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ABSTRACT

Using March Current Population Survey (CPS) data, we investigate married women's labor supply behavior from 1980 to 2000. We find that their labor supply function for annual hours shifted sharply to the right in the 1980s, with little shift in the 1990s. In an accounting sense, this is the major reason for the more rapid growth of female labor supply observed in the 1980s, with an additional factor being that husbands' real wages fell slightly in the 1980s but rose in the 1990s. Moreover, a major new development was that, during both decades, there was a dramatic reduction in women's own wage elasticity. And, continuing past trends, women's labor supply also became less responsive to their husbands' wages. Between 1980 and 2000, women's own wage elasticity fell by 50 to 56 percent, while their cross wage elasticity fell by 38 to 47 percent in absolute value. These patterns hold up under virtually all alternative specifications correcting for: selectivity bias in observing wage offers; selection into marriage; income taxes and the earned income tax credit; measurement error in wages and work hours; and omitted variables that affect both wage offers and the propensity to work; as well as when education groups and mothers of small children are analyzed separately.

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I. Introduction

One of the most dramatic developments in the United States since World War II has been the increasing labor force participation of women. Whereas in 1947 31.5% of women and 86.8% of men were in the labor force, by 1999, women's labor force participation had roughly doubled to 60%, while men's had fallen moderately to 74.7% (Blau, Ferber and Winkler 2002, p. 85). What was a comparatively rare event in the late 1940s—women working outside the home—had become the mode by the 1990s. And, reflecting shifts in both men's and women's labor supply behavior, the gender gap in labor force participation rates fell from 55 to 15 percentage points, a 73% decline. Beginning in the late 1970s or early 1980s, women's relative wages also rose: the female/male ratio of annual earnings of full-time, full-year workers increased from 60.2% in 1980 to 72.2% in 1999. Moreover, during the post-1970 period, women's representation in high-paying professions and managerial jobs also greatly increased (Blau, Ferber and Winkler 2002). Since 1990, however, women's increases in labor force participation and relative wages have slowed. For example, their labor force participation rose only from 57.5% to 60% between in 1990 and 1999, a much slower rate of increase than in previous decades (Blau, Ferber and Winkler 2002; Blau and Kahn 2000). Moreover, the female/male ratio of annual earnings for full-time, full-year workers barely increased from 71.6% in 1990 to 72.2% in 1999. [1]

The concurrent slowdowns in both women's relative wage and employment increases in the 1990s suggest that women may be moving along their labor supply curves. In this paper, we shed light on the connection between wages and labor supply by using March Current Population Survey (CPS) data to investigate women's labor supply behavior over the 1980-2000 period. We focus on married couples in light of a long tradition in labor supply research that emphasizes the

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[1] We reach a similar conclusion about women's progress in the 1980s when we use earnings measures that more closely approximate a wage rate, such as weekly earnings for full-time workers or average hourly earnings (Blau and Kahn 2000). We refer to annual earnings in the text because this series is available for a longer time period than are data on weekly or hourly earnings.

family context in which work and consumption decisions are made (Blundell and MaCurdy 1999).[2] And, moreover, changes in the labor supply behavior of married women have driven the changes in labor supply for women overall. Chiefly we focus on annual hours, but also investigate the behavior of other measures of labor supply.

One goal of our research is to shed light on the reasons for these changes in labor supply. Why did married women's labor supply rise so much in the 1980s, and why did its increase slow in the 1990s? We study the impact of changing wage offers to women and men, as well as nonlabor income, and demographic factors (for example, the number and age composition of children) as causes of the labor supply trends.[3] These factors can be thought of as changes in the explanatory variables in women's labor supply function, and we find that they play some role in explaining the overall patterns. In addition, we study whether this function itself has changed over the 1980-2000 period, and it is the changes in the labor supply function that comprise the most dramatic of our findings.

We find that married women's real wages increased in both the 1980s and 1990s and these caused comparable increases in labor supply in each decade, given women's positively-sloped labor supply schedules. However, their labor supply function shifted sharply to the right in the 1980s, with little shift in the 1990s. In an accounting sense, this difference in the supply shift is the major reason for the more rapid growth of female labor supply in the 1980s than the 1990s. In addition, married men's real wages fell slightly in the 1980s but rose in the 1990s, a factor that contributed modestly to the slowdown in the growth of women's labor supply in the 1990s.

Most strikingly we find that, over both decades, there was a steady and dramatic reduction in women's own wage labor supply elasticity. This is a significant new development. In 1980, we estimate this elasticity to range from about .8 to .9; it fell, according to our

[2] We recognize that the propensity to be married has fallen steadily over this period (see Table 1 below) and that this phenomenon may affect statistical analyses of married people through sample composition (selectivity) effects. Below, we make a number of adjustments for this factor.

[3] As was the case for marital status itself, we recognize that fertility is potentially endogenous, and attempt to account for this possibility.

estimates, to about .6 in 1990; and continued to decline to about .4 by 2000. In addition, continuing a long-term trend, married women's labor supply became substantially less responsive to their husbands' wages, particularly over the 1980s. We estimate the husband's wage elasticity of married women's labor supply to have declined in absolute value from -0.3 to -0.4 in 1980; to -0.2 to -0.3 in 1990; and -0.2 in 2000. Taking the 1980 to 2000 period as a whole, we estimate that married women's own wage elasticity was reduced by 50 to 56 percent, while their cross wage elasticity fell by 38 to 47 percent in absolute value. Married women's own wage and cross wage elasticities decreased in magnitude (i.e., absolute value) at both the extensive and intensive margins; however, the fall in their own wage elasticities for annual hours occurred mostly through a reduction of responsiveness at the extensive margin. In contrast to the trends for wives, husbands' own wage elasticities ranged from 0.01 to 0.14 and did not show a strong pattern over time, and husbands showed little labor supply responsiveness with respect to their spouses' wages. Thus, women's own and cross wage labor supply elasticities were becoming more like men's. Such a development is likely to be due at least in part to the fact that, with rising female participation rates, fewer and fewer women are on the margin between participating and not participating in the labor force. Moreover, increasing divorce rates and increasing career orientation of women are also expected to make their labor supply less sensitive to their own wages and to their husbands' wages (Goldin 1990).

We found that these patterns hold up in virtually all cases under a variety of alternative specifications, including ones that correct for: selectivity bias in observing wage offers; selection into marriage; income taxes and the earned income tax credit; measurement error in wages and work hours; and omitted variables that affect both wage offers and propensity to work. Moreover, our results are similar whether we define "marriage" in the usual CPS fashion (that is, legally married, spouse present) or whether we include likely cohabitors in the sample of married couples. And the decline in the magnitude of married women's own and cross wage labor supply elasticities occurred within each education level and for mothers of small children analyzed separately, suggesting that it was a pervasive phenomenon among married women.

The reduction in married women's labor supply elasticities implies that government policies such as income taxes that affect marginal wage rates have a much smaller distortionary effect on the economy now than in the past. Conversely, our results imply that the potential for marginal tax rate cuts to increase labor supply is much smaller now than 20 years ago, since tax rates were much higher then and so was married women's labor supply responsiveness.

II. Recent Research on Female Labor Supply and Research Questions of the Study

As surveyed by Blundell and MaCurdy (1999), there have been numerous studies of female labor supply. We do not repeat such a survey here. Rather, we report on some recent studies of women's labor supply to provide both a sense of the econometric issues researchers have faced and the results that were obtained. As a baseline, Blundell and MaCurdy (1999) report that across 18-20 estimates of own wage labor supply elasticities in various recent studies, the median elasticity was 0.08 for men and 0.78 for married women. Jacobsen (1998) summarizes existing work as showing a median male labor supply elasticity of -0.09 and a female elasticity of 0.77. And Filer, Hamermesh and Rees (1996) characterize the middle-level estimates of labor supply elasticities as equaling 0.0 for men and 0.80 for women. For cross wage elasticities, Killingsworth (1983) reports a median spouse wage elasticity of 0.13 for married men's labor supply and -0.08 for married women's labor supply, although a recent study of the 1980s by Devereux (2004), analyzing labor supply conditional on having positive hours, reports a cross elasticity of roughly -0.4 to -0.5 for women and -.001 to -.06 for men.

These surveys suggest that women's labor supply is considerably more sensitive to their own wages than is men's. This difference is usually explained by the traditional division of labor in the family, in which women are seen as substituting among market work, home production and leisure, while men are viewed as substituting only or primarily between market work and leisure (Mincer 1962). Since women have closer substitutes for time spent in market work than men do, changes in market wages are expected to have larger substitution effects on women's labor supply. Further, since, given traditional gender roles, women are perceived as secondary earners within the family, they are likely to be more negatively affected by their spouse's wages (though issues of complementarity and substitutability of the home time of husband and wife also need to be considered). A corollary of this reasoning is that to the extent that the traditional division of labor is breaking down and men and women are more equally share home and market responsibilities, we expect women's labor supply elasticities to approach men's over time.

It is instructive to place the evidence on women's own wage and cross wage labor supply elasticities into historical perspective. Goldin (1990) reports that around 1900, when relatively few women were in the labor force, married women's own wage elasticity was very small, but the cross elasticity with respect to their husbands' wages was negative and very large in absolute value. She interprets this combination of outcomes as reflecting the norm that married women would not work unless they were "forced" to do so by the low earnings of their husbands. Goldin argues that in the early 20th century, a married woman's employment outside the home was a signal that her husband was not able to adequately provide for the family. Since women who were employed during this early time worked primarily as domestic servants and in manufacturing or agriculture as low-level workers, the limited and undesirable nature of female employment strengthened the negative signal in married women's employment. However, as the 20th century progressed, women's education levels rose, and job opportunities became more varied for women with high school degrees and beyond. It became more plausible that some married women might be working because of the high value of their market time. Married women's employment therefore became a much noisier signal about their husbands' abilities as providers (Goldin 1990, p. 134), and the stigma against married women working was thereby diminished. By 1940, married women's own wage labor supply elasticity had increased substantially while their response to other family income (primarily husband's income) had decreased noticeably.

Goldin (1990) argues that as divorce rates rose, and women's jobs increasingly became careers as opposed to merely a means to earn income, not only should the income effect (of husbands' income) continue to decline, but the substitution effect of own wages on married women's labor supply should begin to fall as well. Some evidence for this is provided by summaries of labor supply studies reported in Goldin spanning data from 1900 through 1970 (pp. 132-33). These studies present clear evidence of a declining income elasticity over this period. Married women's own wage elasticities continued to increase through 1950, but then fell in estimates based on 1960 and 1970 data. Indeed, based on one study, Mroz (1987), by 1975, women's labor supply responsiveness to wages and income looked like those for men. However, as we have seen, Blundell and MaCurdy's (1999) comprehensive review, with most of the data in the studies cited coming from the 1970s and early 1980s, continued to find a large gender difference in own wage elasticities, with men's elasticities near zero and women's at 0.8 (Blundell and MaCurdy 1999). This is an hours elasticity and thus not directly comparable to the participation elasticities in the studies surveyed by Goldin. However, the participation elasticities she reports for studies using 1960 and 1970 data are smaller than the elasticies we estimate for participation for 1980—see Table 7 below.[4] Consistent with this, taking the 1968-70 to 1988-90 period as a whole, Juhn and Murphy (1997) find evidence not only of a continued reduction in the labor supply responsiveness of married women to their husbands earnings, but of an *increase* in married women's responsiveness to their own wages. Nonetheless, Goldin's (1990) reasoning about women's careers and the anticipation of divorce does lead one to expect an eventual decline in own wage elasticities for married women, as well as a continued decline in their responsiveness to husband's income. This expectation forms a central research focus of this paper.[5]

[4] The studies are Bowen and Finegan (1969), which reported a wage elasticity of .41 for 1960, and Fields (1976), which reported a wage elasticity of .37 for 1970.

[5] In the process of completing a revision of the August 2004 version of this paper we became aware of a recently completed working paper on this topic, Heim (2004), which finds, as we do, declining own wage and income elasticities of labor supply for married women over a roughly similar period (1979-2003 in his case). Although his paper also uses CPS data, there are a number of differences in our approaches further suggesting that this finding is

Although married women's labor force participation increased dramatically over the 1960s and 1970s, it is not unreasonable that the expected decrease in own wage elasticities did not occur until the 1980s. Beginning in the 1960s, increases in the participation rates of married women were associated with a new pattern of entry of younger women, who previously tended to withdraw from the labor force during the childbearing and childrearing years (Blau, Ferber and Winkler 2002. pp. 86-88). As this process continued and more firmly took hold, the resulting greater attachment of women to the labor force over the life cycle likely became more and more the norm, eventually generating the expected decline in married women's own wage elasticities. Lags may have also occurred in the response to rising divorce rates. The divorce rate increased substantially over the 1960s and 1970s, but then leveled off and actually fell somewhat in the 1980s (Blau, Ferber and Winkler 2002, p. 305). Nonetheless, it remained high and it is reasonable that expectations of marital instability continued to be realigned to the (relatively) new higher levels.

Another strand of labor supply research takes as its central question the explanation of changes in the quantity of labor supplied by women, especially the rapid increases we have seen since the 1950s. Of course, supply responsiveness to wage opportunities will likely play an important role in such explanations. For example, Goldin (1990) takes existing estimates of women's labor supply elasticities and builds a simple supply and demand model of the female labor market to explain women's rising labor force participation over the 1890-1980 period. For the most recent time period analyzed, 1960-80, she concludes that the majority of the increase can be explained by responses to improving labor market opportunities, with a smaller portion explained by rightward shifts in women's labor supply functions.

More recent studies seek to explain the continued rise in women's labor supply in the 1980s and 1990s. According to Juhn and Murphy (1997), a popular explanation for rising female participation in the 1970s and 1980s was that married women were forced to enter the

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quite robust. Our paper considers a wider range of robustness and specification checks than Heim and also considers the sources of the slowdown in the increase in married women's labor supply in the 1990s compared to the 1980s.

labor market due to declining real wages and declining employment opportunities for their husbands. In other words, this view emphasized the income effect as an explanation for married women's labor market entry over the two decades. However, Juhn and Murphy (1997) cast doubt on this explanation by noting that the women with the fastest increases in labor supply during this period were married to men with high wages rather than to men with low wages, and high wage men experienced more rapid wage increases over this period than low wage men did. If husbands' wages were playing a large role, then the labor supply of women married to low wage men should have increased the fastest, and of course the opposite happened. Juhn and Murphy (1997) conclude that changes in married women's own wage opportunities play a major role in explaining the pattern of labor supply increases—women whose wages grew fastest also had the fastest increases in labor supply. Moreover, as is the case in many labor supply analyses, they conclude that economic variables can account for only a small portion of the increase in the labor supply of married women. Similarly, in analyzing changes in women's labor supply over the 1975-94 period, Pencavel (1998) also concludes that rising own wage opportunities play a role. His estimates also leave a large portion of the increases in labor supply unexplained and thus due to shifts in labor supply functions.

For the 1990s taken separately, the question may again be raised about the relative importance of changes in own and husbands' wages in explaining the trends in married women's labor supply. Since husband's real wage growth improved in the 1990s (see below), it is possible that this factor may explain some of the slowing of the increase in married women's labor supply during this decade. Estimates of the role of this factor will be provided in our empirical results below.

III. Econometric Issues in Estimating Labor Supply Models

Many analyses of labor supply use cross-sectional data on individuals to estimate functions such as the following static labor supply models:

(1a) $$H = a_0 + a_1 \ln W + a_2 I + B'X + u_a \quad \text{or}$$

(1b) $$H = b_0 + b_1 \ln W + b_2 \ln W_s + B_3 A + C'X + u_b,$$

where for each individual i (suppressing subscripts), H is hours worked, W is one's own hourly wage offer, I is family asset income plus spouse's earnings, X is a vector of control variables, W_s is one's spouse's hourly wage offer (assuming one is married), A is family asset income, and u_a and u_b are disturbance terms.

Model (1a) is a traditional static labor supply function in which coefficient a_2 indicates the income effect, while a_1 is the impact of an uncompensated wage increase.[6] Model (1b) is more general than (1a) in that one's spouse's wage is allowed to have an effect on labor supply that is different from the impact of sources of income other than the labor income of either spouse (A). In this case, considerations of substitution or complementarity of husband's and wife's leisure can be taken into account (Ashenfelter and Heckman 1974). Moreover, the model with husband's wages entered separately can be interpreted in light of family bargaining models. Such models predict that individual labor supply and consumption behavior of husbands and wives is differentially influenced by their own sources of income, unlike unitary family models in which it is assumed that all income is pooled (Lundberg and Pollak 1994; McElroy and Horney 1981; Manser and Brown 1980). In addition, a family bargaining approach also suggests disaggregating the non-labor income A according to ownership, and we estimate some models with this specification as well.

Estimation of equations such as (1a) and (1b) presents an array of econometric difficulties that have been addressed by the literature on labor supply, and we use many of the techniques developed by this work. First, we do not observe wage offers for those without jobs.

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[6] The substitution effect can be computed by lowering nonlabor income by (dlnW*W)*H when log wages increase by dlnW and taking the following sum: $[a_1 - (\text{dlnW*W*H})a_2]$.

We impute wages for this group, as detailed in the Data Appendix, by assigning them the predicted wages for people with the same observed characteristics who had low work hours, a procedure similar in spirit to that used by Juhn (1992) and Juhn and Murphy (1997). The predictions come from wage regressions. As an alternative, we also implement a more traditional selectivity bias correction to assign wages to nonworkers, following Heckman (1979).

Second, the issue of measurement error in labor supply analysis is a potentially serious one, since in many data sources, including the CPS, the wage variable is computed by dividing annual earnings by annual work hours. Measurement error in work hours thus induces a negative bias on the wage. Third, a related problem concerns omitted variables. It is plausible that the omitted factors that influence a worker's wage offers such as motivation are also correlated with unmeasured willingness to work. Go-getters are likely to have high wages and long work hours, suggesting an alternative explanation besides upward-sloping labor supply for a positive sample correlation between wages and work hours.

Traditional solutions for the problems of measurement error and omitted variables involve finding instruments for wages, and as described more fully below, we perform instrumental variable (IV) analyses on equations (1a) and (1b). In addition, Angrist (1991), for example, shows that estimating labor supply analyses using grouped data is equivalent to IV on individual data with group averages serving as the instruments. Using group averages as the unit of analysis leads the measurement errors and the unmeasured factors mentioned above to cancel out as the number of observations within cells gets large. We are thus left with a wage-hours correlation that tends toward the true causal relationship. And unlike traditional IV approaches using individual data, the grouped data approach does not require the use of exclusion restrictions, many of which may be difficult to justify on theoretical grounds. In addition to Angrist (1991), several analysts have used grouped data to study labor supply, including Blundell, Duncan and Meghir (1998), Pencavel (1994), and Devereux (2004), and we present some results using such methods here.

While using grouped data is appealing for the reasons just mentioned, this method also has some drawbacks. Specifically, the grouped data approach yields small sample sizes for regression analyses, unlike estimates based on individual data. In addition, as discussed further below, the grouped average approach also must assume that changes in cell means for omitted explanatory variables are not correlated with omitted factors affecting the cell mean labor supply. Moreover, individuals in some cells (e.g., women with a college degree) may on average have higher levels of motivation and work orientation than individuals in other cells. Taking unmeasured cell characteristics into account requires a cell-fixed effects analysis which requires some restrictions on the behavior of the labor supply parameters over time (as shown below), unlike the traditional approach using individual data and independent cross sections. This latter approach preserves large sample sizes at the expense of possibly invalid exclusion restrictions. On the other hand, the grouped data approach's use of group averages as instruments makes substantive exclusion restrictions unnecessary, albeit at the expense of a smaller sample size and constraints on the time path of the parameters. Thus, in our opinion, the cell mean approach and the traditional approach using individual observations both have some drawbacks and some advantages, and we present results using both techniques. In the interest of allowing for maximum flexibility in the time path of the parameters, we particularly emphasize the traditional approach, though our broad conclusions are the same in each case.

Fourth, equations (1a) and (1b) treat the decision to increase one's work hours from, say, 0 to 100 similarly to an increase from 1500 to 1600. But, the process determining labor force participation may differ from the process by which workers adjust their hours given that they are already working (Heckman 1993). Recognizing this possibility, we also explore whether the own and cross wage elasticities of participation have behaved similarly to those for unconditional work hours and also for work hours conditional on working. In analyzing the determinants of work hours conditional on working, we adjust for the selectivity of those observed working.

Fifth, our sample focuses on married women, the most interesting group to study in a family context and the group whose changed behavior has driven the aggregate trends. During the period of our study, the share of women who are married spouse present has declined, raising the possibility that our results could be contaminated by changes in self-selection into the married group. As the marriage rate falls, married women may become more "marriage-prone" relative to the total population of women, on average. If unobserved marriage-proneness is correlated with market work motivation, then comparisons across years may reflect selection in addition to actual behavioral changes. Below, we implement some adjustments for this possibility.

Finally, the theory of life cycle labor supply suggests that one's response to a wage increase will differ according to whether it was anticipated (Blundell and MaCurdy 1999). On the one hand, suppose one has an idea of the path of annual wage rate offers over one's life cycle. Then for a given person, we are likely to observe a positive correlation across years between hourly wage offers and work hours as people supply labor during the most advantageous periods in which to do so. This is the intertemporal substitution effect, which predicts a positive correlation between wage offers and hours controlling for lifetime wealth and therefore the marginal utility of wealth. On the other hand, suppose one receives a wage increment in a given period that was not anticipated. Then this wage increment not only increases the opportunity cost of not working; it also raises one's expected lifetime wealth. It will therefore have opposing income and substitution effects, and we expect the response to an unanticipated wage increase to be less positive than the response to one that was anticipated.

As discussed by Blundell and MaCurdy (1999), to test this model, it is best to have longitudinal data on individuals; this allows one to include a fixed effect in the labor supply function that one interprets as a control for the marginal utility of wealth. The wage coefficient then is an estimate of the intertemporal labor supply elasticity. However, the authors also suggest that ordinary labor supply models estimated on cross-sectional data can still be interpreted in a life cycle context, as does Pencavel (1998). Specifically, if one includes in the X variables a proxy for lifetime earnings potential, such as education, then the wage coefficient can be interpreted as estimating the intertemporal labor supply elasticity. Without such a control, the wage combines the intertemporal effect with the wealth effect of wages. We therefore estimate alternative specifications of (1a) and (1b) with this distinction in mind.

It should be noted that examination of results including education controls may be justified on other grounds as well. Principally, labor supply elasticities may differ for different education groups, with the aggregate function yielding the average response. However, if this is the case, it may not be sufficient to include education controls because changes over time in wage elasticities could simply reflect a change in composition of the population by education rather than a true behavioral shift for otherwise similar individuals. To address this concern, we also estimate the labor supply function separately by education group.

IV. Data and Descriptive Patterns

As noted, we use March CPS data to analyze labor supply. To increase sample size, we use three sets of three years each: 1979-81 ("1980"), 1989-91 ("1990"), and 1999-2001 ("2000").[7] We restrict our regression analyses to married individuals age 25-54 with a 25-54 year old spouse present, in order to abstract from issues of school enrollment and retirement for both husbands and wives.[8] In all analyses we use CPS March Supplement sampling weights adjusted so that each year of data (e.g. 1979) receives the same total weight.

Our basic measure of labor supply is annual work hours: this is the product of usual hours worked per week and weeks worked per year. We include individuals with zero work hours as well but exclude anyone with allocated annual weeks worked or allocated hours worked

[7] Since the CPS samples the same household in two four month periods which are separated by eight months, there will be many cases in which the same household appears in two different March CPS files. We used these observations to increase sample size. However, our results were virtually identical when we restricted the number of times an individual could appear in the sample to once only.

[8] Labor supply for married women age 25-54 with no restrictions on their spouse's age was virtually identical to labor supply for married women age 25-54 married to men age 25-54.

per week. In supplementary analyses we also investigate participation (i.e., working positive hours) and hours conditional on working. As described in detail in the Appendix, hourly wages are defined as annual earnings divided by annual work hours for wage and salary workers. We consider hourly wage observations as invalid if they are less than $2 or greater than $200 per hour in 2000 dollars using the Personal Consumption Expenditures price index from the National Income and Product Market Accounts. For nonworkers, the self-employed and those with invalid wage observations or allocated earnings, wages are imputed using a regression approach. A separate wage regression is run by period (1979-81; 1989-91; or 1999-2001)-gender-weeks worked (less than 20 or 20 and higher) cell. Nonworkers receive predicted wages based on the regression using the under 20 weeks per year sample. The other categories of workers whose wages are imputed (i.e., the self-employed and those with invalid wage observations or allocated earnings) are given imputations using the regression corresponding to the weeks they worked (i.e., less than 20 or 20 and higher). This imputation is similar in spirit to that proposed by Juhn (1992) and Juhn and Murphy (1997). As mentioned earlier, we also estimate some models with a more traditional selectivity-bias correction methodology used to impute wages for nonworkers following Heckman (1979). Nonwage income is defined as income from assets, including interest, dividend and rental income.

Tables 1 and 2 provide some descriptive information on the CPS samples. Looking first at the labor supply trends in Table 1, we see a clear pattern that manifests itself both for all women and for those married (spouse present) and for each measure of labor supply—unconditional work hours (i.e., average hours including those with zero), annual participation (i.e., whether they had any positive work hours in the past year), and average work hours conditional on working. We see dramatic increases over the 1980s, with noticeably smaller increases for the 1990s. Focusing on married women, we find that, over the 1980s, unconditional hours rose by 283 (29%); participation by 10 percentage points (15%); and conditional hours by 179 (12%); for the 1990s these increases were: 110 (9%) for unconditional hours; 1 percentage point (2%) for participation, and 114 (7%) for conditional hours. Married women's labor supply thus rose much faster in the 1980s than in the 1990s both at the extensive and intensive margins. For nonmarried women, this pattern is not shown for participation and is considerably more muted for unconditional hours, suggesting that married women are driving the aggregate trends. Hence, we focus in this paper on the labor supply behavior of married women, where we see the more dramatic changes. It is also important to note that married women still comprise the majority of the prime-age female population and that the family context of labor supply is best tested on a sample of married women, where we can observe spouse-related variables.

Figure 1 indicates that this pattern of faster increases in labor supply in the 1980s than in the 1990s (illustrated for unconditional annual hours) is widespread among subgroups of married women. Disaggregating by education, we find a roughly similar pattern for each education group, albeit with more muted trends for the least educated (i.e., high school dropouts) who have considerably lower labor supply and labor supply increases in each period than the other groups. Similarly, the same temporal pattern prevails among married mothers of children under 6 years old. (See also Table A1.)

Table 1 also indicates that men's labor supply was relatively stable across the three periods in all the dimensions shown, with relatively small changes in hours and participation for men in the aggregate, married men and non-married men. The pattern for the 1980s is very similar to that found by Juhn (1992) for changes in men's annual participation rates (whether they worked at all) and fraction of weeks they worked: she found that in the aggregate, both of these outcomes for men were virtually constant between 1979-81 and 1985-87, the most recent period of her study.[9]

Table 1 also shows a decline in the incidence of marriage for women, from 72% in 1980 to 65% in 1990, with a smaller further decline to 63% by 2000. As discussed above, this pattern suggests that selection into marriage could affect our analyses of married couples. Not

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[9] While Juhn (1992) found declining participation rates for unskilled men during the 1980s, evidently these were not large enough to cause the aggregate male participation rate to decline.

surprisingly, the incidence of marriage among men age 25-54 also declined over the 1980-2000 period, with a pattern similar to women's.

Table 2 shows descriptive data on some of our key explanatory variables, including women's own wages, spouse's wages, non-wage income, education and number and ages of children. We present information on our imputed wages, for which everyone in the sample receives a value, as well as on actual wages for the subsample with valid observations (i.e., wage and salary workers with "legal" values for wages). Under either definition, married women's real wages rose substantially in the 1980s (about 12%), with an even more rapid increase in the 1990s (17-20%). In contrast, married men's real wages fell slightly in the 1980s (by 1-2%) and rose by 8-9% in the 1990s. Taken together, these changes in real wages imply that the gender wage gap among married people closed faster in the 1980s than the 1990s, as also found by Blau and Kahn (2004) for the full male and female populations. The more rapid increase of married women's wages relative to married men's in the 1980s than the 1990s, may have contributed to the higher growth rate in married women's labor supply in the 1980s than the 1990s.

Table 2 also shows substantial improvements in educational attainment for married women and married men in both the 1980s and the 1990s, with no strong pattern indicating that educational attainment grew faster in one decade than the other.[10] And the Table shows that the total number of own children present fell somewhat in the 1980s (from 1.55 to 1.34), with a very small further decline (1.34 to 1.31) in the 1990s. Most of the major changes in the number of children over the two decades were concentrated in those of school age (6-11 and 12-17) during the 1980s, with only small changes in the 1990s. Such a pattern, while consistent with a faster increase in labor supply in the 1980s, is unlikely to have a large impact since school age children tend to have modest effects on female labor supply (compared to younger children).

V. Empirical Procedures and Regression Results

[10] We use Jaeger's (1997) algorithm for assigning education levels to respondents in the 1999-2001 CPS files, in light of the change in the CPS education coding scheme.

A. Basic Regression Results

Our basic empirical procedure involves estimating equations (1a) and (1b) separately for married women and married men for each period: 1979-81, 1989-91 and 1999-2001. The dependent variable is annual work hours, and we treat this as a linear model, although results were very similar when we estimated a Tobit model in order to take into account the mass of observations at zero hours. In addition to the key wage and other income variables, we control in all models for own and spouse age and age squared, eight Census region dummies, a metropolitan area dummy, own and spouse dummies for black, non-Hispanic; other race, nonhispanic; and Hispanic origin (with white non-Hispanic the omitted category), and year dummies (because we pool three years of data for each period).

Four specifications of (1a) and (1b) were estimated. We estimate Models 1 and 2 without controlling for own or spouse education. As discussed above, we interpret the own wage coefficient in such specifications as indicating the effect of wages not controlling for the marginal utility of wealth. Wages in this specification thus combine income and substitution effects. In addition, we estimate Models 3 and 4 that control for a series of own and spouse education dummy variables (as shown in Table 2). The wage coefficient in these models can be interpreted as indicating the intertemporal labor supply elasticity.

Each of these two broad specifications is estimated with (Models 2 and 4) and without (Models 1 and 3) a detailed set of controls for own children living in the household by age group (as shown in Table 2). The decision of whether to control for the presence of children is based on the following considerations. On the one hand, suppose that fertility decisions are based primarily on preferences. Under such a scenario, it is likely that women with preferences for smaller families will have higher labor supply and will invest more in market-related human capital. This reasoning suggests that if we do not control for the number of children, we might observe a spurious positive correlation between wages and labor supply reflecting these preferences rather than a true labor supply effect. And since the impact of children is likely to vary according to the children's ages, we use a detailed child age specification. On the other hand, the decision to have children may be the result of an overall set of time allocation decisions including labor supply (Rosenzweig and Wolpin 1980; Angrist and Evans 1998). Specifically, higher wage offers may induce women to work more and to have fewer children, and controlling for the number of children may therefore lead us to understate the full effects of wages on labor supply. For this reason, we also estimate models with the children variables excluded, allowing wages to have their full effects.

We estimate these models using IV with own wage and spouse's wage each considered endogenous in the models where each spouse's wage is entered separately (i.e., equation 1b) and with own wage and other income each considered endogenous when spouse's earnings and other nonlabor income are added together (i.e., equation 1a). The excluded instruments include a series of dummy variables indicating the decile of actual or imputed wage. Using deciles corrects to some degree for measurement error in the wage (Baker and Benjamin 1997; Juhn and Murphy 1997; Blau, Kahn, Moriarty and Souza 2003). In addition, in all models, own and spouse education are included in the first stage log wage regressions. Thus, in the labor supply models without schooling controls, the education dummies comprise another set of excluded instruments.

Tables 3 and 4 contain basic IV results for wives' and husbands' unconditional hours of labor supply equations based on specification (1b): own and spouse wage rates are each entered separately. (Results with spouse's labor income aggregated into nonlabor income were very similar and are discussed below.) We present results for the four specifications mentioned earlier for each of the three periods; elasticities are shown at the bottom of the table.

We find a dramatic decrease in women's own wage elasticities. This is an important recent development. In addition, we find continued declines in spouse's wage elasticities, particularly in the 1980s. Taken together this pattern of reduced responsiveness of married women's labor supply to their own and their spouse's wages supports the pattern expected by

Goldin as married women's employments shifted from "jobs" to "careers" and as married women responded to continued high divorce rates.

We now examine these results in more detail. Table 3 indicates that married women's labor supply is positively and significantly related to their own log wages in each specification and period. The coefficients on own log wages were roughly constant over the 1980s, ranging from 743 to 856 in 1980 to 732 to 805 in 1990, but fell substantial over the 1990s to 487 to 563 in 2000.[11] Own wage elasticities evaluated at the mean of hours fell continuously over the period from .77 to .88 in the 1980 to .58 to .64 in 1990 and .36 to .41 in 2000. It is notable that the 1980 figures are virtually the same as the modal estimates based on the surveys cited earlier. These studies themselves were largely based on data before the 1980s. The absolute declines in the elasticities were roughly similar over the 1980s (.18 to .24) and the 1990s (.20 to .25). In an accounting sense, the decreases were achieved differently in the two periods. Specifically, although the hours coefficient was relatively stable over the 1980s, mean hours rose considerably. In contrast, over the 1990s, the hours coefficient fell sharply but the increase in mean hours was fairly small. The net effect was a comparable absolute decline in women's own wage labor supply elasticity in the two decades.

The own wage coefficient for women's labor supply is qualitatively similar across specifications (Table 3), although it does decline slightly when we control for schooling and again when we control for the number of children in the various age groups. The decline in the wage coefficient when we control for schooling is counter to what we predicted based on the intemporal labor supply model, since we expect own and husbands' education to proxy for expected lifetime wealth. It is possible that the education variables are correlated with unmeasured aspects of compensation. If these are positively correlated with measured wages, as is likely, then a positive correlation between education and nonwage compensation (controlling

[11] As noted above, Juhn and Murphy (1997) find an increase in married women's own wage employment elasticities for the 1968-70 to 1988-90 period as a whole. However, inspection of results reported in their Table 6 (p.92) indicates that, consistent with our results, they find a roughly stable coefficient on own wages for the 1978-80 to 1988-90 period. And, as we point out in the text, with rising female hours, this would imply a declining elasticity for this period.

for measured wages and the other right hand variables) would help explain the decline in the wage coefficient when own education is included in the model. Since the hours coefficients on own education rise over time (results not shown), it is possible that the decline in the own wage coefficient between 1980 and 2000 is spurious. However, as discussed further below, the decline in women's own wage elasticity of labor supply occurs within education groups, suggesting that this finding does indeed reflect declining wage responsiveness of married women's labor supply.

The slight decline in the own wage coefficients for women's labor supply when we control for children is an expected result in the two scenarios we described earlier: i) the propensity to have children leads women to place a lower value on market time and on human capital investment; or, ii) higher wage offers lead women to shift some of their time allocation from home production (including having and raising children) to market work and human capital investment. Unfortunately, we cannot distinguish between these two scenarios, but the similarity of the results under models controlling and not controlling for children is reassuring. Moreover, the coefficients on the children variables decline moderately between 1980 and 1990 and again between 1990 and 2000. And relative to average labor supply, the effect of children falls even more dramatically. For example, not controlling for education, at the mean labor supply level, each child under one year of age lowers women's labor supply by 41% in 1980, 29% in 1990, and 26% in 2000.[12] Below, we present results for mothers of small children separately and find declining responsiveness to own wages over time for this group as well.

The second set of major results for women's labor supply shown in Table 3 concerns the impact of husband's wages. Consistent with earlier work based on the 1980s (Devereux 2004), we find significant negative effects of husbands' wages on wives' labor supply. These negative effects get smaller in absolute value over time, ranging from -323 to -373 in 1980; to -280 to -319 in 1990; and -262 to -309 in 2000. The elasticity (at the mean labor supply) with respect to

[12] Note that the estimated negative effect of number of children less than 1 is smaller in absolute value than for number of children age 1. Recall that the dependent variable is annual hours, so some of the labor supply observed for mothers of children under age 1 may be prior to the birth (or adoption) of the child.

husbands' wages falls in absolute value more dramatically than the raw hours effect, with particularly large decreases over the 1980s: from -0.33 to -0.39 in 1980; to -0.22 to -0.26 in 1990; to -0.19 to -0.23 in 2000. Finally, we note that, while the coefficients on non-wage income other than husbands' wages are significantly negative (as expected), they are very small in absolute value. For example, the negative elasticities in Table 3 are always below 0.01 in absolute value.

The pattern of coefficients on own and spouse log wages, which yield these striking results for declining own and husband's wage elasticities for married women hold up under a number of different estimation techniques. Some are discussed in more detail below but we summarize three briefly here (see also Table A2).

First, we investigated the impact of using a traditional Heckman (1979) selectivity bias adjustment to assign wages to those without valid wages. These estimates were obtained only for Models 1 and 2, allowing the exclusion of education to identify the labor supply model; for tractability, we considered the spouse's wage as exogenous in this analysis. The first stage probit for having a valid wage offer included as explanatory variables all exogenous variables in the relevant structural wage and labor supply models (i.e., Models 1 and 2 for labor supply).[13] We then formed the Heckman selectivity variable (Mills's Ratio) and added it to a wage equation estimated only for those with valid wages.[14] We then used the predicted wage offers based on our estimated wage coefficients in the final labor supply equation. As may be seen in Table A2, the results are very similar to the ones we presented in Table 3.[15] The own wage effect on labor supply falls from 911-960 hours in 1980, to 768-782 hours in 1990, to 633-646 hours in 2000, a comparable cumulative reduction as found in our basic IV results. The implied elasticities at the mean hours worked fell from .94-.99 in 1980, to .61-.62 in 1990, to .46-.47 in

[13] That is, year, region, metropolitan area, own schooling, own and spouse age, own and spouse race, non-wage income (not including spouse's wages), and spouse log wage.
[14] Variables in the wage equation included all variables in the first stage probit except non-wage income and spouse log wage.
[15] Note, we have not corrected the standard errors in the final stage for the fact that they use an estimated regressor, since we are primarily interested in the magnitude of the labor supply parameters rather than significance tests.

2000. Similarly, cross elasticities fell in absolute value from -.28 to -.31 in 1980, to -.18 to -.20 in 1990, to -.15 to -.17 in 2000. Thus, the Heckman selection model also shows declining responsiveness to own and spouse's wages.

Second, as may also be seen in Table A2, the pattern of results is also quite similar when we use i) OLS estimation rather than IV, and ii) Tobit estimation instead of a linear model to account for the mass of observations at zero hours. For the Tobit estimation, we continued to use predicted wages from our basic IV approach.

Turning now to the labor supply results for husbands (Table 4), the results can be quickly summarized. While men's labor supply is significantly positively affected by their own wages, the responsiveness is relatively small, as previous work has found. Specifically, the own wage elasticity at the mean work hours ranges from 0.01 to 0.07 in 1980; 0.09 to 0.14 in 1990; and 0.05 to 0.10 in 2000. The cross wage elasticity is even smaller than this range in absolute value and changes sign depending on the specification. And the impact of other income has the wrong sign (i.e. it is positive) but implies an elasticity of less than 0.003 in every case.

Our results for married women's and men's labor supply suggest that Goldin's (1990) vision of falling married women's own wage and cross wage labor supply elasticities was coming to pass by 2000. We find that for married women, the own wage elasticity was cut roughly in half and the cross wage elasticity was reduced by about 40 percent. Thus, women's labor supply responses did indeed much more closely resembled men's by 2000.[16] The declining effect of husband's wage shown in Table 3 is also suggested by Goldin's (1990) analysis which

[16] An alternative hypothesis potentially consistent with the decline in the own wage effect on labor supply during 1990s is that welfare reform and expansions in the earned income tax credit (EITC) in the 1990s induced the labor force entry of low wage women, thus flattening the observed relationship between wages and labor supply. However, this reasoning applies most strongly to single mothers, for whom the welfare system's changes were most salient. Thus, changes in the welfare system are unlikely to explain our results. Moreover, while expansions of the EITC in the 1990s raised single mothers' labor supply, they lowered married mothers' labor supply, due to the marriage penalty built into its rules (Eissa and Hoynes 2004). Since this effect is more likely to be observed among low wage women, expansions of the EITC are likely to have steepened the relationship between labor supply and wages for married women, unlike the results we have found. Moreover, as shown below, the labor supply elasticity fell within education groups, suggesting that whatever the effects of the EITC or welfare reform, something more than these policy changes was responsible for the declining estimated labor supply elasticities we document. And, even for less-educated women, estimates presented below which take into account the effect of the EITC (as well as other taxes) continue to show declining labor supply elasticities.

as noted emphasizes rising divorce rates and increasing opportunities for interesting careers for women. We expect both of these factors to reduce women's labor supply responsiveness to their husbands' wages.

B. Accounting for Changes in Women's Labor Supply: 1980-2000

Above we identified behavioral changes in the diminishing own and cross wage elasticities of married women. In this section, we consider the implications of the labor supply functions we have estimated for labor supply changes over the 1980s and 1990s. As we have seen, women's labor supply grew substantially faster in the 1980s and than in the 1990s. To what extent can these changes be explained by exogenous factors such as wage offers and to what extent are the changes due to shifts in women's labor supply functions? Table 5 provides an accounting of the changes in women's labor supply by showing the contribution of changing levels of the explanatory variables, as well as the effect of shifts in the labor supply function (the "Total Unexplained Change") for each period (i.e., 1980-1990 and 1990-2000) and for the difference between the changes over the two periods (i.e., (1990-2000)-(1980-1990)). Of course, the answer one obtains potentially depends on the specification of the labor supply function and the weights one applies to the changes in the explanatory variables. Table 5 shows results for our most and least parsimonious specifications: results for Model 1 (which excludes own education, spouse's education, and children) are shown in Panel A and Model 4 (which includes these three variables) are shown in Panel B. We show results for each specification using the 1980, 1990 and 2000 equations.

Across all of the model and year combinations shown in Table 5, measured factors explain one fifth to two fifths (21 to 38 percent) of the growth in female labor supply over the 1980s, suggesting that the labor supply function shifted to the right over the 1980s. In contrast, using the 1980 and 1990 equations measured factors are more than sufficient to account for the (smaller) increase in labor supply that occurred over the 1990s (explaining106 to 127 percent), and can account for a high proportion of the change (81 to 88) using the 2000 function. Thus, in an accounting sense, one reason for the labor force slow down between the 1980s and the 1990s is that the labor supply function did not shift to the right in the latter decade but rather remained relatively stable. In fact, when the same equation is used to evaluate the impact of the changes in the explanatory variables in the 1980s vs. the 1990s, the larger unexplained increase in labor supply in the 1980s is sufficient or more than sufficient to fully account for the slowdown in the growth of annual hours of 173 hours between the two decades. Of course, as we have seen, the results for the coefficient on own log wages indicate that married women's labor supply function became much steeper (in conventional wage-hours space) in the 1990s. These findings are illustrated in Figure 2, which plots each year's labor supply function based on the estimated wage coefficients, evaluating al the other variables at the 1990 means. (Note that annual hours are on the vertical axis and hourly wages on the horizontal axis.) As may be seen, the function shifted upward between 1980 and 1990, but the responsiveness to wages remained roughly similar. Between 1990 and 2000, the location of the function remained fairly constant but the function rotated to the right indicating a diminished responsiveness to wages.

Looking at the contribution of specific variables, increases in women's real wage offers were the single most important environmental change causing a rise in their labor supply in both decades. Within each specification-year, this factor actually had a larger positive effect in the 1990s than the 1980s, since women's real wages rose more in the latter decade. Thus, while rising real wages for women are an important part of the explanation for why women's labor supply grew in the 1980s and 1990s, they *cannot* explain why labor supply growth was *slower* in the 1990s than the 1980s. Overall, real own wage increases explain 20 to 35 percent of the actual hours increase in the 1980s, and 87 to 152 percent, in the 1990s.

Husbands' real wages on average fell slightly during the 1980s, providing a possible explanation for the rising labor supply of women during this period. However, consistent with Juhn and Murphy (1997), we find little effect of this factor, with declining husband's real wages explaining only 2 percent of the actual hours increase under all specifications. Rising male real wages during the 1990s, do explain some of the reduction in the growth of female labor supply during this decade. The effect of husbands' wage increases in the 1990s lowered female labor supply by 22-30 hours (accounting for 20-27% of the observed change in hours). Thus, comparing the 1980s to the 1990s, changes in husbands' real wage growth between the two decades explained to 28-37 hours of slower female labor supply growth in the 1990s than in the 1980s, or 16-21% of the slowdown. Thus, women's labor supply grew more slowly during the 1990s than during the 1980s in part because husbands' real wages grew more in the 1990s than the 1980s. The estimated effect of this factor is largest in both models when the 1980 equation is used, reflecting the decrease in the responsiveness of married women to their husbands' wages over the period, though the differences across equation-years are not large.

Of the other explanatory variables, rising education levels accounted for hours increases of 16-34 in the 1980s and 10-28 in the 1990s, in each case a modest share of the actual increase in female labor supply (5-12% in the 1980s and 9-26% in the 1990s). And these hours effects were slightly larger in the 1980s than the 1990s. Thus changes in the growth in educational attainment, controlling for wages, accounted for a small portion (3-4%) of the slowdown in women's labor supply growth. The decline in the number of children in each decade also raised women's labor supply modestly, with a slightly larger effect in the 1990s (14-17 hours) than the 1980s (6-11 hours).[17] Thus, in an accounting sense, smaller families can explain a small to modest portion of women's rising labor supply in the two decades (2-4% in the 1980s and 13-15% in the 1990s); however, differences across decades in changes in family size cannot explain the slowdown in women's labor supply growth since the contribution of changes in the number of children was more positive in the 1990s than the 1980s.

[17] The effect of changes in the number and ages of children was larger in the 1990s than the 1980s despite Table 2's data that show a larger fall in the total number of children in the 1980s than the 1990s. The two observations can be reconciled by noting that in the age groups where children have their most negative effect on labor supply (i.e. the preschool ages), the number of children rose in the 1980s and fell in the 1990s. While the number of school age children fell sharply in the 1980s, our estimates imply that these declines did not have a large impact on labor supply. This analysis illustrates the value of disaggregating the number of children by their ages.

In summary, the principal reason for the slowdown in labor supply growth in the 1990s was there was a substantially larger rightward shift in the labor supply function in the 1980s than in the 1990s. This single factor (a larger unexplained increase in labor supply in the 1980s) was sufficient or more than sufficient to account for the smaller increase in married women's labor supply in the 1990s than in the 1980s. In addition, larger increases in husbands' real wage growth in the 1990s explained 16-21% of the slowdown. One factor that does not help to explain the trends is increases in the real wages of married women since they were in fact larger in the 1990s than in the 1980s.

C. Alternative Specifications and Estimation Methods

The results for our basic specification in Table 3 suggest that married women's labor supply has become dramatically less responsive to their own wages over the 1980-2000 period, while their responsiveness to their husbands' wages also decreased. In order to investigate the robustness of these findings, we implemented a variety of alternative specifications and methods of estimating married women's labor supply. The results of most of these models are shown in Tables 6-10. Each of these alternatives leads to the same conclusion: married women's own wage labor supply elasticity fell dramatically between 1980 and 2000. With one exception (i.e., the after-tax results when husbands' earnings are included with asset income in an other family income measure), we continue to find that cross-elasticities fell in absolute value as well.

1. Disaggregation by Subgroups

Education Groups

Models disaggregated by education group are of interest because they address two concerns. First, it is possible that the trends in elasticities documented above are driven by a change in the relative size of education groups, a compositional factor that may not be adequately addressed by our education controls. Second, it is possible that education levels are a proxy for true current wages in the event that we have not been entirely successful in correcting for measurement error in wage rates (or because education is positively correlated with total compensation, including the nonpecuniary benefits of various employments). We have already seen that labor supply patterns within education groups are similar to those obtained for the full sample in Table 1 (see, Figure 1 and also Table A1), with a much larger increase in the 1980s than in the 1990s. Moreover, Table A1 indicates that within education groups, real wages for women generally rose faster in the 1990s than the 1980s (except for college graduates, for whom wages rose slightly faster in the 1980s), and spouse real wages generally declined in the 1980s and rose in the 1990s. Women in the high school dropout group and their spouses had the least favorable real wage changes in each period.

Table 6 shows regression results and elasticities when we disaggregate our basic labor supply model by education group. For all of the groups except those with some college but less than a college degree, the hours effect of own wages is much lower in 2000 than in 1980 or 1990; for the group with some college, the hours effect rises between 1980 and 1990 and falls to roughly its 1980 level by 2000. Moreover, for all of the groups, the effect of spouse's wage is much smaller in absolute value in 2000 than 1980. Taking account of the rising average work hours within each education group, the implied own and cross wage elasticities at the mean fall sharply in magnitude for each of the education groups. The wage coefficients for high school dropouts fall especially precipitously by 2000 and are not only extremely small in absolute value but also wrong signed for own wages (sometimes significantly so) and right signed but insignificant for spouse wages. Below, we explore the possibility that these findings are due to the failure to adjust for the impact of the EITC and taxes, and find this does not appear to be the case.

Taken together, the striking similarity across skill groups in the pattern of changes in elasticities increases our confidence in the conclusions reached based on the pooled sample: women's labor supply is becoming less sensitive to their own and their husbands' wages. And this result is prevalent across education groups. Moreover, when decompositions similar to those presented on Table 5 were undertaken separately by education group, the results were also similar to those for the aggregate. Specifically, most of the 1980s increase in labor supply for each education group was due to a rightward shift in the labor supply function, while the function shifted very little in the 1990s.

Mothers of Young Children

Recent BLS reports have suggested that the labor market attachment of mothers with young children has declined and that this may mark a shift in women's labor supply behavior. For example, the *Monthly Labor Review* editor reports that labor force participation of women with infants fell each year except one between 1998 and 2003 (http://www.bls.gov/opub/ted/2004/apr/wk3/art04.htm). On the other hand, Baker and Boushey (2004) report that during the recessionary period 2000-2002, employment-to-population ratios fell similarly for men and women with children and those without children, suggesting that there was nothing unique about the labor supply behavior of mothers during this period. In light of such data, we conducted additional analyses restricting the sample to married women with children under 6 years of age, in order to determine whether this group's labor supply behavior was changing over the long run in a manner different from other married women. We have already see that the pattern of labor supply trends for this group mirror those of the aggregate: a large rise in the 1980s followed by a much smaller rise in the 1990s, although at a somewhat lower level of labor supply (see Figure 1 and Table A1).

As may be seen in Table 6, we find for this group very similar labor supply patterns for the 1980-2000 period to those for married women overall. Specifically, although the own wage coefficient rose slightly for mothers of young children between 1980 and 1990 (in contrast to the slight fall for the full sample), at sample mean hours, their own wage labor supply elasticity fell between 1980 and 1990 (from .98-1.04 to .79-.86), as we found for the full sample. Moreover, their own wage coefficient fell sharply between 1990 and 2000, just as it did for the full sample;

their own wage labor supply elasticity fell to a 0.49-0.54 range in 2000, again a very similar result to that for all married women. The effect of husband's wages on hours fell in absolute value between 1980 and 1990, as it did for the whole sample; however, for mothers of young children the husband's wage effect rose somewhat between 1990 and 2000 in contrast to the slight further decline for the full sample. The cross wage elasticities for mothers of young children fell in absolute value from -0.56 (for all specifications) in 1980 to -0.32 to -0.35 in 1990, before rising slightly to -0.34 to -0.40 in 2000. This pattern is very similar to that for all married women for 1980-1990, but the slight rise in the cross elasticity for mothers of young children between 1990 and 2000 contrasted to the slight fall for married women as a whole. Nonetheless, for both samples, the cross elasticity was much smaller in 2000 than 1980.

Third, as in the case of the separate education groups, we obtained decomposition results for mothers of children less than 6 years old that were very similar to our findings for the full sample. Again, most of the 1980s increase in labor supply was "unexplained," suggesting a rightward shift in the labor supply function, while the function shifted very little in the 1990s. Thus, at least through the 2000 period, married women with young children appeared to behave very similarly to married women overall. Moreover, we obtained very similar findings when we restricted the sample to married mothers of children less than 3 years old.

2. Adjustments at the Extensive versus the Intensive Margin

The dependent variable in our basic estimations is unconditional hours. We have focused on this measure because it gives the most comprehensive summary of labor supply over the course of the year, and, as we have seen, results are similar for a linear model and Tobit estimation, each of which imposes different assumptions on the relationship between participation and hours given participation. However, separately analyzing these two decisions would involve the least intrusive set of assumptions in that it would allow the explanatory variables to have different effects on these outcomes. Intuitively, the given changes in the explanatory variables may differentially affect the decision to enter the labor market and the decision of people already employed to increase or decrease their work hours (Heckman 1993). Accordingly, Table 7 shows the results of analyses separately estimating the determinants of positive hours and work hours conditional on working. In each case, we use predicted own and husband's wages as in Table 3, although, in the participation probits, we do not correct the standard errors, since we are primarily interested in the parameter estimates, which are consistent.

The probit results in Table 7 for the determinants of positive hours, give the partial derivatives evaluated at the mean of the explanatory variables. We see that the effect of own wages falls modestly from 1980 (a range of 0.36 to 0.41) to 1990 (0.32 to 0.34), and declines sharply by 2000 (0.21 to 0.23), roughly mirroring the results for unconditional hours. Because the incidence of working was rising over the period, the implied elasticities at the mean participation incidence fall faster over time than the regression coefficients: from 0.53-0.61 in 1980, to 0.41-0.44 in 1990, and to only 0.27-0.30 by 2000. The effect of spouse wages on participation also falls in absolute value over the period, though less dramatically. The negative cross-elasticities decrease in magnitude from -.20 to -.24 in 1980 to -.11 to -.13 in 2000, with most of the decline occurring over the 1980s, again as in the unconditional hours results.

Conditional hours are analyzed in three ways. First, we simply use the same IV analysis as in Table 3 with the sample restricted to those with positive hours. Second, we explicitly recognize that there may be a selection bias problem in focusing on those with positive hours. Unfortunately, there are no good instruments for determining participation that do not theoretically affect hours given participation. Instead, we use a procedure for adjusting the samples in the spirit of Hunt (2002). We begin by noting that the participation probability rises over time (Table 1). To adjust for sample selection, we reduce the size of the 1990 and 2000 samples in order that the same fraction of the population is observed in each year. To do this, we estimate participation equations based on the full set of exogenous variables in the IV labor supply models shown in Table 3. These include dummy variables for one's own wage decile, and spouse's wage decile; non-wage income; own and spouse age, education and race; region; and year. We then drop from the sample those with the lowest predicted probabilities of participating in 1990 and 2000.[18] This procedure yields samples with the same relative likelihood of participation in each year, and imposes no a priori assumptions about the wage levels of nonparticipants vs. participants.

Third, if we take the original IV results for unconditional hours and the probit results for participation as approximately unbiased, we can infer the impact of any variable on conditional hours analytically. This approach is appealing in that we do not have to make assumptions about selectivity in estimating the determinants of hours given participation. On the other hand, it uses the unconditional hours results of Table 3 which in effect are a linear approximation to a more complicated labor supply function that distinguishes between participation and hours given participation. To illustrate this third approach to separating the analysis of participation and hours, consider the following expression for expected unconditional work hours:

$$E(H) = E(H|H>0)*Prob(H>0). \quad (2)$$

Then, the effect of any variable x on expected conditional hours can be obtained by differentiating both sides of (2) with respect to x:

$$\partial E(H)/\partial x = Prob(H>0) * \partial E(H|H>0)/\partial x + E(H|H>0) * \partial Prob(H>0)/\partial x. \quad (3)$$

Rearranging terms, we have:

$$\partial E(H|H>0)/\partial x = (1/Prob(H>0))*[\partial E(H)/\partial x - E(H|H>0) * \partial Prob(H>0)/\partial x]. \quad (4)$$

[18] To illustrate this process, recall from Table 1 that 76.6% of women had positive hours in 1990, compared to only 66.2% in 1980. From the 1990 sample of women with positive hours, we eliminate the lowest 13.6% (i.e. [(0.766-0.662)/(0.766)]) of individuals with respect to their estimated probability of having positive hours. We perform a similar adjustment for 2000.

Using our estimated values for the effect of each variable on unconditional hours and on the probability of participating, we can recover the impact of each variable on conditional hours at given levels of Prob(H>0) and E(H|H>0). We use the mean values for these levels. In addition, using the (admittedly uncorrected) standard errors for the effects of x on unconditional hours and on participation, equation (4) can also be used to compute the standard error of the effect of x on conditional hours.

Table 7 shows that all three methods of analyzing conditional work hours yield very similar results for 1980 and 2000: the effect of own and spouse wages is similar across the methods and they each decline sharply between 1980 and 2000. At the mean conditional hours, the own wage elasticity ranges .22 to .28 in 1980 and falls to a range of .08 to .14 by 2000. The estimation methods do give differing results for 1990, with the selectivity corrected own wage elasticity rising to .32-.33, and the elasticities based on the other two methods declining to the .17-.24 range. However, as just noted, by 2000, all three methods yield the same basic result: conditional labor supply own wage elasticities were much smaller by 2000 than they were in 1980. And the spouse wage elasticities fall continuously in absolute value from 1980 to 2000 across all three methods, as in the participation equations.

The results just discussed suggest that women's own wage and cross wage labor supply elasticities decreased in magnitude at both the extensive and intensive margin over this period. Of course, as in the previous literature on labor supply, the participation own wage elasticities were much larger than the conditional hours own wage elasticities (Blundell and MaCurdy 1999). Moreover, we find that the participation own wage elasticities fell by much more over the 1980-2000 period than the conditional elasticities, suggesting that the fall in women's overall own wage labor supply elasticity occurred mostly through a reduction of responsiveness at the extensive rather than the intensive margin. This is to be expected if declining elasticities reflect greater female attachment to the labor force, although it should be noted that even the concept of annual hours conditional on working, which we have termed the intensive margin, includes extensive decisions about participation within the year. To examine this issue further, we performed our basic IV analyses on conditional average weekly hours during the weeks one actually worked, a perhaps more focused measure of the intensive margin than conditional annual hours. We found even smaller conditional elasticities for these analyses than for annual work hours. Specifically, for conditional weekly hours, own wage elasticities ranged from .07 to .09 in 1980 and .09 to .11 in 1990 and fell to the .06-.08 range for 2000. Thus, over the 1980-2000 period, there is still some slight evidence of a falling own wage elasticity at the intensive margin even measured in this more restrictive way.

3. Taxes

Marginal tax rates decreased dramatically over the 1980-2000 period, while the generosity of the Earned Income Tax Credit was greatly increased. Our basic wage and other income measures are defined gross of income taxes and thus may be biased by these changes. The net effect and size of these biases are uncertain. Thus, in this section, we examine the robustness of our findings by reestimating our models using after tax incomes and wages as the key explanatory variables. We do so for all married women pooled and also for separate education groups (given the potentially different impact of policy changes for high and low wage individuals).

In order to impute an after tax wage for each married women, we assumed that husband's earnings were exogenous and included them in "other family income" for the purposes of computing a marginal tax rate for each woman, similar to Eissa and Hoynes (2004). Thus, net other family income for women includes husbands' wage and salary and self-employment earnings as well as asset income. Net other family income is calculated for each man under the assumption that his wife is not working at all. Given these values for other family income, women's wage rates are adjusted using the average tax rate faced by a worker shifting from zero hours to full-year, full-time work (i.e., 40 hours/week for 52 weeks), again as in Eissa and

Hoynes (2004). This procedure recognizes that a woman's marginal tax rate can be affected by her labor supply decisions and thus assigns a tax rate based on a full-time, full-year employment assumption rather than the woman's actual work hours. This tax rate is thus exogenous to the woman's actual labor supply choice on the assumption that she takes her husband's earnings as given.

In computing after tax wages and other family income, we incorporated the effect of the federal income tax, social security taxes and the Earned Income Tax Credit (EITC). The adjustments for the income tax assume that spouses are filing jointly and take the standard deduction plus personal exemptions for themselves and each of their own children under 19. The adjustments for social security taxes, which include both Old-Age, Survivors and Disability Insurance (OASDI) and Hospital Insurance (HI), take into account the different tax rates that apply to wage income and self-employment income and also the maximum tax payable in each year. The adjustments for the EITC assume that all own children under 19 may be considered dependent children and that family investment income (used in an eligibility test in 1999-2001) consists of interest, dividends and rent.

Selected results for before and after tax own wage and other family income are shown in Table 8. The before tax results for all married women are included because the specification differs from that in our basic results (see, Table 3) in that, as just noted, husbands' earnings are now added to asset income to form what we call other family income. Before tax results for all married women closely track those for the basic results: Married women's own wage elasticity fell from .75 to .85 in 1980, to .34 to 39 in 2000. Their other family income elasticity fell absolutely from -.18 to -.19 in 1980 to -.11 to -.14 in 2000, with most of the decrease occurring in the 1980s. Note that the other family income elasticities are smaller in magnitude than those estimated for husbands' wages separately, and decline less over the period. This makes sense since for in these estimates husbands' earnings are included with non-wage income; the elasticities obtained for the latter in Table 3 were considerably smaller in absolute value than for husbands' wages and decreased much less in magnitude over time. The after tax results for all married women continue to show a dramatic decrease in own wage elasticities comparable in magnitude to the pretax results. They no longer show a decrease in responsiveness to other family income, but rather, taking the 1980-2000 period as a whole, the other family income elasticity remains roughly constant to slightly increasing in absolute value, depending on specification. This raises the possibility that the finding of a decreasing responsiveness to other family income (and by implication husbands' wages) in the pretax models is an artifact of measuring the variable in before tax dollars. However, note that the trend for other family income is already considerably more muted than for husbands' wages in our basic specification. Moreover, the treatment of taxes must necessarily be tentative because of the problems of observing true taxable income (e.g. deductions are unobservable) and the fact that tax rates are endogenous.

When education groups are examined separately, the tax-corrected results for the own wage elasticities are very similar to those presented in Table 6, showing sharp declines for all groups. For 2000, we continue to find negative and small (in absolute value) own wage elasticities for women with less than a high school degree even after accounting for income taxes, payroll taxes and the Earned Income Tax Credit.[19] The estimated responsiveness to other family income behaves erratically, with only women with some college and college degrees exhibiting declining responsiveness over the period.

4. Changing Selectivity of Married Couples

As discussed earlier, Table 1 shows a declining incidence of marriage between 1980 and 2000. Since we confine our models to married couples, it is possible that our results are due to a change in the composition of the married group with respect to unmeasured factors, rather than

[19] Eissa and Hoynes (2004) estimate an own after tax wage participation elasticity for married women with less than 12 years of schooling of 0.267 using data from data come from 1985-1997. The after-tax hours elasticities that we estimate for this group fall from .64 to .65 in 1990 to -.14 to -.17 in 2000. Our small and negative estimated elasticities for 2000 are not necessarily inconsistent with Eissa and Hoynes' findings, given that 2000 (1999-2001) is outside their sample period and our 2000 elasticities represent a sharp drop from 1990.

to true behavioral changes. We account for this potential selection bias in several ways, as shown in Table 9.

First, between 1980 and 2000, an increasing number of individuals lived together as a couple but were not officially married, suggesting that the meaning of marriage may have changed over time. Thus, we reestimate our basic model on an expanded sample that includes cohabitors. Cohabitors were identified as pairs of unrelated adults of the opposite sex living in the same household in which there were no other adults present using the Census Bureau's Partners of the Opposite Sex Sharing Living Quarters (POSSLQ) definition (as discussed in Casper and Cohen (2000)).[20] While imperfect, this procedure undoubtedly permits us to add to the sample many people who are in fact cohabiting. Table 9 shows the results of this analysis are very similar to those using the traditional definition of marriage, suggesting that changes in the propensity to be a cohabitor do not account for the falling labor supply elasticities of married women.

Our second method for correcting for selection into marriage is to remove the least marriage-prone individuals for the years with higher overall marriage incidence, in the same way that some labor market participants were removed to account for selection into the group with positive hours (see above). We first estimate a marriage probit for each year using only own age, own education, race/ethnicity and location as explanatory variables. Because marriage is the dependent variable, we of course did not include any spouse-related characteristics or presence of children variables, and we also did not include any wage data since wages may be endogenous with respect to marriage. We then adjusted the samples for 1980 and 1990 by eliminating the least "marriage-prone" married women so that each year's sample of married women represents the same (2000) fraction of the full population, and reestimated the basic models. As Table 9 indicates, the results for own wages, spouse's wages and non-wage income are very similar to

[20] POSSLQ households are identified as all of those that contain two and only two adults (aged 15 or over) who are unrelated and of the opposite sex.

our results in Table 3.[21] In particular, the own wage elasticities evaluated at the mean of the sample included in the regressions fall from 0.77-0.89 in 1980, to 0.60-0.65 in 1990, to 0.35-0.41 in 2000.

Third, an alternative procedure is to add some non-married people (in order of marriage-proneness) to the later samples and estimate our basic labor supply models without controlling for spouse characteristics, children or family non-wage income. In contrast to the earlier procedure of deleting some married people from the sample, this procedure adds observations and thus includes more of the population, although now we cannot investigate family effects. Table 9 reports three sets of results for this approach. The first provides results for this specification for the sample that removes some married women from the earlier years' samples (denoted in the table as "specification 2" for this group). The second adds married women to later years' samples (based on their probability of being married) so that in each year the sample of married women represents the same (1980) fraction of the full population. The third simply estimates the model for all women age 25-54 (regardless of actual marital status), in effect allowing all decisions regarding marriage and children to be endogenous. Each specification yields estimated own log wage coefficients consistent with dramatically declining own wage elasticities over time. For example, for the third specification (all women age 25-54), at the mean of annual hours, the own wage elasticity fell from 0.76-0.80 in 1980, to 0.57-0.58 in 1990, to 0.26-0.32 in 2000. Overall, Table 9 shows that selection into marriage is not the cause of our estimates of falling labor supply elasticities.

5. Omitted Variable Bias: Using Grouped Data

[21] Note that the coefficients for the 2000 regressions differ very slightly from those in Table 3 even though the sample is the same in both tables. The reason for this is that in calculating wage deciles (i.e., the instruments in the IV analysis) for the Table 3 analyses the married sample is used. However for all analyses in Table 9 (with the exception of the specification that includes cohabitors), the full sample (married and unmarried) is used. This is done so as to treat current marital status as endogenously as possible.

As discussed earlier, if tastes for working are positively correlated with unmeasured productivity, then there may be a spurious cross-sectional correlation between individuals' wage rates and their labor supply. While the IV analyses we have performed can in principle eliminate the asymptotic bias due to this factor, they are of course based on exclusion restrictions which may or may not valid. An alternative approach is to form averages of wage offers and labor supply within groups and use these as the units of observation. Within each group, as group size becomes larger and larger, observations with high values of tastes for work and unmeasured productivity will tend to cancel out with observations having low values for these unmeasured factors. Using group averages, therefore, makes it more likely that observed correlations between wage offers and labor supply represent true economic effects. Thus, we estimated models based on grouped data that can, under some circumstances, eliminate the omitted variable biases (asymptotically) that may be present in equations (1a) and (1b).[22] Specifically, Angrist (1991) shows that using group averages is equivalent to estimating a model on individual data and performing instrumental variables analyses with the group averages serving as the instruments.

To implement the strategy of using group averages, we create own age-spouse age-own education-spouse education cells. We define three age groups—25-34, 35-44, and 45-54—and four education groups—less than high school, high school degree, some college, and college degree. Considering both own and spouse age and education, this breakdown potentially yields 144 cells: 3 own age groups x 3 spouse age groups x 4 own education groups x 4 spouse education groups.

To illustrate our use of group averages, consider the following reformulation of our basic labor supply model for individuals (this setup is similar to that in Devereux 2004):

(5) $$H_{ijkt} = b_0 + b_1 \ln W_{ijkt} + b_2 \ln W_{sijkt} + B_3 A_{ijtk} + C'R_{ijkt} + u_{bijkt}$$

(6) $$u_{bijkt} = e_{jk} + f_j t + f_k t + gt + v_{ijkt},$$

[22] See, Angrist (1991); Blundell, Duncan and Meghir (1998); Pencavel (1998); and Devereux (2004).

where i indexes individual, j indexes own and spouse education combination (e.g., own education=some college and spouse education=high school degree), k indexes own and spouse age combination (e.g. own age cell=25-34 and spouse age cell=35-44), t indexes period, H is annual work hours, W is own wage, W_s is spouse's wage, A is non-wage income, R is a vector of regional controls (region dummies and the metropolitan area dummy), own race and spouse race dummies, and year dummies, and v is a disturbance term with age-education cell effects, overall time trends, age cell trends, and education cell trends removed.

The model in equations (5) and (6) differs from the basic model we have described in equation (1b) primarily through its treatment of own and spouse education and age. In equations (5) and (6), there is an own-spouse education-age cell fixed effect (e_{jk}), and the impact of own-spouse education combination is allowed to change over time (f_j) as is the impact of own-spouse age group combination (f_k). In addition, in equation (6), there is a time trend g. In contrast, in equation (1b), own and spouse education group dummy variables were entered in separately, as were own and spouse age and age squared. Moreover, equation (1b) allowed the labor supply parameters to change freely across years. The slightly different treatment of age and education in equations (5) and (6) is implemented in order to facilitate the use of the group averages. Moreover, as will be explained shortly, using group averages with group effects and group-specific trends places more restrictions on the time dimension than our earlier estimation of equation (1b) separately by year.

As explained above, OLS estimation of equation (5) using individual data may produce biased estimates of the labor supply elasticity if, within age-education cells, married women with high tastes for work are also more productive. Taking cell averages of equations (5) and (6), we can eliminate this potential asymptotic bias. However, if there are cross-cell differences in the changes in factors affecting tastes for work and in wage offers, then even using group averages may lead to biased estimates of the labor supply parameters. In other words, in the error components in equation (6), the cell fixed effect e_{jk} may be correlated with average wage offers in the cell. For example, college graduates may have higher wage offers and greater work orientedness than high school dropouts. This unmeasured factor can be accounted for by estimating equation (5) using first differences. But it is also possible that wage offers for college graduates and their work orientedness rose relative to those of high school dropouts over the 1980-2000 period, suggesting that even first differences may yield biased estimated. Specifically, the cell specific trend terms f_j and f_k may be correlated with the cell's trends in average relative wages. We can account for these unobserved changes by estimating equation (5) using first differences and including cell dummy variables. When we first difference these cell averages, we obtain the following estimating equation:

(7) $$\Delta H_{jk} = g + b_1 \Delta \ln W_{jk} + b_2 \Delta \ln W_{sjk} + B_3 \Delta A_{jk} + C' \Delta R_{jk} + f_j + f_k + \Delta v_{jk},$$

where Δ signifies a 10 year change.

The use of first differences in estimating equation (7) and inclusion of the group effects f_j and f_k allow for age-education cell fixed effects as well as a different trend for age groups and for education groups. Moreover, inclusion of the change in the control variables R adjusts for changes in the race-regional composition of age-education cells. This reduction in omitted variable bias is, however, obtained at the expense of constraining the labor supply parameters to be constant over a given 10 year period, an outcome we have reason to doubt based on our earlier estimates. Nonetheless, it is possible to estimate equation (7) for the 1980s and again for the 1990s; in this way, we can determine whether the average effect of own and husband's wages on labor supply over the 1980s was larger than their effect in the 1990s.

Table 10 presents the results of several specifications for the grouped averages approach. We included only cells with at least five observations in each year, although the results were not sensitive to other assumptions about cell inclusion. The regressions in Table 10 are weighted by the inverse of the sum of the cell sizes for the two years used to form the first difference.[23] The

[23] This weight is based on the assumptions of constant variance in annual hours for individuals and independence of the sample ten years apart. In this case, we have:

results are similar to our earlier findings for own wages and spouse wages, although the effects of non-wage income rise in absolute value. Specifically, at the initial year mean hours worked (1980 for the 1980-90 change regressions and 1990 for the 1990-2000 change regressions), the estimated own wage elasticity falls from 0.45-0.90 in 1980-1990 to 0.16-0.34 in 1990-2000, an even larger decline than obtained for the models estimated on individual data. The spouse wage elasticity falls in absolute value from -0.42 to -0.65 in 1980-90 to -0.14 to -0.23 for 1990-2000. The hours effect of non-wage income was small, positive and usually insignificant for 1980-90 and became negative and usually insignificant while remaining small in absolute value for 1990-2000. Specifically, the non-wage income elasticity ranges from 0.02 to 0.03 in 1980-90 (at the 1980 mean non-wage income of $1540) and from -0.01 to -0.04 in 1990-2000 (at the 1990 mean non-wage income of $2127).[24]

6. The Bargaining Model

Table A2 shows results for a specification in which non-wage income is divided into own and spouse components. This specification implicitly tests the bargaining framework against the unitary family labor supply model. In the bargaining model, we expect own asset income to exert a larger influence on a woman's labor supply than her husband's asset income. Only for 1990 is this outcome observed, and even here the difference between the own non-wage and spouse non-wage income coefficients is not statistically significant. For 1980 and 2000, the own

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$$\text{var}(\Delta H_{jk}) = \text{var } H_{jkt} + \text{var } H_{jkt+1} = [(1/N_{jkt}) + (1/N_{jkt+1})]\sigma^2,$$

where for cell jk N_{jkt} is the cell size for year t and σ is the individual residual standard deviation of work hours. The cell sizes (N_{jkt}) are themselves based on weighted counts of the individuals in the cells, where the individuals are given their adjusted CPS sampling weight, where as discussed earlier, we scale the raw CPS weights to have the same sum for each year.

[24] Devereux (2004) uses 1980 and 1990 Census data to estimate grouped data labor supply models, although in his case the dependent variable is the log of hours conditional on supplying labor. Nonetheless, our results for the 1980-1990 spouse wage elasticity are similar to his. However, his findings for the own conditional labor supply elasticity range from 0.7 to 1.2 without controlling for group indicators, and 0.002 to 0.4 controlling for group indicators.

non-wage income effect is smaller in absolute value than the effect of spouse's non-wage income, although the differences between these coefficients are usually not significant.[25] Thus, the bargaining model does not receive strong support here. Observe, however, that our basic finding of declining (in absolute value) own and spouse wage elasticities continues to hold.

VI. Conclusions

This paper has used March CPS data to investigate married women's labor supply behavior over the 1980-2000 period. Married women's labor supply rose dramatically in the 1980s, with a much smaller increase in the 1990s. We find that married women's real wages increased in both the 1980s and 1990s and these caused comparable increases in labor supply in each decade, given women's positively-sloped labor supply schedules. However, their labor supply function shifted sharply to the right in the 1980s, with little shift in the 1990s. In an accounting sense, this difference in the supply shift is the major reason for the more rapid growth of female labor supply in the 1980s than the 1990s. In addition, married men's real wages fell slightly in the 1980s but rose in 1990s, a factor that contributed modestly to the slowdown in the growth of women's labor supply in the 1990s. Moreover, during both decades, there was a dramatic reduction in married women's own labor supply elasticity. This is a significant new development. In addition, continuing a long-term trend, married women's labor supply became less responsive to their husbands' wages, particularly over the 1980s. Taking the 1980 to 2000 period as a whole, women's own wage elasticity was reduced by 50 to 56 percent, while their cross wage elasticity fell by 38 to 47 percent in absolute value. Thus, as predicted by Goldin (1990), women's own and cross wage labor supply elasticities were becoming more like men's, possibly reflecting increasing divorce rates and increasing career orientation of women.

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[25] Specifically, for 1980, the significance level of testing for the difference between these two coefficients ranges from 5% to 17%, while it ranges from 9% to 18% in 2000. For 1990, these tests yield significance levels of 43-63%.

We found that these patterns hold up in virtually all cases under a variety of alternative specifications, including ones that correct for: selectivity bias in observing wage offers; selection into marriage; income taxes, payroll taxes and the earned income tax credit; measurement error in wages and work hours; and omitted variables that affect both wage offers and the propensity to work. And the decreasing responsiveness of married women to their own and their spouses' wages occurred within each education level and for mothers of small children analyzed separately, suggesting that it was a pervasive phenomenon among married women. Further analyses indicate that married women's own wage participation elasticities fell by much more over the 1980-2000 period than for own wage hours elasticities conditional on employment, suggesting that the fall in women's own wage annual hours elasticity occurred mostly through a reduction of responsiveness at the extensive rather than the intensive margin. However, reductions in the magnitudes of both own wage and husbands' wage elasticities occurred at the intensive margin as well.

The reduction in the magnitude of women's labor supply elasticities implies that government policies such as income taxes that affect marginal wage rates have a much smaller distortionary effect on the economy now than in the past. Conversely, our results imply that the potential for marginal tax rate cuts to increase labor supply is much smaller now than 20 years ago when marginal tax rates were much higher and women's labor supply responses were more elastic.

Data Appendix:

Data were obtained from the 1979-1981, 1989-1991 and 1999-2001 March supplements of the Current Population Survey. To ensure that each year was given equal weight, the March supplement person weights were divided by the sum of these weights over all observations in a given year. Husband and wife records were matched, with observations dropped if either spouse was a member of the armed forces, or not in the 25-54 age range

The number of children at each age was calculated for each married couple. Values for the highest grade completed by husbands and wives in the 1999-2001 sample were assigned using Jaeger's (1997) suggested correspondence. Annual hours worked were defined as the product of the number of weeks worked in the previous year and the number of hours usually worked (HRSWK) during those weeks; a respondent was considered to be in the workforce if HRSWK>0.

All nominal earnings and income variables were converted into 2000 dollars using the National Income and Product Account price index for personal consumption expenditures. All top-coded values of total wage and salary earnings (WSAL-VAL) in 1979-1981 were multiplied by 1.45. For our 1989-91 and 1999-2001 samples, wage and salary income was split into two variables by the CPS: wage and salary income on one's main job and wage and salary income on secondary jobs. The CPS topcoded value for main job earnings was $99,999 for 1989-91 and $150,000 for 1999-2001. We multiplied these by 1.45. The top code on other wage and salary earnings (WS-VAL) was $99,999 in 1989-1991 but was only $25,000 (in current dollars) during 1999-2001. For consistency, we forced a $25,000 top code for all years for secondary wage and salary earnings and multiplied these by 1.45 as well. The measure of wage and salary earnings used (WSINC) was equal to the modified value of WSAL-VAL in 1979-1981 and the sum of the modified values of ERN-VAL and WS-VAL in 1989-1991 and 1999-2001. Lnw was equal to the log of WSINC divided by the product of WKSWORK and HRSWK.

We also experimented with two other methods for adjusting top-coded earnings values. First, we followed Card and DiNardo's (2002) strategy of forcing the same topcode ($99,999) for main job wage and salary earnings for data from 1989 onward, while keeping the $25,000 top code for secondary wage and salary earnings. Second, we followed Autor, Katz and Kearney's (2004) strategy of keeping our topcoded values the same as the CPS's and then multiplying by our correction factor (1.45) in each case. (Our correction factor was midway between the 1.4 value used by Card and DiNardo (2002) and Autor, Katz and Kearney's (2004) value of 1.5.) In both cases, the labor supply results were virtually unchanged.

Flags were generated for any observation that had an allocated value for any variable used in creating lnw or that had a wage value less than $2 or greater than $200 (in 2000 dollars). An imputed wage variable was created, using actual wages unless the individual was not employed or the calculated wage value was not valid, in which case predicted values were used from separate log wage regressions for each combination of gender, decade and low/high work hours (using a 20 hours/week cut-off). The regressors used were own and spouse variables for age, age squared, 3 education categories and 3 race/Hispanic categories, plus 8 region categories and a metropolitan area indicator.

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Figure 1: Annual Hours Trends for Selected Groups of Married Women, 1980-2000

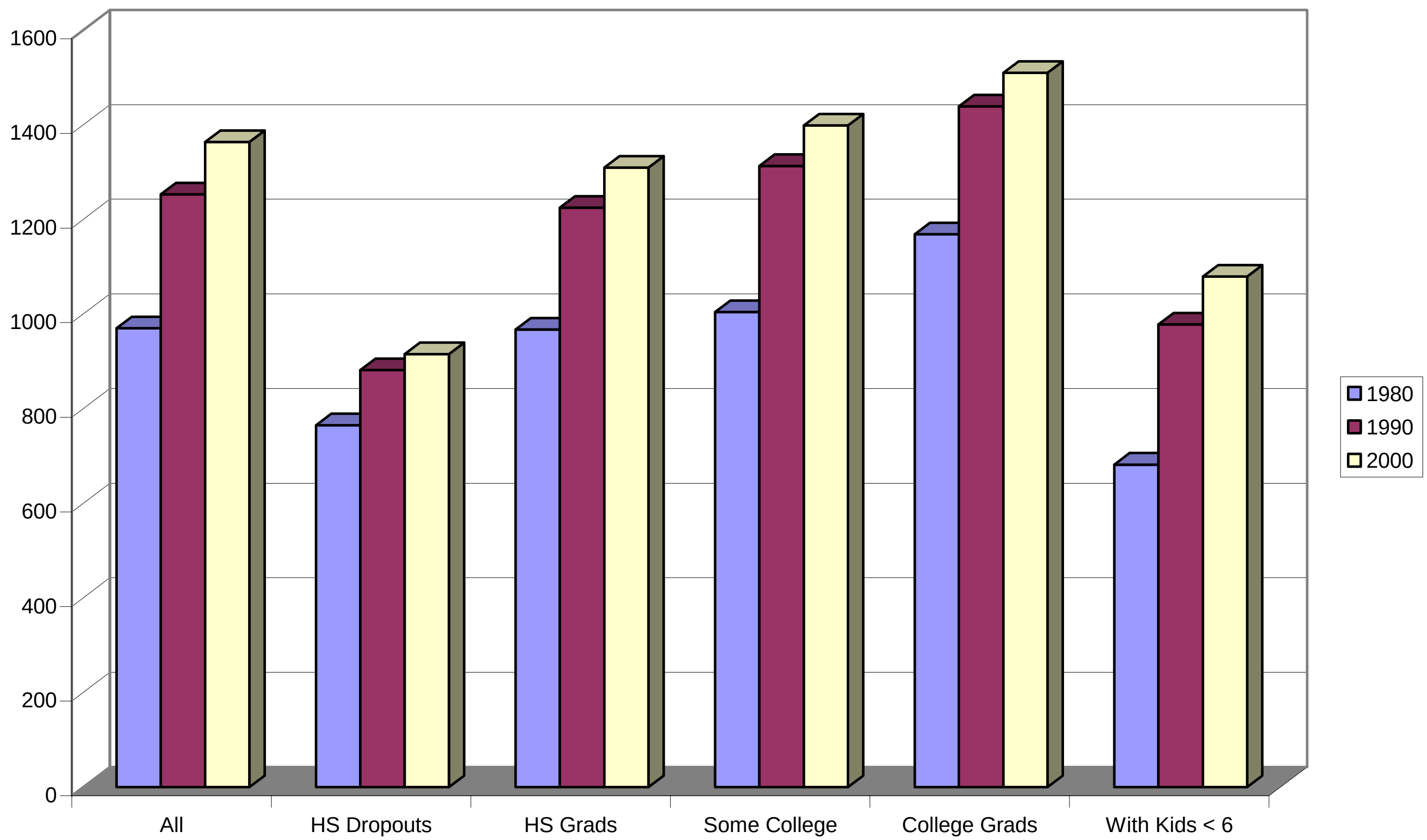

Figure 2: Predicted Labor Supply by Own Hourly Wage, 1990 Means for Other Variables

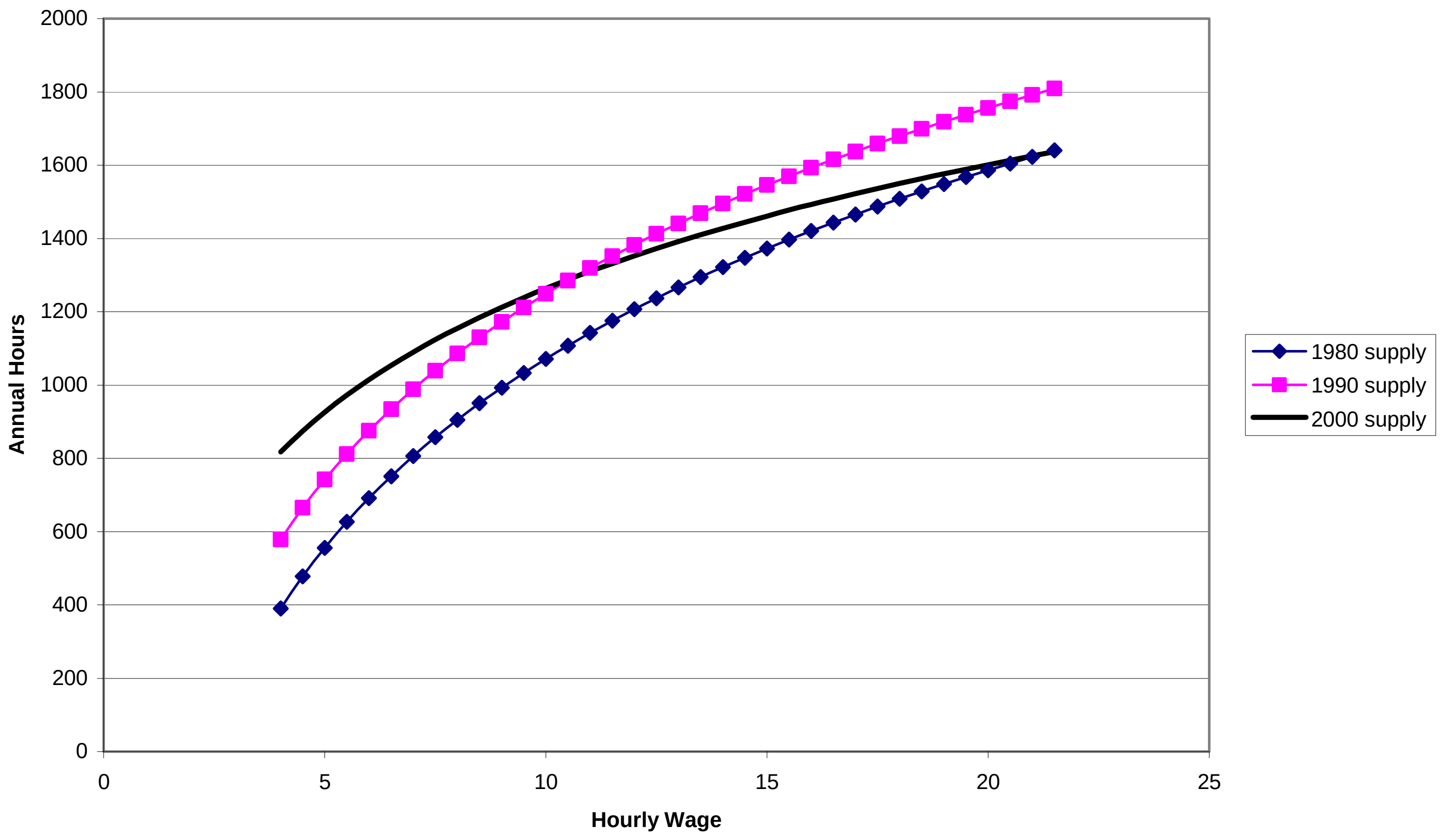

Table 1: Selected Descriptive Statistics for the Full Sample

	1979-1981		1989-1991		1999-2001		Changes	
	Mean	N	Mean	N	Mean	N	1980-1990	1990-2000
Women								
Proportion married	0.715	100709	0.654	100177	0.626	87823	-0.061	-0.028
Total								
Annual hours	1081.3	100709	1332.3	100177	1454.6	87823	251.0	122.3
Worked positive hours	0.695	100709	0.777	100177	0.802	87823	0.082	0.025
Annual hours conditional on working	1556.9	70077	1715.5	77883	1814.1	70109	158.6	98.6
Married								
Annual hours	969.8	64001	1253.1	58987	1363.3	48733	283.4	110.2
Worked positive hours	0.667	64001	0.767	58987	0.780	48733	0.100	0.013
Annual hours conditional on working	1454.4	42882	1633.7	45388	1748.1	37922	179.4	114.3
Non-married								
Annual hours	1371.5	28213	1504.0	33993	1606.7	32241	132.5	102.7
Worked positive hours	0.783	28213	0.811	33993	0.841	32241	0.029	0.030
Annual hours conditional on working	1751.8	22043	1853.4	27523	1910.1	26947	101.6	56.6
Men								
Proportion married	0.741	92486	0.655	92259	0.619	82022	-0.087	-0.036
Total								
Annual hours	2025.0	92486	2008.0	92259	2031.3	82022	-17.0	23.3
Worked positive hours	0.948	92486	0.938	92259	0.923	82022	-0.010	-0.016
Annual hours conditional on working	2136.1	87969	2140.1	87012	2201.7	76124	4.0	61.5
Married								
Annual hours	2142.2	64001	2147.5	58987	2183.3	48733	5.4	35.8
Worked positive hours	0.969	64001	0.964	58987	0.955	48733	-0.005	-0.009
Annual hours conditional on working	2210.7	62025	2227.2	56859	2286.3	46525	16.5	59.1
Non-married								
Annual hours	1729.3	21649	1757.8	28961	1803.2	29363	28.6	45.4
Worked positive hours	0.891	21649	0.890	28961	0.872	29363	-0.001	-0.018
Annual hours conditional on working	1941.7	19384	1975.2	26026	2067.6	25914	33.5	92.4

Notes: Sample restricted to individuals aged 25-54. Married includes individuals who are married with spouse aged 25-54 present; non-married includes all individuals who are not married with a spouse present. 1980-1990 refers to changes between the 1979-81 averages and the 1989-91 averages, and similarly for 1990-2000.

Table 2: Mean Values of Selected Explanatory Variables, Estimation Sample of Married Women Age 25-54

	1979-1981	1989-1991	1999-2001	Changes: 1980-1990	Changes: 1990-2000
Own log imputed wage	2.192	2.308	2.504	0.116	0.196
Own log valid wage*	2.248	2.373	2.546	0.124	0.173
Spouse log imputed wage	2.834	2.814	2.900	-0.020	0.085
Spouse log valid wage**	2.829	2.815	2.896	-0.013	0.081
Non-wage income (divided by 1000)	1.540	2.127	2.997	0.587	0.870
Less than Grade 12	0.185	0.119	0.084	-0.066	-0.035
Grade 12	0.477	0.433	0.323	-0.043	-0.110
Some college	0.171	0.212	0.288	0.041	0.076
College graduate	0.168	0.236	0.305	0.068	0.069
Spouse less than Grade 12	0.210	0.134	0.092	-0.076	-0.042
Spouse Grade 12	0.362	0.368	0.314	0.006	-0.054
Spouse some college	0.172	0.201	0.265	0.029	0.063
Spouse college graduate	0.256	0.296	0.330	0.041	0.033
Number of children age less than 1	0.058	0.064	0.055	0.006	-0.009
Number of children age 1	0.065	0.070	0.063	0.005	-0.007
Number of children age 2	0.068	0.071	0.067	0.004	-0.004
Number of children age 3-5	0.224	0.236	0.212	0.012	-0.024
Number of children age 6-11	0.554	0.487	0.482	-0.067	-0.005
Number of children age 12-17	0.577	0.412	0.430	-0.165	0.018
Total children under 18	1.545	1.341	1.310	-0.204	-0.031
Number of observations	64001	58987	48733	----	----

Notes: Imputed wage equal to actual wage unless individual did not work, had a wage of less than $2 or more than $200 (in 2000 dollars), had allocated wage and salary income or was self-employed, in which case predicted values are used from separate log wage regressions for each combination of gender, decade and low/high work hours (using a 20 hours/week cutoff). The regressors used were own and spouse variables for age, age squared, 3 education categories and 3 race/Hispanic categories, plus 8 region categories and a metropolitan area indicator.

* Sample sizes are 32900, 36666 and 28807 in the three periods, respectively.

** Sample sizes are 43146, 42078 and 33179 in the three periods, respectively.

Table 3: Instrumental Variables Labor Supply Estimates for Wives (dependent variable is annual hours, including zeroes)

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Own log wage	855.828**	779.630**	820.500**	743.209**	805.423**	753.600**	788.859**	731.527**	563.540**	547.054**	508.998**	487.197**
	(10.183)	(9.875)	(11.035)	(10.637)	(8.479)	(8.252)	(9.389)	(9.087)	(10.066)	(9.821)	(11.306)	(10.998)
Spouse log wage	-351.267**	-322.904**	-373.429**	-348.194**	-310.142**	-279.786**	-318.924**	-294.880**	-308.682**	-263.491**	-299.457**	-261.606**
	(10.117)	(9.679)	(10.866)	(10.400)	(8.974)	(8.620)	(9.714)	(9.330)	(10.463)	(10.161)	(11.466)	(11.128)
Non-wage income	-3.732**	-3.824**	-3.810**	-3.948**	-3.140**	-3.049**	-2.790**	-2.814**	-2.107**	-1.577**	-1.723**	-1.293**
	(0.460)	(0.439)	(0.460)	(0.439)	(0.438)	(0.420)	(0.437)	(0.419)	(0.401)	(0.388)	(0.398)	(0.386)
Num. children age <1		-395.534**		-395.229**		-360.420**		-356.601**		-348.272**		-344.883**
		(14.818)		(14.764)		(14.494)		(14.427)		(17.816)		(17.670)
Num. children age 1		-534.435**		-532.195**		-449.911**		-449.690**		-425.845**		-423.952**
		(14.096)		(14.045)		(13.775)		(13.707)		(16.938)		(16.805)
Num. children age 2		-401.529**		-400.039**		-355.536**		-353.861**		-378.038**		-378.015**
		(13.720)		(13.666)		(13.670)		(13.600)		(16.289)		(16.165)
Num. children age 3-5		-315.800**		-314.862**		-295.215**		-293.669**		-286.517**		-282.766**
		(7.712)		(7.681)		(7.654)		(7.614)		(9.320)		(9.246)
Num. children age 6-11		-166.575**		-163.205**		-172.046**		-168.191**		-167.513**		-161.905**
		(4.660)		(4.648)		(4.974)		(4.951)		(5.783)		(5.741)
Num. children age 12-17		-36.753**		-32.385**		-59.932**		-56.444**		-64.468**		-58.030**
		(4.444)		(4.438)		(5.427)		(5.406)		(6.076)		(6.032)
Own and spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	64001	64001	64001	64001	58987	58987	58987	58987	48733	48733	48733	48733
Elasticities												
Own log wage	0.883	0.804	0.846	0.766	0.643	0.601	0.630	0.584	0.413	0.401	0.373	0.357
Spouse log wage	-0.362	-0.333	-0.385	-0.359	-0.247	-0.223	-0.255	-0.235	-0.226	-0.193	-0.220	-0.192
Non-wage income	-0.004	-0.004	-0.004	-0.004	-0.003	-0.002	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001

Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, spouse age and age squared, 3 race and Hispanic origin dummies, 3 race and Hispanic origin dummies for spouse, and two year dummies. Elasticities are computed at the mean.

Table 4: Instrumental Variables Labor Supply Estimates for Husbands (dependent variable is annual hours, including zeroes)

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Own log wage	136.145**	134.133**	27.086**	25.228**	274.247**	272.191**	185.114**	183.036**	197.558**	193.273**	97.120**	93.037**
	(7.781)	(7.785)	(8.303)	(8.309)	(7.083)	(7.090)	(7.639)	(7.645)	(8.193)	(8.215)	(8.982)	(8.994)
Spouse log wage	75.594**	78.390**	-19.776*	-13.863	63.359**	67.428**	-3.735	2.016	59.251**	63.281**	-17.358	-12.420
	(7.832)	(7.943)	(8.431)	(8.498)	(6.692)	(6.787)	(7.383)	(7.445)	(7.882)	(7.940)	(8.857)	(8.889)
Non-wage income	1.872**	1.866**	0.887*	0.897*	2.788**	2.783**	2.141**	2.143**	1.934**	1.881**	1.575**	1.528**
	(0.354)	(0.353)	(0.351)	(0.351)	(0.345)	(0.345)	(0.344)	(0.344)	(0.314)	(0.314)	(0.312)	(0.312)
Num. children age <1		46.738**		37.405**		27.277*		18.740		48.283**		43.724**
		(11.918)		(11.795)		(11.922)		(11.821)		(14.404)		(14.282)
Num. children age 1		24.095*		17.309		40.922**		34.298**		25.898		20.522
		(11.337)		(11.221)		(11.331)		(11.231)		(13.694)		(13.583)
Num. children age 2		40.668**		36.181**		21.723		17.883		48.126**		39.085**
		(11.036)		(10.918)		(11.245)		(11.143)		(13.169)		(13.066)
Num. children age 3-5		29.988**		26.704**		22.288**		21.541**		25.961**		26.492**
		(6.203)		(6.136)		(6.296)		(6.239)		(7.535)		(7.473)
Num. children age 6-11		3.512		9.929**		8.617*		12.706**		12.626**		15.409**
		(3.748)		(3.714)		(4.092)		(4.057)		(4.675)		(4.640)
Num. children age 12-17		-1.685		6.282		12.368**		19.089**		31.338**		35.307**
		(3.575)		(3.546)		(4.464)		(4.429)		(4.912)		(4.876)
Own and spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	64001	64001	64001	64001	58987	58987	58987	58987	48733	48733	48733	48733
Elasticities												
Own log wage	0.067	0.066	0.013	0.012	0.137	0.136	0.092	0.091	0.097	0.095	0.048	0.046
Spouse log wage	0.037	0.039	-0.010	-0.007	0.032	0.034	-0.002	0.001	0.029	0.031	-0.009	-0.006
Non-wage income	0.001	0.001	0.001	0.001	0.003	0.003	0.002	0.002	0.003	0.003	0.002	0.002

Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, spouse age and age squared, 3 race and Hispanic origin dummies, 3 race and Hispanic origin dummies for spouse, and two year dummies. Elasticities are computed at the mean.

Table 5: Predicted Changes in Married Women's Unconditional Annual Work Hours, 1980-2000

	Predicted Changes in Labor Supply Due to Changes Using:								
	1980 Equation		1990 Equation		2000 Equation		1980 Eq	1990 Eq	2000 Eq
Variable	1980-1990	1990-2000	1980-1990	1990-2000	1980-1990	1990-2000	(1990-2000) - (1980-1990)		
A. Model 1 (Excludes Own Education, Spouse's Education, and Children)									
Own log wage	99.62	167.47	93.75	157.61	65.60	110.28	67.85	63.85	44.68
Spouse log wage	7.06	-30.01	6.23	-26.49	6.20	-26.37	-37.06	-32.72	-32.57
Non-wage income	-2.19	-3.25	-1.84	-2.73	-1.24	-1.83	-1.06	-0.89	-0.60
Age	2.54	4.59	2.89	4.33	5.59	15.46	2.04	1.45	9.87
Race-Hispanic	-1.97	-1.33	-0.38	-0.08	-2.73	-3.48	0.64	0.30	-0.75
Spouse age	-1.90	3.09	-3.68	3.33	-6.61	-1.25	4.98	7.01	5.36
Spouse race-Hispanic	0.79	-0.79	-2.07	-3.51	-1.61	-2.28	-1.58	-1.44	-0.68
Region/MSA	-4.14	0.78	-10.03	-1.16	-5.71	-1.02	4.92	8.87	4.69
							0.00	0.00	0.00
Total Actual Hours Change	283.37	110.21	283.37	110.21	283.37	110.21	-173.16	-173.16	-173.16
Total Explained Change	99.83	140.43	84.85	131.33	59.50	89.48	40.60	46.47	29.98
Total Unexplained Change	183.54	-30.22	198.52	-21.12	223.87	20.72	-213.76	-219.63	-203.14
B. Model 4 (Includes Own Education, Spouse's Education, and Children)									
Own log wage	86.51	145.43	85.15	143.15	56.71	95.34	58.92	58.00	38.63
Spouse log wage	6.99	-29.74	5.92	-25.19	5.26	-22.35	-36.74	-31.11	-27.60
Non-wage income	-2.32	-3.43	-1.65	-2.45	-0.76	-1.13	-1.12	-0.80	-0.37
Education	15.50	9.55	17.90	11.12	33.51	28.21	-5.95	-6.78	-5.29
Children	5.77	16.67	11.15	14.65	11.23	14.15	10.90	3.50	2.92
Age	-1.05	-19.56	0.88	-18.67	4.70	-6.84	-18.51	-19.54	-11.54
Race-Hispanic	0.83	2.60	1.09	2.08	-0.81	-0.64	1.77	0.99	0.17
Spouse age	-0.15	-4.40	-0.74	-3.37	-3.54	-5.90	-4.25	-2.63	-2.36
Spouse education	-3.36	-3.62	-1.50	-0.23	-2.99	-4.15	-0.26	1.27	-1.16
Spouse race-Hispanic	2.97	2.80	0.55	0.60	0.56	1.24	-0.17	0.05	0.68
Region/MSA	-6.09	0.20	-10.75	-1.44	-4.78	-0.91	6.28	9.31	3.87
							0.00	0.00	0.00
Total Actual Hours Change	283.37	110.21	283.37	110.21	283.37	110.21	-173.16	-173.16	-173.16
Total Explained Change	105.63	116.39	107.98	120.25	99.10	97.00	10.76	12.27	-2.09
Total Unexplained Change	177.74	-6.18	175.39	-10.04	184.27	13.20	-183.92	-185.43	-171.07

Based on IV models in Table 3. Total Actual Hours Change is the change in the predicted hours where for each year, predicted hours are computed using that year's equation and that year's mean values for the explanatory variables.

Table 6: Selected Instrumental Variables Results for Married Women, Education Groups and Mothers of Children Under 6 Years Old

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
A. Regression Results for Education Groups												
Grade 11 or less												
Own log wage	650.443**	619.654**	663.856**	633.607**	658.142**	641.992**	658.676**	646.958**	-93.634	-111.195*	-107.726*	-116.228*
	(29.954)	(29.564)	(30.075)	(29.676)	(34.512)	(34.036)	(34.656)	(34.173)	(52.186)	(51.378)	(52.479)	(51.667)
Spouse log wage	-124.243**	-147.363**	-172.375**	-194.586**	-119.365**	-129.217**	-132.855**	-143.984**	-22.636	-8.193	-27.086	-18.559
	(23.517)	(23.188)	(22.767)	(22.438)	(28.641)	(28.241)	(27.159)	(26.782)	(40.603)	(39.901)	(37.200)	(36.595)
Non-wage income (/1000)	-1.613	-2.181	-1.276	-1.842	0.728	0.834	0.783	0.888	3.130	1.838	2.726	1.693
	(1.987)	(1.956)	(1.990)	(1.959)	(2.516)	(2.478)	(2.529)	(2.492)	(5.058)	(4.975)	(5.064)	(4.982)
Grade 12												
Own log wage	869.154**	794.876**	871.453**	796.919**	842.207**	785.244**	846.782**	788.579**	502.599**	478.189**	540.098**	513.786**
	(16.656)	(16.181)	(16.707)	(16.230)	(14.968)	(14.621)	(14.995)	(14.645)	(21.386)	(21.076)	(21.332)	(21.025)
Spouse log wage	-376.417**	-353.920**	-394.058**	-372.429**	-311.744**	-291.533**	-316.237**	-296.136**	-123.513**	-102.598**	-200.101**	-176.487**
	(16.582)	(15.974)	(16.182)	(15.590)	(16.052)	(15.562)	(15.094)	(14.632)	(22.007)	(21.631)	(20.331)	(19.980)
Non-wage income (/1000)	-2.841**	-3.186**	-2.669**	-3.034**	-3.244**	-3.501**	-2.825**	-3.174**	-1.963	-1.948	-0.577	-0.664
	(0.819)	(0.788)	(0.820)	(0.789)	(0.928)	(0.899)	(0.929)	(0.899)	(1.040)	(1.020)	(1.037)	(1.018)
Some college												
Own log wage	690.452**	617.725**	695.546**	622.653**	802.934**	730.496**	804.494**	732.026**	631.842**	598.689**	660.394**	625.823**
	(25.227)	(23.964)	(25.213)	(23.954)	(19.111)	(18.442)	(19.069)	(18.417)	(19.544)	(19.022)	(19.442)	(18.942)
Spouse log wage	-402.177**	-369.683**	-403.678**	-374.007**	-363.004**	-329.249**	-372.365**	-338.027**	-269.079**	-233.302**	-335.877**	-297.920**
	(26.433)	(24.929)	(25.844)	(24.369)	(23.063)	(21.992)	(21.631)	(20.626)	(21.777)	(21.147)	(20.167)	(19.567)
Non-wage income (/1000)	-6.095**	-6.378**	-5.850**	-6.156**	-1.735	-1.914*	-1.086	-1.434	-3.400**	-3.019**	-2.055**	-1.841**
	(0.996)	(0.938)	(0.995)	(0.937)	(0.917)	(0.872)	(0.914)	(0.870)	(0.707)	(0.684)	(0.702)	(0.680)
College Graduates												
Own log wage	763.226**	640.227**	763.851**	640.914**	719.445**	646.703**	722.242**	649.974**	412.023**	394.587**	432.663**	411.517**
	(24.112)	(22.584)	(24.097)	(22.575)	(18.554)	(17.641)	(18.524)	(17.609)	(19.335)	(18.506)	(19.234)	(18.424)
Spouse log wage	-515.945**	-445.115**	-512.136**	-444.260**	-396.393**	-350.462**	-406.458**	-360.916**	-374.618**	-337.869**	-401.881**	-362.097**
	(25.887)	(23.956)	(25.540)	(23.629)	(21.156)	(19.910)	(20.289)	(19.082)	(21.213)	(20.258)	(19.945)	(19.037)
Non-wage income (/1000)	-3.724**	-4.090**	-3.574**	-3.974**	-3.485**	-3.767**	-3.216**	-3.518**	-1.938**	-1.436**	-1.384*	-0.988
	(0.720)	(0.664)	(0.720)	(0.664)	(0.610)	(0.573)	(0.608)	(0.571)	(0.552)	(0.525)	(0.549)	(0.523)
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own/spouse education[a]	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Table 6: Selected Instrumental Variables Results for Married Women, Education Groups and Mothers of Children Under 6 Years Old (cont'd)

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Elasiticities for Education Groups												
Grade 11 or less												
Own log wage	0.850	0.810	0.868	0.828	0.746	0.728	0.747	0.734	-0.102	-0.121	-0.118	-0.127
Spouse log wage	-0.162	-0.193	-0.225	-0.254	-0.135	-0.147	-0.151	-0.163	-0.025	-0.009	-0.030	-0.020
Non-wage inc (/1000)	-0.001	-0.002	-0.001	-0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Grade 12												
Own log wage	0.899	0.822	0.901	0.824	0.688	0.641	0.691	0.644	0.384	0.365	0.412	0.392
Spouse log wage	-0.389	-0.366	-0.408	-0.385	-0.255	-0.238	-0.258	-0.242	-0.094	-0.078	-0.153	-0.135
Non-wage inc (/1000)	-0.004	-0.004	-0.003	-0.004	-0.004	-0.004	-0.003	-0.004	-0.003	-0.003	-0.001	-0.001
Some college												
Own log wage	0.688	0.615	0.693	0.620	0.612	0.556	0.613	0.558	0.452	0.428	0.472	0.447
Spouse log wage	-0.401	-0.368	-0.402	-0.373	-0.276	-0.251	-0.284	-0.257	-0.192	-0.167	-0.240	-0.213
Non-wage inc (/1000)	-0.011	-0.012	-0.011	-0.012	-0.003	-0.003	-0.002	-0.002	-0.007	-0.006	-0.004	-0.004
College graduates												
Own log wage	0.653	0.548	0.654	0.548	0.500	0.449	0.502	0.452	0.273	0.261	0.287	0.273
Spouse log wage	-0.441	-0.381	-0.438	-0.380	-0.275	-0.244	-0.282	-0.251	-0.248	-0.224	-0.266	-0.240
Non-wage inc (/1000)	-0.010	-0.011	-0.009	-0.010	-0.010	-0.011	-0.009	-0.010	-0.007	-0.005	-0.005	-0.003
B. Regression Results for Mothers with Children Under 6 Years Old												
Own log wage	711.200**	671.235**	701.786**	668.832**	824.778**	773.872**	841.610**	795.816**	577.009**	535.067**	557.624**	523.386**
	(16.443)	(16.479)	(17.842)	(17.591)	(14.737)	(14.852)	(16.415)	(16.259)	(18.019)	(18.100)	(20.164)	(19.960)
Spouse log wage	-379.476**	-384.109**	-384.898**	-380.852**	-337.626**	-340.224**	-314.136**	-311.299**	-426.769**	-418.086**	-381.205**	-370.146**
	(16.876)	(16.531)	(17.929)	(17.541)	(15.841)	(15.529)	(17.017)	(16.677)	(18.412)	(18.111)	(19.802)	(19.453)
Non-wage income (/1000)	-4.386**	-4.271**	-4.086**	-3.951**	-3.874**	-3.929**	-2.765**	-2.858**	-1.560*	-1.259	-1.018	-0.762
	(1.065)	(1.041)	(1.065)	(1.042)	(1.039)	(1.017)	(1.038)	(1.016)	(0.788)	(0.772)	(0.779)	(0.765)
Elasiticities for Mothers with Children Under 6 Years Old												
Own log wage	1.043	0.985	1.029	0.981	0.843	0.791	0.860	0.814	0.535	0.496	0.517	0.485
Spouse log wage	-0.557	-0.563	-0.565	-0.559	-0.345	-0.348	-0.321	-0.318	-0.395	-0.387	-0.353	-0.343
Non-wage inc (/1000)	-0.006	-0.006	-0.006	-0.006	-0.005	-0.006	-0.004	-0.004	-0.004	-0.003	-0.002	-0.002
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own/spouse education[a]	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

[a]Includes spouse education only in the education group models; and both own and spouse education in the regressions for mothers of children under 6.
Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, spouse age and age squared, 3 race and Hispanic origin dummies, 3 race and Hispanic origin dummies for spouse, and two year dummies. Elasticities are evaluated at the mean.

Table 7: Estimation Results for Adjustment Along the Extensive and Intensive Margins

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Employment participation probit estimation												
Own log wage	0.407**	0.391**	0.379**	0.356**	0.336**	0.325**	0.332**	0.317**	0.232**	0.231**	0.218**	0.213**
	(0.006)	(0.006)	(0.007)	(0.007)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Elasticity	***0.610***	***0.586***	***0.568***	***0.534***	***0.438***	***0.424***	***0.433***	***0.413***	***0.297***	***0.296***	***0.279***	***0.273***
Spouse log wage	-0.145**	-0.136**	-0.165**	-0.162**	-0.108**	-0.097**	-0.114**	-0.108**	-0.103**	-0.088**	-0.097**	-0.085**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Elasticity	***-0.217***	***-0.204***	***-0.247***	***-0.243***	***-0.141***	***-0.126***	***-0.149***	***-0.141***	***-0.132***	***-0.113***	***-0.124***	***-0.109***
Non-wage income (/1000)	-0.001**	-0.001**	-0.002**	-0.002**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Instrumental variables estimation of annual hours for those who worked												
Own log wage	405.737**	371.967**	398.102**	366.974**	383.763**	362.480**	373.537**	352.114**	244.296**	240.228**	219.478**	212.542**
	(9.114)	(8.952)	(9.656)	(9.428)	(7.270)	(7.150)	(7.899)	(7.723)	(8.003)	(7.874)	(8.836)	(8.661)
Elasticity	***0.279***	***0.256***	***0.274***	***0.252***	***0.235***	***0.222***	***0.229***	***0.216***	***0.140***	***0.137***	***0.126***	***0.122***
Spouse log wage	-245.504**	-235.635**	-247.459**	-235.840**	-203.948**	-191.226**	-203.100**	-190.628**	-193.124**	-175.293**	-190.633**	-175.340**
	(10.808)	(10.472)	(11.530)	(11.185)	(8.572)	(8.321)	(9.219)	(8.953)	(9.345)	(9.120)	(10.255)	(10.006)
Elasticity	***-0.169***	***-0.162***	***-0.170***	***-0.162***	***-0.125***	***-0.117***	***-0.124***	***-0.117***	***-0.110***	***-0.100***	***-0.109***	***-0.100***
Non-wage income (/1000)	-2.596**	-2.869**	-2.593**	-2.840**	-1.412**	-1.482**	-1.302**	-1.385**	-1.255**	-0.992**	-1.159**	-0.929**
	(0.511)	(0.495)	(0.512)	(0.496)	(0.431)	(0.418)	(0.432)	(0.419)	(0.352)	(0.343)	(0.352)	(0.343)
Instrumental variables estimation of annual hours for those who worked with selection correction												
Own log wage	405.737**	371.967**	398.102**	366.974**	544.002**	518.500**	545.767**	515.591**	214.321**	210.950**	184.946**	173.059**
	(9.114)	(8.952)	(9.656)	(9.428)	(9.393)	(9.194)	(10.113)	(9.835)	(8.784)	(8.638)	(9.729)	(9.508)
Elasticity	***0.279***	***0.256***	***0.274***	***0.252***	***0.333***	***0.317***	***0.334***	***0.316***	***0.123***	***0.121***	***0.106***	***0.099***
Spouse log wage	-245.504**	-235.635**	-247.459**	-235.840**	-211.028**	-189.366**	-202.784**	-184.255**	-166.750**	-134.825**	-163.109**	-139.434**
	(10.808)	(10.472)	(11.530)	(11.185)	(9.631)	(9.320)	(10.303)	(9.959)	(11.288)	(10.804)	(12.077)	(11.607)
Elasticity	***-0.169***	***-0.162***	***-0.170***	***-0.162***	***-0.129***	***-0.116***	***-0.124***	***-0.113***	***-0.095***	***-0.077***	***-0.093***	***-0.080***
Non-wage income (/1000)	-2.596**	-2.869**	-2.593**	-2.840**	-1.880**	-2.140**	-1.622**	-1.938**	-0.551	-0.406	-0.426	-0.326
	(0.511)	(0.495)	(0.512)	(0.496)	(0.542)	(0.529)	(0.545)	(0.531)	(0.407)	(0.394)	(0.407)	(0.394)
Inferred Conditional Hours Effects (based on unconditional hours IV and employment probits)												
Own net log wage	396.223**	316.367**	404.538**	338.450**	334.549**	290.366**	321.460**	278.619**	202.331**	183.437**	163.794**	147.055*
	(20.281)	(19.930)	(22.708)	(22.270)	(13.977)	(13.744)	(16.250)	(15.954)	(17.094)	(16.858)	(19.775)	(18.013)
Elasticity	***0.272***	***0.218***	***0.278***	***0.233***	***0.205***	***0.178***	***0.197***	***0.171***	***0.116***	***0.105***	***0.094***	***0.084***
Spouse log wage	-211.199**	-188.180**	-200.619**	-169.108**	-174.448**	-158.289**	-173.110**	-154.523**	-164.815**	-140.508**	-166.440**	-144.818**
	(18.838)	(18.305)	(21.074)	(20.530)	(14.495)	(14.124)	(16.572)	(16.192)	(17.482)	(17.186)	(18.487)	(18.144)
Elasticity	***-0.145***	***-0.129***	***-0.138***	***-0.116***	***-0.107***	***-0.097***	***-0.106***	***-0.095***	***-0.094***	***-0.080***	***-0.095***	***-0.083***
Non-wage income (/1000)	-3.435**	-3.574**	-1.350	-1.558*	-1.966**	-1.847**	-1.509**	-1.540**	-0.459	0.220	0.033	-1.658**
	(0.695)	(0.663)	(0.695)	(0.663)	(0.572)	(0.548)	(0.570)	(0.547)	(0.514)	(0.497)	(0.510)	(0.495)
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own and spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Notes: Elasticities are computed at the mean. See Table 3 for additional details.

Table 8: Estimation Results for Net of Taxes Variables

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
A. Selected Regression Results												
Instrumental variables estimation with combined non-wage income (before taxes)												
Own log wage	828.205**	754.019**	800.750**	724.393**	773.279**	724.687**	767.479**	711.425**	528.422**	518.655**	488.085**	469.379**
	(10.059)	(9.755)	(11.015)	(10.615)	(8.289)	(8.069)	(9.351)	(9.047)	(9.655)	(9.428)	(11.195)	(10.890)
Other family income[a]	-4.634**	-4.299**	-4.555**	-4.281**	-3.917**	-3.564**	-3.668**	-3.403**	-3.526**	-3.042**	-3.195**	-2.800**
	(0.127)	(0.121)	(0.132)	(0.127)	(0.107)	(0.102)	(0.111)	(0.107)	(0.103)	(0.100)	(0.107)	(0.104)
Instrumental variables estimation with net-of-tax variables												
Own net log wage	837.837**	782.957**	783.988**	737.141**	748.158**	701.899**	728.234**	678.375**	512.947**	503.271**	471.130**	454.538**
	(10.529)	(10.129)	(11.419)	(10.937)	(8.260)	(8.035)	(9.297)	(8.987)	(9.389)	(9.164)	(10.802)	(10.501)
Other family income[a]	-3.242**	-2.689**	-3.899**	-3.270**	-5.283**	-4.651**	-5.117**	-4.560**	-4.335**	-3.669**	-4.005**	-3.434**
	(0.201)	(0.192)	(0.221)	(0.211)	(0.124)	(0.119)	(0.130)	(0.125)	(0.120)	(0.117)	(0.125)	(0.122)
B. Elasticities												
All married women												
Before taxes												
Own log wage	0.854	0.778	0.826	0.747	0.617	0.578	0.612	0.568	0.388	0.380	0.358	0.344
Other family income[a]	-0.190	-0.176	-0.187	-0.176	-0.145	-0.132	-0.136	-0.126	-0.138	-0.119	-0.125	-0.110
Net-of-tax variables												
Own log wage	0.864	0.807	0.808	0.760	0.597	0.560	0.581	0.541	0.376	0.369	0.346	0.333
Other family income[a]	-0.106	-0.088	-0.127	-0.107	-0.162	-0.143	-0.157	-0.140	-0.140	-0.118	-0.129	-0.111
Education Groups (net-of tax variables)												
Grade 11 or less												
Own log wage	0.789	0.794	0.802	0.809	0.642	0.644	0.640	0.646	-0.156	-0.140	-0.171	-0.147
Other family income[a]	0.028	0.012	0.041	0.028	-0.030	-0.035	-0.032	-0.034	0.007	0.011	0.003	0.009
Grade 12												
Own log wage	0.909	0.857	0.911	0.860	0.647	0.605	0.651	0.608	0.371	0.357	0.387	0.372
Other family income[a]	-0.109	-0.097	-0.101	-0.089	-0.151	-0.137	-0.140	-0.128	-0.092	-0.082	-0.075	-0.066
Some college												
Own log wage	0.672	0.627	0.676	0.631	0.564	0.513	0.567	0.516	0.432	0.412	0.447	0.426
Other family income[a]	-0.219	-0.195	-0.197	-0.175	-0.185	-0.162	-0.164	-0.146	-0.165	-0.147	-0.138	-0.124
College graduates												
Own log wage	0.655	0.569	0.656	0.570	0.459	0.414	0.461	0.416	0.246	0.236	0.259	0.247
Other family income[a]	-0.200	-0.167	-0.190	-0.159	-0.206	-0.186	-0.196	-0.176	-0.188	-0.160	-0.169	-0.144
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own and spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

[a]Includes husbands' income and asset income; divided by 1000.

Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, spouse age and age squared, 3 race and Hispanic origin dummies, 3 race and Hispanic origin dummies for spouse, and two year dummies. Elasticities are calculated at the mean.

Table 9: Selected Results for Women with Marriage Selection Corrections

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Instrumental variables estimation including cohabitants												
Own log wage	838.605**	757.957**	794.313**	714.781**	705.988**	633.292**	664.324**	585.222**	554.995**	532.712**	501.902**	473.638**
	(10.207)	(9.892)	(11.085)	(10.675)	(8.121)	(7.955)	(8.622)	(8.409)	(9.498)	(9.251)	(10.564)	(10.260)
Spouse log wage	-350.495**	-317.153**	-378.230**	-347.141**	-297.314**	-280.655**	-329.794**	-321.922**	-272.111**	-226.486**	-266.693**	-229.095**
	(10.082)	(9.635)	(10.833)	(10.358)	(8.834)	(8.495)	(9.292)	(8.931)	(9.903)	(9.608)	(10.835)	(10.505)
Non-wage income (/1000)	-1.911**	-1.934**	-1.985**	-2.022**	-1.456**	-1.273**	-1.524**	-1.452**	-1.200**	-0.833**	-0.999**	-0.687**
	(0.230)	(0.220)	(0.230)	(0.220)	(0.248)	(0.239)	(0.248)	(0.238)	(0.215)	(0.208)	(0.214)	(0.207)
Removing some married women from earlier samples (specification 1)												
Own log wage	853.356**	770.771**	825.338**	739.142**	816.425**	764.063**	807.673**	747.835**	562.650**	541.076**	505.688**	476.234**
	(10.579)	(10.236)	(11.466)	(11.024)	(8.658)	(8.426)	(9.658)	(9.346)	(9.701)	(9.468)	(11.016)	(10.719)
Spouse log wage	-364.106**	-332.468**	-382.958**	-354.550**	-319.046**	-287.304**	-320.736**	-295.582**	-290.564**	-247.619**	-281.520**	-246.377**
	(10.417)	(9.931)	(11.151)	(10.632)	(9.064)	(8.701)	(9.826)	(9.430)	(10.065)	(9.777)	(11.087)	(10.761)
Non-wage income (/1000)	-4.092**	-4.187**	-4.151**	-4.308**	-3.311**	-3.183**	-2.933**	-2.926**	-2.137**	-1.570**	-1.788**	-1.333**
	(0.498)	(0.474)	(0.498)	(0.475)	(0.440)	(0.422)	(0.440)	(0.422)	(0.400)	(0.387)	(0.398)	(0.386)
Removing some married women from earlier samples (specification 2) [a]												
Own log wage	796.126**		805.747**		744.320**		778.083**		479.272**		461.974**	
	(10.540)		(11.589)		(8.487)		(9.736)		(9.290)		(11.044)	
Adding unmarried people to later samples [a]												
Own log wage	809.509**		814.692**		741.305**		764.024**		488.770**		449.705**	
	(9.996)		(11.050)		(7.992)		(9.147)		(8.666)		(10.284)	
Using all women in all periods [a]												
Own log wage	864.811**		822.736**		768.842**		729.859**		462.444**		375.076**	
	(7.933)		(8.824)		(6.409)		(7.369)		(6.978)		(8.259)	
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own/spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

[a] Specification excludes spouses' characteristics.

Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, 3 race and Hispanic origin dummies, and, where applicable, spouse age and age squared, 3 race and Hispanic origin dummies for spouse, and two year dummies.

Table 10: Results Using Grouped Data

	(1989-1991) - (1979-1981)				(1999-2001) - (1989-1991)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Own log wage	431.025**	473.313**	755.539**	870.093**	244.537	196.983	425.426	323.228
	(162.505)	(175.483)	(211.072)	(270.588)	(194.843)	(198.718)	(228.253)	(228.660)
Spouse log wage	-404.863*	-474.681**	-552.672*	-632.424**	-217.742	-179.184	-281.981	-243.659
	(165.764)	(172.145)	(213.048)	(233.096)	(195.354)	(200.777)	(253.700)	(249.889)
Non-wage income ($1000s)	17.003	20.020*	14.526	17.046	-23.087*	-16.289	-20.932	-7.061
	(9.464)	(9.892)	(8.970)	(9.482)	(10.698)	(12.698)	(11.019)	(12.719)
Aged 35-44		12.216		4.311		1.115		13.515
		(22.718)		(22.263)		(30.110)		(29.762)
Aged 45-54		-13.928		-17.646		24.384		44.876
		(32.910)		(32.721)		(39.541)		(38.466)
Grade 12			66.596	53.117			18.483	56.403
			(36.252)	(39.174)			(45.781)	(47.008)
Some college			95.565*	75.853			37.282	77.963
			(44.645)	(50.036)			(49.503)	(50.833)
College graduate			2.171	-24.029			67.466	113.416*
			(57.242)	(68.188)			(49.631)	(51.748)
Spouse aged 35-44		-34.088		-32.637		18.429		25.499
		(23.856)		(23.169)		(29.580)		(28.441)
Spouse aged 45-54		-4.213		-4.256		21.203		45.066
		(36.170)		(35.857)		(40.190)		(39.000)
Spouse Grade 12			12.532	0.765			84.369	130.471**
			(30.255)	(34.051)			(42.960)	(45.527)
Spouse Some college			64.772	57.935			59.032	116.857*
			(33.566)	(37.046)			(52.512)	(56.506)
Spouse College graduate			33.906	28.019			14.792	64.768
			(41.124)	(48.774)			(59.610)	(63.114)
Constant	192.995**	195.204**	63.266	92.189	21.773	-0.640	-99.314	-238.939**
	(35.917)	(41.047)	(66.285)	(86.291)	(30.056)	(35.298)	(73.709)	(90.092)
Observations	129	129	129	129	129	129	129	129
R-squared	0.48	0.50	0.57	0.59	0.20	0.22	0.28	0.34
Elasticities								
Own log wage	0.445	0.488	0.779	0.898	0.195	0.157	0.340	0.258
Spouse log wage	-0.417	-0.489	-0.570	-0.652	-0.174	-0.143	-0.225	-0.194
Non-wage income	0.027	0.032	0.023	0.027	-0.039	-0.028	-0.036	-0.012

Notes: Standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. Additional controls for all models include averages of 8 regional dummies, a metropolitan area dummy, 3 race and Hispanic origin dummies, 3 spouse's race and Hispanic origin dummies and 2 year dummies. All models are estimated in first differences. Elasticities are computed at the beginning period means.

Table A1: Selected Means for Married Women for Education Groups and Mothers with Children Under 6 Years Old

Group	1980	1990	2000	Changes 1980-1990	Changes 1990-2000
A. Work Hours (including those with zeros)					
Women's Education Group					
Less Than High School	765.23	881.83	915.56	116.60	33.74
High School Degree	966.87	1224.90	1309.61	258.02	84.71
Some College	1004.01	1312.90	1398.55	308.89	85.65
College Degree	1168.84	1439.02	1509.87	270.18	70.84
Mothers With Children < 6	681.73	978.10	1079.27	296.37	101.16
B. Own Log Wages (including imputations)					
Women's Education Group					
Less Than High School	1.98	1.94	2.03	-0.04	0.08
High School Degree	2.14	2.18	2.30	0.04	0.12
Some College	2.29	2.37	2.48	0.08	0.11
College Degree	2.48	2.68	2.87	0.20	0.19
Mothers With Children < 6	2.19	2.29	2.51	0.11	0.21
C. Spouse Log Wages (including imputations)					
Women's Education Group					
Less Than High School	2.59	2.43	2.42	-0.17	0.00
High School Degree	2.85	2.76	2.78	-0.09	0.02
Some College	2.92	2.89	2.91	-0.03	0.01
College Degree	2.98	3.04	3.15	0.06	0.11
Mothers With Children < 6	2.79	2.77	2.87	-0.02	0.10

Table A2: Additional Specifications for Annual Unconditional Work Hours, Married Women, Microdata

	1979-1981				1989-1991				1999-2001			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Ordinary least squares estimation												
Own log wage	682.932**	616.330**	629.697**	565.259**	719.824**	671.410**	689.001**	636.887**	497.359**	481.580**	440.604**	419.727**
	(9.393)	(9.091)	(10.064)	(9.690)	(8.106)	(7.880)	(8.913)	(8.619)	(9.312)	(9.077)	(10.319)	(10.031)
Spouse log wage	-293.937**	-270.639**	-323.740**	-301.921**	-270.971**	-244.252**	-285.305**	-263.694**	-266.307**	-226.749**	-263.547**	-231.041**
	(9.212)	(8.812)	(9.776)	(9.356)	(8.389)	(8.056)	(8.992)	(8.636)	(9.534)	(9.254)	(10.305)	(9.997)
Non-wage income (/1000)	-3.530**	-3.647**	-3.858**	-3.996**	-3.033**	-2.942**	-2.827**	-2.846**	-2.050**	-1.482**	-1.721**	-1.267**
	(0.458)	(0.438)	(0.458)	(0.438)	(0.437)	(0.419)	(0.436)	(0.419)	(0.399)	(0.387)	(0.397)	(0.385)
Heckman selection correction for wage												
Fitted values, own log wage	910.788**	959.942**			781.572**	767.668**			633.344**	646.249**		
	(25.094)	(28.504)			(19.899)	(20.019)			(20.073)	(20.011)		
Spouse log wage	-298.812**	-273.455**			-244.991**	-222.028**			-237.275**	-202.860**		
	(9.683)	(9.167)			(9.150)	(8.717)			(10.013)	(9.667)		
Non-wage income (/1000)	-4.390**	-4.736**			-2.140**	-2.438**			-0.648	-0.162		
	(0.873)	(0.826)			(0.657)	(0.626)			(0.528)	(0.509)		
Tobit estimation												
Own log wage	904.797**	805.948**	816.352**	722.572**	876.910**	815.701**	829.759**	764.302**	603.031**	584.346**	524.030**	498.963**
	(13.127)	(12.595)	(13.954)	(13.318)	(10.213)	(9.887)	(11.158)	(10.745)	(11.609)	(11.292)	(12.788)	(12.400)
Spouse log wage	-413.228**	-376.236**	-472.386**	-436.426**	-338.922**	-303.811**	-365.626**	-336.560**	-320.254**	-271.914**	-324.030**	-284.753**
	(13.400)	(12.772)	(14.213)	(13.549)	(10.778)	(10.334)	(11.539)	(11.061)	(12.132)	(11.763)	(13.101)	(12.695)
Non-wage income (/1000)	-4.951**	-5.137**	-5.622**	-5.822**	-4.036**	-3.875**	-3.841**	-3.820**	-2.516**	-1.823**	-2.110**	-1.556**
	(0.683)	(0.651)	(0.684)	(0.651)	(0.571)	(0.545)	(0.570)	(0.545)	(0.508)	(0.491)	(0.504)	(0.488)
Instrumental variables estimation with separate non-wage variables												
Own log wage	856.124**	779.853**	820.767**	743.471**	805.906**	753.937**	789.017**	731.607**	563.184**	546.737**	508.676**	486.916**
	(10.184)	(9.875)	(11.034)	(10.637)	(8.485)	(8.257)	(9.392)	(9.089)	(10.075)	(9.829)	(11.312)	(11.003)
Spouse log wage	-351.053**	-322.731**	-373.273**	-348.047**	-309.495**	-279.197**	-318.552**	-294.524**	-307.917**	-262.933**	-298.874**	-261.194**
	(10.116)	(9.677)	(10.866)	(10.400)	(8.974)	(8.620)	(9.715)	(9.331)	(10.468)	(10.166)	(11.470)	(11.131)
Own non-wage income	-2.749*	-2.419*	-2.890**	-2.618*	-4.336**	-3.918**	-3.893**	-3.637**	-0.721	-0.448	-0.389	-0.207
(/1000)	(1.079)	(1.032)	(1.076)	(1.029)	(0.000)	(1.016)	(1.055)	(1.012)	(0.979)	(0.947)	(0.971)	(0.940)
Spouse non-wage income	-5.121**	-5.442**	-5.136**	-5.498**	-3.027**	-3.118**	-2.678**	-2.863**	-3.283**	-2.504**	-2.819**	-2.148**
(/1000)	(0.826)	(0.789)	(0.823)	(0.787)	(0.851)	(0.817)	(0.847)	(0.813)	(0.746)	(0.722)	(0.740)	(0.716)
Children controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Own and spouse education	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Notes: Asymptotic standard errors in parentheses. * and ** denote significance at 5% and 1%, respectively, two tailed tests. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, spouse age and age squared, 3 race and Hispanic origin dummies, 3 race and Hispanic origin dummies for spouse, and two year dummies.