living alone that was at least as much as what she achieved when she was a member of the joint household. They estimate a model which consists of individual utility functions for each member of the household, a household utility function (which is a weighted sum of each member's utility function), a transformation function (that determines how market goods are converted into goods for household consumption) and an intra-household sharing rule. They estimate indifference scales for two sharing rules (the wife's share is 0.5 and 0.65) and two scenarios regarding the economies of scale (one where these are restricted to be positive) using a Canadian dataset, FAMEX, for the years 1974 to 1992. The disadvantage of using these estimates is that these are based on Canadian data. However, given the geographical proximity, cultural and economic similarities I do not believe the estimates computed using U.S.

[13] Betson and Michael (1993) use data from the 1980-1986 Consumer Expenditure Survey (CEX) data.

data would be too different. They estimate an indifference scale of 1.72 for the scenario where there is equal intra-household sharing and there are possibilities for diseconomies of scale. I use that to adjust the income of a woman in a marital or cohabiting union. In other words, a joint household income of $1,000 will be equivalent to a single household income of $581.40.

I refer to the dependent variable (real annual household income which is divided by 1.72 for women in marital and cohabiting unions) as *household income*.

E. Independent Variables

A detailed marital history is collected for all respondents. Start and stop dates of marriages, divorces, marital separations and being re-united are available but start and stop dates of cohabitation spells are not available for years prior to 1990. Before that the only information available was whether a person was cohabiting with a partner at the time of the interview. Using this information it is fairly straightforward to assign marital status in each interview year but not for the years of marital status transitions. The problem of assigning marital status in the years of transition is accentuated by the way the income information is reported. To compute the marital status variables in the years of transition I use similar criterion suggested as in Light (2004). I denote a woman to be single in a particular calendar year if she was not living together with any partner or spouse for nine months or more in that year. Similarly, I define her to be cohabiting (or married) in a particular calendar year if she was living together with a single partner (or spouse) for nine or more months in that year. I drop all person-year observations for which I cannot assign a marital status by this nine-month rule. In cases where the exact dates are not known I ignore the nine-month rule and code a person-year observation to be cohabiting if the person was cohabiting for at least one month with a partner in the interview year.[14]

I compute the total hours worked during the interview year from the weekly work histories. The respondent reports the current hours worked at a particular job and that is taken to be the hours worked in each week that she reports to be working at that job. This results in the annual hours worked being sensitive to which week in the year the respondent was interviewed. If he/she was interviewed during the week when she was working an unusually high number of

[14] In some cases a person who reported living with a partner at an earlier interview reported living with the same partner in a later interview round when exact cohabitation start and stop dates were asked. In such cases using the unique partner identification codes, the exact start date of the cohabitation spell can be ascertained and then I use the nine-month rule.

hours then the annual hours worked that I compute would also be high. To control for this problem I constrain annual hours worked to be 3000 (*i.e.*, an average of 60 hours per week).

In addition to marital and employment status variables I include a number of other independent variables (X_{it}). Child care costs play a vital role in a woman's decision to take up employment, and in deciding the intensity of employment. A woman with high child care costs would be able to work longer hours only if the earnings were sufficiently high to cover her child care costs that she would incur when she is at work. I use the number of children ever born to the woman as a proxy for the child care costs. Number of children is also found to affect parents' earnings and marriage probabilities (Bennett, Bloom and Craig 1989, Bennett, Bloom and Miller 1995 and Brien, Lillard and Waite 1999 and Lundberg and Rose 2002). Living with parents may affect a woman's employment and marriage search activities. I include a variable which takes on a value of one if the woman is currently living with her parents (and zero otherwise) to control for this. The other variables that I include are age by the end of the interview year and its squared and cubic terms.

I also include some time-invariant variables (A_i) in estimation of equation (1). Including these in the estimation of (2) and (4) is pointless as their coefficients cannot be identified. These variables are race and ethnicity and schooling and family structure at age 14. Race and ethnicity and family structure variables are collected during the first interview in 1979. Schooling as measured by the highest grade completed by May of the interview year is a time-varying variable but it is time invariant in this study as I restrict the person-year observations to be when the woman is not enrolled in school.

In order to estimate the model specified in (4) I use a number of different dummy variables to represent economically disadvantaged or poor women. One of these is a dummy that indicates whether a woman *ever* reported receiving any government assistance program (AFDC, WIC, Food Stamps, SSI but not unemployment compensation). It should be noted that these women may not be receiving welfare during the year that they contribute a person-year observation to the sample. It is possible that a woman may be poor or economically disadvantaged but may not be receiving welfare assistance for various reasons. A woman may be eligible for welfare participation (and hence qualifies as "poor") but does not participate in the program either because she does not have enough information about it or she perceives that there is a stigma attached to welfare participation (Moffitt 1983, Mead 1986, Zedlewski and Brauner 1999 and Cohen-Cole and Zanella 2006). It could also be that a woman is eligible for welfare participation but she does not receive it because the welfare program is for a fixed period of time and she has completed that period (*e.g.*, TANF has a limit of 60 months). Another situation could be that although she is poor she does not receive assistance because she just missed the income cut-off. It is thus a good idea to use other measures of "poor".

A second dummy variable that I use to identify poor women is one that indicates whether the woman was a teenage single mother or not. I consider a woman to be a single teenage mother if her first child was born before she was 18 *and* if the child was born before her first marriage. Being a teenage, single mother does not necessarily mean that she is poor but it does affect her schooling choices and thus predispose her towards economic hardships in the future. The third indicator of poor that I use consists of non-white race and ethnicity dummies—black and Hispanic. The lower wages and schooling of blacks and Hispanics as compared to whites are well established and so I use that as another proxy for poor. Of all the different indicators of economic disadvantage, welfare recipiency is the most explicit and direct indicator because of the income eligibility condition inherent in most welfare programs. Because welfare recipiency is directly linked with low income levels of the recipient I use welfare recipiency as the primary definition of "poor" and in the rest of paper I use these terms interchangeably.

F. Sample statistics

In Tables 2 and 3 below, and Table 10 in the Appendix, I report the summary statistics of the variables used in this study. The sample consists of 4,541 women contributing 39,904 person-year observations. In this sample, I find the mean household income of married women and cohabiting women to be higher than that of single women but the difference varies by women's hours worked. Among nonemployed women the average household income of married women is 229% higher than that of single women, among part-time employed women this is 96% and among full-time employed women it is 40%. Similarly, the cohabiting-single gap is 71% for nonemployed women and 59% for part-time employed. This provides some justification for using the specification of the model where marital status variables are interacted with employment variables. Moreover, the married-single and cohabiting-single income gaps for poor women are different from that of the entire sample. For example, the average household income of married, nonemployed, poor women is 110% higher than that of their single counterparts and the average household income of cohabiting, nonemployed, poor women is 57% higher than that of their single counterparts.

Table 2: Comparing Average Household Income of Married and Cohabiting Women with that of Single Women[a]

	Full-sample	***Ever* received welfare**	**Teenage, single mother**
Percentage difference in the average household income of cohabiting women to that of single women			
Among nonemployed women	71%	57%	54%
Among women working less than 1000 hours per year	121%	92%	56%
Among women working between 1000 and 1999 hours per year	59%	57%	55%
Among women working for 2000 or more hours per year	31%	17%	31%
Among all women	46%	44%	50%
Percentage difference in the average household income of married women to that of single women			
Among nonemployed women	229%	110%	82%
Among women working less than 1000 hours per year	232%	125%	98%
Among women working between 1000 and 1999 hours per year	96%	73%	68%
Among women working for 2000 or more hours per year	40%	29%	31%
Among all women	81%	72%	78%
Number of women	**4,541**	**2,085**	**636**
Number of person-year observations	**39,904**	**18,531**	**5,822**

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.

Table 3: Summary Statistics

	Full-sample		*Ever* received welfare		Teenage, single mothers	
	Mean	**s. e.**	**Mean**	**s. e.**	**Mean**	**s. e.**
Household Income[a]	24.40	(0.107)	16.28	(0.104)	15.90	(0.164)
Dependent Variable:						
Log household income[a]	2.83	(0.005)	2.40	(0.008)	2.45	(0.012)
Independent Variables:						
Age	28.38	(0.027)	27.89	(0.040)	27.50	(0.071)
Number of children ever born	1.18	(0.006)	1.53	(0.010)	2.26	(0.016)
1 if living with parents	0.21	(0.002)	0.23	(0.003)	0.21	(0.005)
Highest grade completed	12.68	(0.011)	11.80	(0.015)	11.11	(0.024)
1 if married	0.57	(0.002)	0.47	(0.004)	0.42	(0.006)
1 if cohabiting	0.04	(0.001)	0.05	(0.002)	0.05	(0.003)
Annual hours worked	1274.67	(4.769)	1003.29	(6.980)	926.33	(12.711)
1 if *ever* received welfare	0.46	(0.007)	1.00	(0.000)	0.87	(0.013)
1 if a teenage, single mother	0.14	(0.005)	0.27	(0.010)	1.00	(0.000)
1 if black	0.26	(0.006)	0.38	(0.011)	0.51	(0.020)
1 if Hispanic	0.16	(0.005)	0.19	(0.009)	0.15	(0.014)
1 if poor-white	0.16	(0.005)	0.17	(0.008)	0.16	(0.015)
1 if white	0.59	(0.007)	0.43	(0.011)	0.33	(0.019)
Family structure at age 14:						
Living with both biological parents	0.69	(0.007)	0.56	(0.011)	0.48	(0.020)
Living with biological mother	0.25	(0.006)	0.34	(0.010)	0.40	(0.019)
Living with biological father	0.02	(0.002)	0.03	(0.004)	0.03	(0.007)
Not living with either biological parents	0.04	(0.003)	0.06	(0.005)	0.09	(0.011)
Number of women	**4,541**		**2,085**		**636**	
Number of person-year observations	**39,904**		**18,531**		**5,822**	

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.

Poor women constitute 46% of the sample, teenage, single mothers 14%, blacks 26% and Hispanics 16%. The poor sub-sample and the other economically disadvantaged sub-samples (blacks, Hispanics, and single, teenage mothers) have lower schooling, lower household income and lower employment rates than the entire sample. For example, poor women have an average household income of U.S. $16,281 while women in the full-sample have an average household income of U.S. $24,404. Blacks and teenage, single mothers have average household incomes similar to that of poor women but Hispanics have a higher average household income of U.S. $22,310. Poor women and teenage, single mothers have lower employment rates compared to all other sub-samples (nonpoor, not teenage single, mothers, whites, blacks and Hispanics). Average number of kids born is also higher for all these sub-samples, especially teenage, single mothers. A high proportion of blacks, Hispanics and teenage, single mothers qualify as poor; these proportions are 69%, 55% and 87%, respectively. These differences observed between poor and nonpoor samples show that estimating gains from marriage, cohabitation and employment separately for poor women is warranted.

V. Results

A. First-Difference Estimates

I report the results of the first-difference estimation (equation (2) and (4)) in Table 4. Using these estimated coefficients I predict the change in log household income of single, nonemployed women and single, part-time employed women if they were to cohabit, marry or increase their hours worked. I report these estimates in Tables 5 and 6.

I predict (see Table 5) that the log household income of single, nonemployed women increases by 0.91 if they cohabit, by 1.14 if they marry, by 0.83 if they work part-time (1000 hours worked per year), and by 1.27 if they work full-time (2,000 hours per year). I find that poor women (ever received welfare) are predicted to gain slightly less. Their predicted gains are 0.79 if they cohabit, 1.04 if they marry, 0.76 if they work part-time and 1.16 if they work full-time. These translate into predicted income gains of 119%, 182%, 113% and 220%, respectively (see Table 6). The finding that the biggest predicted gain is from entering full-time employment (while remaining single) reflects the fact that the expected earnings of these low-wage women exceed the share of adjusted earnings that they can be expected to gain by marrying a (typically low-wage) man. It is not surprising that the predicted gains are lower for poor women than for others, given their lower earnings potential and the lower potential earnings of their spouses and partners.

Table 4: Coefficients and Standard Errors Based on First-Difference Estimation of Log Household Income[a,c]

	Full-sample		*Ever* received welfare[b]		Teenage, single mother[b]	
1 if married (MARRIED)	1.136	(0.044)	1.037	(0.057)	0.553	(0.102)
1 if cohabiting (COHABIT)	0.906	(0.067)	0.785	(0.074)	0.335	(0.122)
Annual hours worked (HOURS)	0.001	(4.3E-5)	0.001	(5.3E-5)	4.7E-4	(7.4E-5)
MARRIED × HOURS	-0.001	(4.5E-5)	-0.001	(5.7E-5)	-2.0E-4	(8.5E-5)
COHABIT × HOURS	-4.9E-4	(8.5E-5)	0.000	(1.1E-4)	-4.6E-5	(2.0E-4)
HOURS^2	-2.0E-7	(1.3E-8)	-1.8E-7	(1.7E-8)	-5.4E-8	(2.6E-8)
MARRIED × HOURS^2	1.6E-7	1.4E-08)	1.4E-7	(1.9E-8)	9.0E-9	(3.0E-8)
COHABIT × HOURS^2	7.2E-8	(3.0E-8)	2.6E-8	(4.3E-8)	-4.2E-8	(7.1E-8)
Number of children ever born	0.017	(0.009)	0.053	(0.016)	0.087	(0.030)
1 if living with parents	-0.153	(0.016)	-0.152	(0.026)	-0.160	(0.045)
Age	0.585	(0.065)	0.656	(0.109)	0.575	(0.175)
Age^2	-0.016	(0.002)	-0.019	(0.004)	-0.016	(0.006)
Age^3	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Effect of increasing age by one year (estimated at sample mean)	0.036	(0.003)	0.027	(0.005)	0.014	(0.008)
Adjusted R-square	0.2013		0.2059		0.2115	
Number of differenced observations: 30078						

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.

[b] The estimates for those who "*ever* received welfare" and "teenage, single mothers" are based on separate estimations of the pooled sample with these variable dummies interacted with all regressors.

[c] Standard errors in parentheses.

Table 5: Predicted Change in Log Household Income[a] Based on First-Difference Estimations[d]

Transitions:	Full-sample		*Ever* received welfare[b]		Teenage, single mother[b]	
For nonemployed women						
Single-to-Married	1.14	(0.04)	1.04	(0.06)	0.55	(0.10)
Single-to-Cohabiting	0.91	(0.07)	0.79	(0.07)	0.34	(0.12)
For part-time woman						
Single-to-Married	0.50	(0.03)	0.47	(0.04)	0.37	(0.09)
Single-to-Cohabiting	0.49	(0.04)	0.48	(0.06)	0.25	(0.11)
For single women						
Nonemployed to part-time employed[c]	0.83	(0.03)	0.76	(0.04)	0.42	(0.05)
Nonemployed to full-time employed[c]	1.27	(0.04)	1.16	(0.05)	0.73	(0.07)
Part-time employed to full-time employed[c]	0.44	(0.01)	0.41	(0.02)	0.31	(0.03)

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted by household composition.
[b] The estimates for those who "*ever* received welfare" are based on separate estimations of the pooled sample with this dummy variable interacted with all regressors.
[c] Part-time employed: annual hours worked is 1000; Full-time employed: annual hours worked is 2000.
[d] Standard errors in parentheses.

Table 6: Predicted Percentage Change in Household Income[a] Based on First-Difference Estimations

Transitions:	**Full-sample**	***Ever* received welfare[b]**	**Teenage, single mother[b]**
For nonemployed women			
Single-to-Married	212%	182%	74%
Single-to-Cohabiting	147%	119%	40%
For part-time woman			
Single-to-Married	64%	61%	44%
Single-to-Cohabiting	63%	61%	28%
For single women			
Nonemployed to part-time employed[c]	130%	113%	52%
Nonemployed to full-time employed[c]	257%	220%	107%
Part-time employed to full-time employed[c]	55%	50%	36%

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.
[b] The estimates for those who "*ever* received welfare" are based on separate estimations of the pooled sample with this dummy variable interacted with all regressors.
[c] Part-time employed: annual hours worked is 1000; Full-time employed: annual hours worked is 2000.

The difference in the estimated coefficients for marital status and hours worked between poor and nonpoor women are statistically significant (see Table 4 above, and also Table 11 in the Appendix). Also, poor-nonpoor differences in predicted gains for all four transitions mentioned above are statistically significant (at 1% level of significance). The difference in the predicted gains from cohabiting, marriage, part-time and full-time employment are statistically significant at the 1% level for poor, single, nonemployed women except for the difference in predicted gains from cohabitation and part-time employment. In case of nonpoor, single, nonemployed women the difference in the predicted gains from different transitions are statistically significant except for the following. The difference in predicted gains from cohabitation and full-time employment and the difference in predicted gains from marriage and cohabitation are not statistically significant for single, nonemployed nonpoor women.

When I consider transitions of poor women who are already employed part-time, I find that their expected gains from cohabitation and marriage are virtually identical (0.48 and 0.47, respectively) and that union formation now has a greater expected benefit than moving to full-time employment, which I predict raises log household income by 0.41. In other words, the estimated income gains from cohabitation, marriage and full-time employment for these women are 61%, 61% and 50%, respectively. These are not much different from the predicted gains for the entire sample or for their nonpoor counterparts. The predicted gains in log household incomes from cohabitation, marriage and full-time employment for the full-sample translate into gains in household income of 63%, 64% and 55%, respectively. Comparing poor and nonpoor sub-samples I find that the poor-nonpoor difference in these predicted gains are statistically significant only for gains from full-time employment. This shows that as poor women participate in the labor market more, their economic disadvantage becomes less severe and their marriage market (and to a lesser extent labor market) opportunities are quite similar to the rest of the sample.

I find that the estimated marginal effects of marriage and cohabitation decline with increase in the woman's hours worked (for both poor women and women in the full-sample). The main sources of economic gain from union formation are the economies of scale inherent in the adjustment factor for household composition and the difference in the income of the woman and her partner or spouse. More hours worked implies higher wages and higher economic independence. Such women are less likely to want to change their lifestyles or occupation after marriage/cohabitation and so are more likely to find partners similar to themselves (Oppenheimer 1988). In a household model where there is consumption of public goods within the household and some goods are produced in the household using time inputs, positive assortative mating will be higher if the presence of public goods is higher (Lam 1988). As the household income increases, the amount of public goods within a household also increases and so women with higher incomes will tend to find partners with similar income levels as their own.

The predicted gains from marriage are higher than that from cohabitation at lower levels of employment. Comparing poor and nonpoor sub-samples I find that this is true of poor, single women only (see Table 5 above, and also Tables 12 and 13 in the Appendix). It should also be noted that the difference in predicted gains from marriage and cohabitation are statistically significant only for poor, single women at zero levels of employment. The predicted change in log income for single, nonemployed, nonpoor women is 1.61 if they enter a cohabiting union and 1.47 if they marry. The corresponding numbers for single, part-time employed nonpoor women are 0.64 and 0.56, respectively. This is because poor, single women with low levels of employment are more likely to select particularly low-wage men to cohabit with and relatively higher wage men to marry (Smock and Manning 1995, Smock and Manning 1997). The predicted gains from marriage for nonpoor, single women are *always* lower than that from cohabitation. When the absolute difference in spousal incomes is increases so does the likely alimony payment. It follows that higher the difference in the (potential or actual) income of the partners in a couple, the more likely is it that they will enter into cohabiting unions rather than marriage. This is less relevant for poor, single women at low levels of employment because their household incomes are typically very low.

Next, I compare the predicted gains for poor women with those of teenage, single mothers. Teenage, single mothers, most of whom are welfare recipients (and hence part of the poor sample) do not fare as well as the rest of the women in the poor sample. For example, the predicted gains from cohabitation, marriage, part-time and full-time employment for nonemployed, teenage, single mothers are 0.34, 0.55, 0.42, and 0.73, respectively – much lower than the gains for poor women. Unlike poor, single women, teenage, single mothers always select relatively higher wage men to marry and relatively lower wage men to cohabit with (and so their gains from marriage are higher than that from cohabitation even at higher employment levels).

Compared to whites the estimated coefficients of marriage and employment variables are significantly different for blacks but not for Hispanics (see Tables 11, 12 and 13 in Appendix). The predicted gains from union formation for black women are not only lower than that of white (and Hispanic) women but also that of poor women. Given the low incidence of inter-racial marriages, this is indicative of lower earnings of black men as compared to whites and Hispanics (even among the typically low-wage men who are the potential partners and spouses of poor women).

The difference in predicted gains of these different sub-samples shows that we should study welfare recipients separately when examining gains from marriage, cohabitation and employment. Moreover, it is quite clear that using just one definition of poor may not be sufficient.

B. OLS Estimates

I report the estimated marital and employment status coefficients based on OLS (equation (1)) in Table 7 and the predicted gains based on these OLS estimates in Tables 8 and 9. The difference in OLS and first-difference estimates show that it is necessary to use first-difference or some other estimation method to control for endogeneity of marital and employment status variables when estimating gains from marriage, cohabitation or employment.

The predicted gains from marriage for poor, nonemployed, single women based on these OLS estimates is 0.93 which is less than that computed from first-difference estimates. This would imply that the individual-specific, time-invariant unobservable has opposing effects on household income and marriage probabilities. In other words, poor, nonemployed, single women with higher incomes are less likely to marry. In this study I do not explicitly control for welfare participation. Rather the poor sub-sample consists of women who have received welfare payments at some point in time and it is more likely that they received it when they were single and nonemployed. If joint household incomes make them ineligible for welfare and if their share of the joint income is less than their welfare income then they may choose not to marry. It follows from this argument that those receiving welfare payments (and hence with higher incomes) are less likely to marry.

The predicted gains from cohabitation based on first-difference and OLS estimates are almost the same for these women. A cohabiting partner may not be considered part of the woman's regular household (he may be living with her on and off) and so his income would not be included in the calculation of household income necessary to determine her eligibility for welfare assistance. However, this explanation only applies for cases where the welfare participation did not change for a woman for the years that she contributed person-year observations to this analysis. More generally, effects of marital and employment status is identified only to the extent that unobservables that are correlated with these variables are in fact individual-specific and time-invariant.

Table 7: Coefficients and Standard Errors Based on OLS Estimation of Log Household Income[a,c]

	Full-sample		***Ever* received welfare[b]**	
1 if married (MARRIED)	1.176	(0.046)	0.928	(0.040)
1 if cohabiting (COHABIT)	0.867	(0.063)	0.783	(0.060)
Annual hours worked (HOURS)	0.001	(5.16E-5)	0.001	(5.71E-5)
MARRIED × HOURS	-0.001	(5.58E-5)	-4.36E-4	(6.58E-5)
COHABIT × HOURS	-3.81E-4	(8.77E-5)	-2.06E-4	(1.04E-4)
HOURS2	-1.13E-7	(1.50E-8)	-7.80E-8	(1.94E-8)
MARRIED × HOURS2	9.52E-8	(1.72E-8)	2.90E-8	(2.33E-8)
COHABIT × HOURS2	2.92E-8	(3.15E-8)	-3.70E-8	(3.96E-8)
Constant	-2.971	(0.608)	-3.050	(0.920)
Number of children ever born	0.082	(0.009)	0.135	(0.012)
1 if living with parents	-0.363	(0.023)	-0.407	(0.033)
Highest grade completed	0.097	(0.004)	0.077	(0.007)
1 if black	-0.217	(0.023)		
1 if Hispanic	-0.107	(0.023)		
Family structure at age 14:				
(Omitted: Living with both parents)				
Living with:				
biological mother	-0.111	(0.052)	-0.065	(0.072)
biological father	-0.001	(0.021)	0.004	(0.028)
neither biological parents	-0.106	(0.041)	-0.122	(0.052)
Age	0.270	(0.062)	0.302	(0.094)
Age^2	-0.007	(0.002)	-0.008	(0.003)
Age^3	0.000	(0.000)	0.000	(0.000)
Effect of increasing age by one year (estimated at sample mean)	0.024	(0.002)	0.011	(0.003)
Adjusted R-square	0.5148		0.5428	
Number of differenced observations: 39,904				

[a] Household Income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.
[b] The estimates for those who "*ever* received welfare" are based on separate estimations of the pooled sample with this dummy variable interacted with all regressors.
[c] Standard errors in parentheses.

Table 8: Predicted Change in Log Household Income[a] Based on OLS Estimations[d]

Transitions:	Full-sample		*Ever* received welfare[b]	
For nonemployed women				
Single-to-Married	1.18	(0.05)	0.93	(0.04)
Single-to-Cohabiting	0.87	(0.06)	0.78	(0.06)
For part-time woman				
Single-to-Married	0.58	(0.02)	0.52	(0.03)
Single-to-Cohabiting	0.52	(0.04)	0.54	(0.05)
For single women				
Nonemployed to part-time employed[c]	0.81	(0.04)	0.73	(0.04)
Nonemployed to full-time employed[c]	1.39	(0.05)	1.30	(0.05)
Part-time employed to full-time employed[c]	0.58	(0.02)	0.57	(0.02)

Table 9: Predicted Percentage Change in Household Income[a] Based on OLS Estimations[c]

Transitions:	Full-sample	*Ever* received welfare[b]
For nonemployed women		
Single-to-Married	224%	153%
Single-to-Cohabiting	138%	119%
For part-time woman		
Single-to-Married	78%	68%
Single-to-Cohabiting	67%	72%
For single women		
Nonemployed to part-time employed[c]	125%	107%
Nonemployed to full-time employed[c]	302%	265%
Part-time employed to full-time employed[c]	79%	77%

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.
[b] The estimates for those who "*ever* received welfare" are based on separate estimations of the pooled sample with this dummy variable interacted with all regressors.
[c] Part-time employed: annual hours worked is 1000; Full-time employed: annual hours worked is 2000.
[d] Standard errors in parentheses

Predicted gains from increasing hours worked based on OLS estimates are higher than those based on first-difference estimates for *all* nonpoor women. The same is true of predicted gains from full-time employment for single, nonemployed poor women. The opposite is the case for the predicted gains from part-time employment for nonemployed, single women. If high ability (unobserved) women are more likely to get full-time jobs and because of their high ability are also likely to earn more then this would explain why predicted gains based on OLS estimates would be higher. For poor nonemployed women, many of whom may be on welfare, an opposite effect may be present. Earnings from part-time employment may not offset the loss in welfare and earnings and so women on welfare would be less likely to take up low-paying part-time employment. Earnings from full-time employment would compensate for loss in welfare income and the positive effect of ability would dominate.

C. Tests and Other Issues

I perform the Wald test to test the exogeneity condition as described in section III and find that the $H_0 : \rho = 0$ is not rejected but $H_0 : (\pi, \rho) = 0$ is. Here I report the approximate F-statistics (converted from the Wald statistic). I find that for the null hypothesis $H_0 : (\pi, \rho) = 0$, F (10, 30055) = 10 and for the Null Hypothesis $H_0 : \rho = 0$, F (8, 30055) = 1.53.

I test the validity of the particular functional form that I use by doing a Wald test for the null hypothesis that the coefficients of the variables in this functional form are zero (see section III). This test is rejected because the converted F statistic, F (8, 30065) is 236.18. Higher order terms for HOURS variable is not warranted. The Wald test for the null hypothesis that the coefficients of $HOURS_{it}^3, MARRIED_{it} \times HOURS_{it}^3$ and $COHABIT_{it} \times HOURS_{it}^3$ are zero is not rejected. The converted F-Statistic, F (3, 300065) is 9.810e-42. I also do not learn much from using a more flexible form where I categorize annual hours worked into four dummies – nonemployment, low-employment, part-time employment and full-time employment (all interacted with marital status variables).

The estimated gains discussed above are sensitive to the choice of the adjustment factor used to make single and joint incomes comparable. Because the same adjustment factor is used for cohabiting couples and married couples, the difference in the estimated gains from marriage and cohabitation is not sensitive to its choice but the difference in estimated gains from changing employment intensity and the estimated gains from union formation is. I find that an adjustment factor of 1.50 (this implies a higher degree of economies of scale than 1.72) will make the estimated gains from marriage and the estimated gains from full-time employment for single, nonemployed, women equal. For single, nonemployed poor women it is 1.52. For teenage, single mothers a higher degree of economies of scale would be necessary; an adjustment factor of 1.44. The corresponding adjustment factors for equalizing expected gains from cohabitation and full-time employment are 1.19, 1.18 and 1.16, respectively.

VI. Concluding Comments

In this paper, I set out to answer the following questions. What are the economic gains that *any* "poor" single woman would experience if she were to cohabit, to marry or change her employment intensity? Would these gains vary by her initial hours worked? How would the answers to these questions compare with the results for all women (poor and nonpoor)? More generally, I wanted to measure the relative effectiveness of marriage, cohabitation and employment as mechanisms to improve the economic condition of women and their children, especially poor women who are the target group of public policies.

Using a first-difference estimation method, I find that poor (defined as those who ever received welfare), single, nonemployed women are expected to gain economically if they marry or cohabit but they are expected to gain more from increasing employment levels to full-time employment (*i.e.,* 2,000 hours per year) than from forming unions. These expected gains, however, are less than those of their nonpoor counterparts. This finding is consistent with the fact that poor, single, nonemployed women and their potential spouses or partners tend to have low-paying jobs. The differences in these expected gains between poor, single women and nonpoor, single women reduce as their levels of initial employment increase. In other words, poor women who are able to overcome their initial disadvantage and get employment fare much better than those who do not. The predicted differences in gains from marriage, cohabitation and employment between poor and nonpoor single, nonemployed women are statistically significant. The predicted difference in gains from marriage (and cohabitation) between poor and nonpoor, single, part-time employed women is not statistically significant but that from full-time employment is. In light of these results, policies directed towards increasing the labor market skills (such as programs that teach skills for particular jobs as well as those that teach interview techniques and behavioral skills required at the work place) of these poor women and their potential spouses and partners would go a long way towards improving the economic well-being of these women and their children. Also, given that divorce rates have been rising, especially since the 1960s (Cherlin 1981, U.S. Census Bureau 2003), investing in the labor market may be less risky for women than investing in marriage.

Marriage and cohabitation produce similar gains (*i.e.,* the difference in the predicted gains from marriage and cohabitation are not statistically significant), except for poor, nonemployed, single women. The predicted gains from marriage for poor, nonemployed, single women are higher than that from cohabitation (and the predicted difference is statistically significant). The total expected gains from marriage and cohabitation will differ if the expected duration of marriage and cohabitation are different.

Existing studies measuring the economic gains from marriage or cohabitation typically restrict the gains for poor women to be equal to the gains for nonpoor women. The finding in this paper that the poor-nonpoor difference in the estimated coefficients for marital and employment status variables are statistically significant makes the case for relaxing that restriction in future studies in this area. In addition to those who "ever received welfare" I examined some other groups who could also be categorized as economically disadvantaged or poor; *e.g.,* teenage, single mothers, blacks and Hispanics. The difference in predicted gains of welfare recipients and these groups show that there is need to study these groups in addition to and separately from welfare recipients. Finally, the difference in the estimated coefficients from OLS and first-difference estimates that I find in this study justifies the need to use first-difference estimation method (or some other method to take care of the selection bias) instead of OLS in these studies.

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Appendix

Table 10: Summary Statistics for Hispanic, Black, White and *Never* Received Welfare Sub-samples[b]

	***Never* received welfare**	**Whites**	**Hispanics**	**Blacks**
	Mean	**Mean**	**Mean**	**Mean**
Household Income[a]	31.45 (0.16)	28.38 (0.16)	17.42 (0.15)	22.31 (0.23)
Dependent Variable:				
Log household income[a]	3.20 (0.01)	3.06 (0.01)	2.41 (0.01)	2.76 (0.01)
Independent Variables:				
Age	28.81 (0.04)	28.29 (0.04)	28.55 (0.05)	28.42 (0.07)
Number of children ever born	0.88 (0.01)	1.02 (0.01)	1.39 (0.01)	1.39 (0.02)
1 if living with parents	0.19 (0.00)	0.15 (0.00)	0.31 (0.00)	0.23 (0.01)
1 if married	0.65 (0.00)	0.68 (0.00)	0.29 (0.00)	0.63 (0.01)
1 if cohabiting	0.03 (0.00)	0.04 (0.00)	0.03 (0.00)	0.05 (0.00)
Annual hours worked	1509.96 (6.09)	1328.32 (6.19)	1194.11 (9.46)	1222.56 (11.91)
Number of women	**2,456**	**2,659**	**1,166**	**716**
Number of person-year observations	**21,373**	**22,622**	**11,008**	**6,274**

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.
[b] Standard errors in parentheses.

Table 10 Continued

	Never received welfare	Whites	Hispanics	Blacks
	Mean	**Mean**	**Mean**	**Mean**
1 if *ever* received welfare	0.00 (0.00)	0.34 (0.01)	0.69 (0.01)	0.55 (0.02)
1 if a teenage, single mother	0.03 (0.00)	0.08 (0.01)	0.28 (0.01)	0.14 (0.01)
1 if black	0.15 (0.01)	0.00 (0.00)	1.00 (0.11)	0.00 (0.00)
1 if Hispanic	0.13 (0.01)	0.00 (0.00)	0.00 (0.11)	1.00 (0.00)
1 if poor-white	0.16 (0.01)	0.27 (0.01)	0.00 (0.00)	0.00 (0.00)
1 if white	0.72 (0.01)	1.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Highest grade completed	13.44 (0.02)	13.00 (0.02)	12.46 (0.02)	11.90 (0.03)
Family structure at age 14:				
Living with both biological parents	0.79 (0.01)	0.77 (0.01)	0.49 (0.01)	0.69 (0.02)
Living with biological mother	0.17 (0.01)	0.19 (0.01)	0.41 (0.01)	0.24 (0.02)
Living with biological father	0.02 (0.00)	0.03 (0.00)	0.02 (0.00)	0.02 (0.00)
Not living with either biological parents	0.02 (0.00)	0.02 (0.00)	0.08 (0.01)	0.05 (0.01)
Number of women	**2,456**	**2,659**	**1,166**	**716**
Number of person-year observations	**21,373**	**22,622**	**11,008**	**6,274**

Table 11: Coefficients and Standard Errors Based on First-Difference Estimation of Log Household Income for Hispanic, Black, White and *Never* Received Welfare Sub-samples[a,c]

	***Never* received welfare[b]**	**Whites[b]**	**Hispanics[b]**	**Blacks[b]**
1 if married (MARRIED)	1.468 (0.087)	1.293 (0.072)	1.133 (0.132)	0.972 (0.078)
1 if cohabiting (COHABIT)	1.605 (0.139)	1.248 (0.101)	0.720 (0.142)	0.593 (0.118)
Annual hours worked (HOURS)	0.001 (8.5E-5)	0.001 (7.8E-5)	0.001 (1.4E-4)	0.001 (5.6E-5)
MARRIED × HOURS	-0.001 (8.6E-5)	-0.001 (7.8E-5)	-0.001 (1.4E-4)	-0.001 (7.1E-5)
COHABIT × HOURS	-0.001 (1.4E-4)	-0.001 (0.000)	-0.001 (1.9E-4)	0.000 (1.5E-4)
HOURS^2	-2.8E-07 (2.2E-8)	-2.1E-7 (2.2E-8)	-2.9E-7 (4.1E-8)	-1.7E-7 (1.7E-8)
MARRIED × HOURS^2	2.5E-07 (2.3E-8)	1.9E-7 (2.2E-8)	2.4E-7 (4.4E-8)	1.1E-7 (2.3E-8)
COHABIT × HOURS^2	2.5E-07 (4.1E-8)	1.6E-7 (4.4E-8)	1.6E-7 (6.4E-8)	-7.1E-8 (5.4E-8)
Number of differenced observations: 30078				

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted for household composition.
[b] The estimates of whites, blacks, Hispanics and those who "*never* received welfare" are based on separate estimations of the pooled sample with these variable dummies interacted with all regressors.
[c] Standard errors in parentheses.

Table 11 Continued[c]

	***Never* received welfare**[b]	**Whites**[b]	**Hispanics**[b]	**Blacks**[b]
Number of children ever born	-0.020 (0.010)	-0.018 (0.010)	0.005 (0.022)	0.097 (0.024)
1 if living with parents	-0.161 (0.019)	-0.131 (0.021)	-0.168 (0.040)	-0.172 (0.032)
Age	0.411 (0.069)	0.485 (0.073)	0.440 (0.167)	0.830 (0.157)
Age^2	-0.010 (0.002)	-0.013 (0.002)	-0.011 (0.006)	-0.024 (0.005)
Age^3	9.6E-05 (2.4E-5)	0.000 (2.6E-5)	1.0E-04 (6.0E-5)	2.3E-4 (5.5E-5)
Effect of increasing age by one (estimated at sample mean)	0.047 (0.003)	0.043 (0.003)	0.040 (0.007)	0.022 (0.006)
Adjusted R-square	0.2059	0.2057		
Number of differenced observations: 30078				

[b] The estimates whites, blacks, Hispanics and those who "*never* received welfare" are based on separate estimations of the pooled sample with these variable dummies interacted with all regressors.
[c] Standard errors in parentheses.

Table 12: Predicted Change in Log Household Income[a] Based on First-Difference Estimations for Hispanic, Black, White and *Never* Received Welfare Sub-samples[d]

Transitions:	*Never* received welfare[b]	Whites[b]	Hispanics[b]	Blacks[b]
For nonemployed women				
Single-to-Married	1.47 (0.09)	1.29 (0.07)	1.13 (0.13)	0.97 (0.08)
Single-to-Cohabiting	1.61 (0.14)	1.25 (0.10)	0.72 (0.14)	0.59 (0.12)
For part-time woman				
Single-to-Married	0.56 (0.04)	0.57 (0.03)	0.35 (0.07)	0.45 (0.06)
Single-to-Cohabiting	0.64 (0.06)	0.58 (0.05)	0.20 (0.09)	0.50 (0.09)
For single women				
Nonemployed to part-time employed[c]	1.10 (0.06)	0.88 (0.06)	1.02 (0.10)	0.77 (0.04)
Nonemployed to full-time employed[c]	1.64 (0.09)	1.35 (0.07)	1.46 (0.13)	1.21 (0.05)
Part-time employed to full-time employed[c]	0.54 (0.02)	0.46 (0.02)	0.44 (0.04)	0.44 (0.02)

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted by household composition.
[b] The estimates of whites, blacks, Hispanics and those who "*never* received welfare" are based on separate estimations of the pooled sample with these variable dummies interacted with all regressors.
[c] Part-time employed: annual hours worked is 1000; Full-time employed: annual hours worked is 2000.
[d] Standard errors in parentheses.

Table 13: Predicted Percentage Change in Household Income[a] Based on First-Difference Estimations for Hispanic, Black and Never Received Welfare Sub-samples

Transitions:	***Never* received welfare[b]**	**Whites[b]**	**Hispanics[b]**	**Blacks[b]**
For nonemployed women				
Single-to-Married	334%	264%	211%	164%
Single-to-Cohabiting	398%	248%	106%	81%
For part-time woman				
Single-to-Married	75%	77%	42%	57%
Single-to-Cohabiting	90%	79%	23%	65%
For single women				
Nonemployed to part-time employed[c]	201%	142%	179%	117%
Nonemployed to full-time employed[c]	417%	284%	332%	235%
Part-time employed to full-time employed[c]	72%	59%	55%	55%

[a] Household income is the annual household income of the woman and her spouse or partner, if present, deflated by the implicit GDP price deflator (2000=100). It is expressed in thousands of dollars. The household incomes of women who are married or cohabiting is adjusted by household composition.
[b] The estimates of whites, blacks, Hispanics and those who "*never* received welfare" are based on separate estimations of the pooled sample with these variable dummies interacted with all regressors.
[c] Part-time employed: annual hours worked is 1000; Full-time employed: annual hours worked is 2000.