CHANGES IN THE LABOR SUPPLY BEHAVIOR OF MARRIED WOMEN: 1980-2000

Francine D. Blau

Cornell University, NBER, IZA and CESifo

and

Lawrence M. Kahn

Cornell University, IZA and CESifo

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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: 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 age groups, education groups, race groups, and mothers of small children are analyzed separately.

Francine D. Blau
School of Industrial and
Labor Relations
Cornell University
350 Ives Hall East
Ithaca, NY 14853-3901
and NBER, IZA, CESifo
fdb4@cornell.edu

Lawrence M. Kahn
School of Industrial and
Labor Relations
Cornell University
362 Ives Hall East
Ithaca, NY 14853-3901
and IZA, CESifo
lmk12@cornell.edu

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 2000, women's labor force participation rate had roughly doubled to 60%, while men's had fallen moderately to 74.8%.[1] 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 73.3% in 2000. Moreover, during the post-1970 period, women's representation in high-paying professions and managerial jobs also greatly increased. 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 2000, a much slower rate of increase than in previous decades. Over the same period, the female/male ratio of annual earnings for full-time, full-year workers barely increased from 71.6% to 73.3%.

Since women's labor supply is positively affected by their own wages and negatively affected by men's wages, the concurrent slowdowns in both women's relative wage and employment increases in the 1990s suggest the possibility that the latter is a labor supply response. 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 family context in which work and consumption decisions are made (Blundell and MaCurdy 1999). Moreover, changes in the labor supply behavior of married women have driven the changes in labor supply for women overall. Chiefly

[1] Data in this paragraph are from published government sources summarized in Blau, Ferber and Winkler (2006).

we focus on annual hours including the nonemployed, but also investigate participation (i.e., positive work hours) and hours conditional on employment.

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. 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 the 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 supply shifts 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, a significant new development. In addition, continuing a long-term trend, married women's labor supply also became substantially less responsive to their husbands' wages, particularly over the 1980s. 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. These reductions occurred at both the extensive and intensive margins; however, the decrease in 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 were very small and did not show a strong pattern over time, and husbands showed little labor supply responsiveness with respect to their spouses' wages. Thus, married women's own and cross wage labor supply elasticities were becoming more like married men's. Such a development is likely to be due at least in part to the fact that, with rising participation rates, fewer and fewer married women are on the margin between participating and not participating in the labor force. Moreover, increasing divorce rates and increasing career orientation of married 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 and estimation methods. An innovative feature of one of these alternatives is to control for the selection into marriage, an important exercise since the incidence of marriage has been falling steadily. This raises the possibility that the sample of married women has become more "marriage-prone" over time relative to the whole population of women, and this compositional shift could influence measured labor supply elasticities among married women. However, our results hold up even when we account for this compositional factor.

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 quantity of labor supplied 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. In addition, the potential for increases in demand in the female labor market to raise the quantity of women's labor supply is also much smaller than previously; rather, any increases in demand for women will cause larger increases in women's relative wages than previously.

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.[2] 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, their labor supply is 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 more equally share home and market responsibilities, we expect women's labor supply elasticities to approach men's over time.

A similar conclusion is reached by Goldin (1990). She reports that around 1900, when relatively few attractive labor market options were available to women and there was

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[2] Similarly, 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.

considerable stigma against wives working, 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. However, as women's education levels rose and their job opportunities became more varied, the stigma against married women working diminished. As a consequence, their own wage elasticity increased substantially while their responsiveness to other family income (primarily husband's income) decreased. Goldin further reasons that, as divorce rates have risen since 1960, and women's jobs have increasingly become careers as opposed to merely a means to earn income, not only should the effect of husbands' income continue to decline in magnitude, but the substitution effect of own wages on married women's labor supply should begin to fall as well. Studies reported in Goldin (1990), spanning data from 1900 through 1970 (pp. 132-33), present clear evidence of a declining responsiveness to husband's income over this period. Some data reviewed by Goldin suggested declining own wage elasticities of married women after 1950. 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. 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.[3]

[3] 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 2006, pp. 90-91). 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 2006, pp. 293, 296). 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 early 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 examines 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. However, Juhn and Murphy 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. If husbands' wages were playing a large role, then the labor supply of women married to low wage men should have increased the fastest. Juhn and Murphy (1997) conclude that changes in married women's own wage opportunities help explain the pattern of labor supply increases—women whose wages grew fastest also had the fastest increases in labor supply. However, 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 husbands' 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) $$H = a_0 + a_1 \ln W + a_2 I + B'X + u_a \quad \text{or}$$

$$\text{(1b)} \qquad H = b_0 + b_1 \ln W + b_2 \ln W_s + b_3 A + C'X + u_b,$$

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. 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). The model with husband's wages entered separately can also be interpreted in light of family bargaining models. In contrast to unitary family models in which it is assumed that all income is pooled, such models predict that individual labor supply and consumption behavior of husbands and wives is differentially influenced by their own sources of income (Lundberg and Pollak 1994; McElroy and Horney 1981; Manser and Brown 1980).[4]

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, our sample focuses on married women, the most interesting group to study in a family context and the group whose behavior has driven the aggregate trends. During the period of our study, the share of women who were married spouse present 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

[4] A family bargaining approach also suggests disaggregating non-labor income A according to ownership, and we estimate some models with this specification as well.

“marriage-prone” relative to the total population of women, on average. If unobserved marriage-proneness is correlated with the motivation to work in the market, then comparisons across years may reflect selection in addition to actual behavioral changes. Below, we implement some adjustments for this possibility.

Second, we do not observe wage offers for those without jobs. 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 (less than 20) weeks worked, 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). In addition, unlike much work on female labor supply, in some models we explicitly account for taxes (including income and payroll taxes, as well as the earned income tax credit), using a design developed by Eissa and Hoynes (2004).

Third, 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. Fourth, 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. On the other hand, as described below, the grouped data approach places more restrictions on the labor supply parameters than the traditional use of individual data does. In addition to Angrist (1991), several analysts have used grouped data to study labor supply, including Blundell, Duncan and Meghir (1998), Pencavel (1998), and Devereux (2004), and we present some results using such methods here.

Fifth, equations (1a) and (1b) impose a linear functional form; that is, they treat the decision to increase one's work hours from, say, 0 to 100 similarly to an increase from 1500 to 1600. We thus test the robustness of our findings by separately examining participation (i.e., positive work hours) and conditional hours (i.e., work hours given participation). An additional functional form issue concerns the possible truncation of work hours for many workers at a conventional full–time, full-year level, possibly limiting the responsiveness of such workers to wage increases. We address this possibility by estimating median regressions, where the estimates are not sensitive to behavior at the tails of the distribution of work hours.

IV. Data and Descriptive Patterns

As noted, we use March CPS data to analyze labor supply. To increase sample size and minimize the effect of the selection of endpoints, we use three sets of three years each: 1979-81 ("1980"), 1989-91 ("1990"), and 1999-2001 ("2000").[5] We restrict our regression analyses to

[5] We include two year dummy variables in each regression. 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.

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.[6] 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 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.[7] 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 (see http://www.bea.gov). 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). Appendix Table A1 compares own and spouse education and age, as well as number of children, across the

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6 Labor supply results for married women age 25-54 with no restrictions on their spouse's age were virtually identical to the labor supply results for those married to men age 25-54.

7 Work hours and wages refer to the previous year, so we are in effect studying the years 1978-80, 1988-90, and 1998-2000. Each of these periods is centered near a business cycle peak, although there were mild downturns in 1980 and 1990 but continued expansion in 2000 (see, for example, the Bureau of Labor Statistics unemployment statistics, at http://www.bls.gov, accessed March 15, 2006). If anything, this difference should have raised women's hours in the last period, but in fact we see a slowdown in the growth of their hours which is perhaps understated due to this factor. To some degree, our control for year mitigates these differences in economic conditions, at least within each of the periods.

samples of nonworkers and those working less than 20 weeks. It shows that the two samples are reasonably similar with respect to these outcomes, suggesting that those with short work weeks may be an appropriate base from which to estimate the wages of nonworkers. Nonwage income is defined as income from assets, including interest, dividend and rental income.

Appendix Tables A2 and A3 provide some descriptive information on the CPS samples. Looking first at the labor supply trends in Table A2, 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 hours), 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 284 (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 faster in the 1980s than in the 1990s both at the extensive and (to a lesser extent) intensive margins. For nonmarried women, this pattern is not observed 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.

The same temporal pattern prevails among married mothers of children under 6 years old, as well as when we consider age groups separately.

Table A2 also indicates that men's labor supply was fairly 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.[8] Table A2 also shows a decline in the incidence of marriage for women, from 73% in 1980 to 67% in 1990, with a smaller further decline to 64% by 2000. Not 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 A3 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 (2006) 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.

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[8] 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.

Table A3 also 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, may not have a large impact if school age children tend to have modest effects on female labor supply (compared to younger children).

V. Empirical Procedures and Regression Results

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 specifications with (Models 3 and 4) and without (Models 1 and 2) controlling for own or spouse education.[9] There are several reasons one might wish to control for schooling. First, it may be an indicator of work orientation. In addition, it may be correlated with nonwage compensation, allowing us to place a

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[9] 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.

sharper interpretation on the wage variable. And, education may be an indicator of permanent income or wealth. If so, then Blundell and MaCurdy's (1999) discussion implies that the wage coefficient controlling for education may be an estimate of the intertemporal labor elasticity. On the other hand, with education excluded from the basic labor supply equation, the wage variable would refer to a change in wages that also raises lifetime wealth. Thus, we also estimate the models with education excluded. In addition to controlling for education in some models, we also estimate the models separately by education group, since responses to wages may differ across this dimension.

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 A3). 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 depend 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 (for both own and spouse 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.

Table 1 contains basic IV results for wives' 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.) 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. As indicated by our discussion of previous empirical findings, this is an important recent development. In addition, we find that the long-term trend towards declines in the magnitude of spouse's wage elasticities continued in this period, 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 (1990) 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 1 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 substantially over the 1990s to 487 to 563 in 2000.[10] Own wage elasticities evaluated at the mean of hours in each period fell steadily from

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[10] 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.

.77 to .88 in 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. 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.

One possible reason why the responsiveness of women's labor supply to their own wages declined is a statistically based one: it is possible that, as female labor supply increased, a growing share of women reached the point where it was virtually impossible for them to increase their work hours further, given that the distribution of work hours may effectively be truncated at the full time-full year level. We investigated this possibility by estimating women's labor supply functions using median regression, since hours at the median are not affected by truncation at the top: median work hours for women were 800 in 1980, 1560 in 1990, and 1785 in 2000, supporting this idea. As the bottom panel of Table 1 shows, labor supply elasticities and cross elasticities fell dramatically in magnitude at the median.[11] Further, the decline in female labor supply elasticities across the skill distribution reported below (including high school dropouts) also seems inconsistent with a simple hypothesis that our results are due to women moving to an inelastic portion of a constant labor supply function.

The own wage coefficient for women's labor supply is qualitatively similar across specifications in Table 1, 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 consistent with the idea that the education

[11] Note, we have not corrected the standard errors in the final stage median regressions for the fact that they use estimated regressors (i.e., imputed wages), since we are primarily interested in the magnitude of the labor supply parameters rather than significance tests.

variables are positively correlated with unmeasured aspects of compensation or tastes for work, but not with the version of life-cycle model in which education is a proxy for the marginal utility of wealth. 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 decline, though slight, 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. Also of interest, the coefficients on the children variables decline moderately in magnitude 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]

The second set of major results for women's labor supply shown in Table 1 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 husbands' wages falls in absolute value more dramatically than the raw hours effect, with

[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.

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 1 are always below 0.01 in absolute value.

Turning now to a consideration of the labor supply results for husbands, the findings (available in our longer paper, Blau and Kahn 2005) 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 and significance level depending on the specification. And the impact of other income has the wrong sign (i.e., it is positive and significant) 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 in magnitude. Thus, women's labor supply responses did indeed much more closely resemble men's by 2000.[13]

B. Pervasiveness of the Reduction in Female Labor Supply Elasticities

[13] 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, estimates presented below which take into account the effect of the EITC (as well as other taxes) continue to show declining labor supply elasticities.

Table 1 presents evidence of striking decreases in the labor supply responsiveness of married women. While these results may accurately reflect changes in average behavior, it is possible that the findings are driven by shifts in the composition of the female labor force that are not adequately controlled for in our basic analysis. For this reason, and because it is in any case of interest to know how far reaching these trends are, in this subsection we consider separate analyses of labor supply behavior by subgroup.. We find that the decline in wage responsiveness was pervasive and dramatic across a variety of dimensions, including education, race, age, and marital status. It appears that women in general have either become more committed to the idea of working or anticipate spending a larger portion of their lives without spouses, with both phenomena implying reduced own wage labor supply elasticities. The similarity in the decline in elasticities across subgroups suggests that this commitment or expectation cuts across skill levels and even family type. For example, single women in 1980 may have anticipated being married for a longer portion of their lives than single women in 2000.

1. Education Groups

In addition to addressing shifts in the relative size of education groups, models disaggregated by education are of interest because compensation may be better measured within education groups thus yielding a more precise estimate of the supply elasticity. This would be the case if education levels reflect unmeasured differences in wages because 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. The elasticities in Table 2 from estimating our basic labor supply model disaggregated by education group indicate that own and cross wage elasticities fall sharply in magnitude for all of the education groups. The decline for high school dropouts by 2000 is especially precipitous: own wage elasticities are not only extremely small in absolute value but also become negative (sometimes significantly so); elasticities remain negative 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.[14]

2. 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 seen that the pattern of labor supply trends for this group mirrors 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).

As may be seen in Table 2, we find very similar labor supply patterns for this group over the 1980-2000 period to those for married women overall. Specifically, the own wage elasticity for mothers of young children fell steadily between 1980 and 2000 (from .98-1.04 in 1980 to .49-.54 in 2000). And 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

[14] In addition, we investigated the possibility that the 2000 results for the less educated were influenced by the fact that this group has a relatively large share of immigrants (Borjas 2003). Specifically, we re-estimated our models for 2000 using only natives. The results for this sample using either before-tax or after-tax wages on models with all education groups pooled or treated separately were similar to those based on the full sample of all residents. Unfortunately, the CPS for 1979-81 and 1989-91 did not collect nativity data, but the similarity of the 2000 results for natives and for the full sample is reassuring.

to -0.40 in 2000. The slight rise in magnitude of the cross elasticity for mothers of young children between 1990 and 2000 contrasts to the slight fall for married women as a whole. Nonetheless, for both samples, the cross elasticity was much smaller in magnitude in 2000 than 1980. 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.

3. Age Groups

In her Ely Lecture at the American Economic Association meetings, Goldin (2006) suggested that a number of substantial sharp changes in women's labor force behavior and outcomes occurred beginning with the cohort of women born in the 1940s. According to this view, unlike previous cohorts, members of these newer cohorts expected to be in the labor force for the long term, rather than to enter and exit depending on family responsibilities. This reasoning suggests that newer cohorts will have lower own wage and cross elasticities (in absolute value), and a greater commitment to work and careers. To examine these issues, we disaggregated our labor supply functions by age group, as shown in Table 2.

Table 2 indicates that own and cross wage elasticities declined in magnitude both between cohorts and within cohorts. First, reading horizontally for a given age group, one can assess between cohort changes in labor supply behavior. Each age group is replaced ten years later by one with much smaller (in magnitude) own and cross wage elasticities. The largest changes are for the 45-54 year olds, where own wage elasticities fell from 1.03-1.08 in 1980 to .42-.47 in 2000. Interestingly, this is the age group where we have the cleanest "before" and "after" test of Goldin's (2006) conjecture about the 1940s being the key birth cohort: the birth years for the 1980 group span 1925-1936 (a period completely before the 1940s), while the birth years for the 2000 sample span 1945-1956; none of our other age groups completely precedes the key birth years.[15]

Second, reading diagonally in the southeast direction, one can follow the progress of individual birth cohorts. And in almost every case these show considerable within-cohort reductions in the magnitudes of own wage and cross wage elasticities. For example, among those born between 1945 and 1956, and therefore age 25-34 in 1979-81, own wage elasticities fall from .68-.86 in 1980 to .42-.47 in 2000; cross elasticities for this group fall in magnitude from -.35 to -.41 in 1980 to -.15 to -.17 in 2000. These reductions are actually comparable to the changes for the 25-34 year old age group. The other cohorts also typically show declining magnitudes for own and cross wage elasticities.[16]

Our analysis of age groups does indeed show that members of newer cohorts have less responsive labor supply functions over their life than earlier cohorts, as suggested by Goldin's (2006) reasoning. However, within cohorts, there have also been major reductions over time in the degree to which women's labor supply responds to their own and husbands' wages. This pattern suggests that the changing norms and expectations of labor force commitment affected adult women even after most had made their investments in schooling. These within cohort changes and the similar changes that occurred even for lower education groups suggest that by 2000, women were becoming more committed to market work, even if this did not necessarily mean working in a high-level career.

4. Other Subgroups

We also estimated separate labor supply functions for black married women and single women (of all races), two groups with historically high labor force attachment for whom one might expect smaller changes in elasticities compared with white and married women, respectively.

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[15] The 35-44 year olds in 1980 come the closest; however, even their birth years spanned 1935-46. These birth year intervals reflect our pooling of three years of CPS data for each period.

[16] The only exception is the cohort that was 25-34 in 1990. For this group, the cross wage elasticity stays roughly constant between 1990 and 2000, although the own wage elasticity falls sharply.

Married black women and single women had smaller elasticities than married white women and all married women respectively, as expected. However, the elasticities for these groups fell by amounts similar to the declines for whites and married women, respectively, over the period. Specifically, own wage elasticities for single women ranged from .43 to .59 in 1980 (across specifications controlling or not controlling for education and children) but fell to the .15 to .28 range by 2000. And figures for black women ranged from .38 to .53 in 1980, with a fall to the .08 to .18 range by 2000. Own wage elasticities for married white women were similar to the full sample, not surprisingly: .72 to .83 in 1980 and .36 to .41 in 2000.

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

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 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 3 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). 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 3 shows results for our most fully specified model, which includes own education, spouse's education and children. We show results for this model since this specification gives the explanatory variables their best chance of explaining the observed changes in labor supply, although results were very similar for more parsimonious specifications. We show results using the 1980, 1990 and 2000 equations.

Across the three years' equations shown in Table 3, measured factors explain 35 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 109 percent), and can account for a high proportion of the change (88 percent) using the 2000 function. Thus, in an accounting sense, one reason for the labor force growth 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. We also obtained very similar decomposition results separately by education group as well as for mothers of children less than six years old.

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 year's equation, 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 31 percent of the actual hours increase in the 1980s, and 87 to 132 percent, in the 1990s. 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 own wages over the period. The 2000 function thus leaves less room for future wage increases to cause higher female labor supply than under previous labor supply functions. This suggests that demand increases will cause women's wages to rise to a greater extent than in the past.

We should point out that the effect of real wage increases may be overstated here, since they don't account for women's growing experience levels. In other words, wage offers to women of a given level of human capital probably rose more slowly than the increases assumed in Table 3. In our earlier work (Blau and Kahn 2006), we found that women's human capital levels (including actual experience and education) increased similarly relative to men's in both the 1980s and 1990s. Thus, given men's real wage increases in the 1980s and 1990s, the wage increases to women with given human capital levels would have led to decomposition results with a smaller contribution from own wage changes and a larger unexplained portion. But because of the similarity in women's relative human capital changes across the two decades, our conclusion about a larger rightward shift in the 1980s than the 1990s would remain unchanged.

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. Thus, comparing the 1980s to the 1990s, changes in husbands' real wage growth between the two decades explained 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 increased more in the 1990s than the 1980s.

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.

D. Alternative Specifications and Estimation Methods

In order to further investigate the robustness of the findings shown in Table 1, we implemented a variety of alternative specifications and methods of estimating married women's labor supply. Each of these alternatives leads to the same conclusion: married women's own wage 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. Changing Selectivity of Married Couples

As discussed earlier, the declining incidence of marriage may produce selection biases in our sample of married women. We account for this factor in several ways, as shown in Table 4. 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 likely cohabitors. Cohabitors were identified in a consistent fashion across years as pairs of unrelated

[17] The effect of changes in the number and ages of children was larger in the 1990s than the 1980s despite Table A3'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.

adults (aged 15 or over) 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). While imperfect, this procedure undoubtedly permits us to add to the sample many people who are in fact cohabiting. Table 4 shows that the results of this analysis are very similar to those using the traditional definition of marriage, suggesting that changes in the propensity to cohabit do not account for the falling labor supply elasticities of married women.

Second, we remove the least marriage-prone individuals for the years with higher overall marriage incidence, in the spirit of a similar adjustment for selection into employment used by Hunt (2002). 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.[18] As Table 4 indicates, the results for own wages, spouse's wages and non-wage income are very similar to our results in Table 1.[19] 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.

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[18] To illustrate this process, recall from Table A2 that in 2000, 63.6% of women were married, while in 1980, 72.6% were married. From the 1980 sample of married women, our procedure would eliminate the lowest 12.4% (i.e. [(0.726-0.636)/(0.726)]) of individuals with respect to their estimated probability of being married. The actual percentages are very slightly different from those in this example, because in the regression samples, we have excluded married women whose spouses have allocated income variables, while in Table A2, we include the full set of married women. We perform a similar adjustment for 1990.

[19] Note that the coefficients for the 2000 regressions differ very slightly from those in Table 1 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 1 analyses the married sample is used. However for all analyses in Table 4 (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.

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 4 reports three sets of results for this approach. The first provides results for the same specification (i.e., excluding family-related variables) 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 unmarried women to later years' samples (in order of their probability of being married) so that in each year the sample of 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 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 0.55-0.58 in 1990, to 0.26-0.32 in 2000. Overall, Table 4 shows that selection into marriage is not the cause of our estimates of falling labor supply elasticities.

2. 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 re-estimating our models using after tax incomes and wages as the key explanatory variables.

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, similarly 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 the assumption of full-time, full-year employment rather than the woman's actual work hours. This tax rate is exogenous to the woman's actual labor supply choice.

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 18 or younger. 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 18 or younger 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 5. The before tax results for all married women are included because the specification differs from that in our basic results (see Table 1) 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 in magnitude 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 their magnitude declines less over the period. This makes sense since in these estimates husbands' earnings are combined with non-wage income; the elasticities obtained for the latter in Table 1 were considerably smaller in absolute value than for husbands' wages and decreased much less in magnitude over time.

The after tax results 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 were examined separately (results available in Blau and Kahn 2005), the tax-corrected results for the own wage elasticities are very similar to those presented in Table 2, showing sharp declines for all groups. For 2000, we continued 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.[20]

3. Adjustments at the Extensive versus the Intensive Margin

[20] 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 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.

The dependent variable in our basic estimations is unconditional hours, which are of course affected both by decisions to participate in the labor force (extensive margin) and to work more or fewer hours conditional on working (intensive margin). Recognizing that these two types of decisions may be differentially affected by our explanatory variables (Heckman 1993), we present in Table 6 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 1, 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 6 for the determinants of positive hours, give the partial derivatives evaluated at the mean of the explanatory variables as well as the implied elasticities at the mean. Own wage participation elasticities fall sharply: 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. These findings mirror the unconditional hours results.[21]

Conditional hours are analyzed in two ways. First, we simply use the same IV analysis as in Table 1 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 implement a similar procedure to that used in correcting for selection into marriage (see above). We begin by noting that the participation probability rises over time (Table A2). To adjust for sample selection, we reduce the size of the 1990 and 2000 samples so 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

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[21] We obtained similar results to the participation probits when we estimated models of the determinants of the probability that a woman worked full–time, full-year, an alternative participation measure used by Welch (1997).

variables in the IV labor supply models shown in Table 1. 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 to yield samples with the same relative likelihood of participation in each year. Note that this procedure imposes no a priori assumptions about the wage levels of nonparticipants vs. participants.

Table 6 shows that both 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 in magnitude between 1980 and 2000. At the mean conditional hours, the own wage elasticity ranges from .25 to .28 in 1980 and falls to a range of .10 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 elasticity without correcting for selectivity declining to the .22-.24 range. However, as just noted, by 2000, both methods yield the same basic result: own wage elasticities for conditional work hours were much smaller by 2000 than they were in 1980. And spouse wage elasticities fall continually in absolute value from 1980 to 2000 across both methods, as in the participation equations.

These results 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, we find that the participation own wage elasticities are much larger than the conditional hours own wage elasticities (Blundell and MaCurdy 1999). Moreover, our results indicate 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.

4. Omitted Variable Bias: Using Grouped Data

As discussed earlier, using grouped data can eliminate asymptotic biases due to possible correlation of tastes for working with unmeasured productivity, without the exclusion restrictions needed for the IV approach. 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.

OLS estimation of our basic labor supply models using individual data may produce biased estimates of the labor supply elasticity if, within age-education cells, married women with strong tastes for work are also more productive. Taking cell averages, we can eliminate this potential asymptotic bias. However, if there are cross-cell differences in the factors affecting tastes for work and in wage offers, then even using group averages may lead to biased estimates of the labor supply parameters. 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 the labor supply models using first differences of cell means. 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 estimates. We can account for these unobserved changes by estimating the models using first differences and including dummy variables for cell characteristics. These consist of main effects for dummy variables for categories referring to own age, spouse age, own education and spouse education. The use of first differences and inclusion of the group effects allow for age and education cell fixed effects as well as a different trend for age groups and for education groups. Moreover, by including the change in the control variables, we adjust for changes in the race-regional composition of age-education cells.

The potential reduction in omitted variable bias produced by using grouped data is a substantial benefit to using this technique, however, it is 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 the grouped data first difference labor supply equation for the 1980-90 and 1990-2000 periods separately; 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 7 presents the results of two specifications for the grouped averages approach (i.e., with and without controlling for own and spouse age and education dummy variables). 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 7 are weighted by the inverse of the sum of the cell sizes for the two years used to form the first difference.[22] The results are similar to our earlier findings for own wages and spouse wages; although the effects of non-wage income rise in absolute value, they still remain very small in magnitude.[23]

5. Further Specifications

We found very similar results to those reported in Table 1 for a number of additional specifications (see results reported in Blau and Kahn 2005). First, we used a traditional Heckman (1979) selectivity bias correction for predicted wages for those not working. In these

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[22] 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:

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

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.

[23] 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.

models, we excluded education from the labor supply function but included it in the wage offer equations. Second, we used OLS on equations 1(a) and 1(b). Third, we estimated the model using Tobit instead of a linear hours model. And, finally, we disaggregated the nonwage income variable in equation 1(b), as implied by bargaining models, although we obtained no evidence that the effect of own nonwage income differed from that of spouse's nonwage income.

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 the 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 wage 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 as well, 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.

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 labor supply than in the past. In addition, the potential of technological changes that raise the demand for female labor to bring women into the labor market is much smaller than previously; rather, these demand changes would instead raise women's relative wages to a greater degree than before.

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, or if either spouse had allocated annual weeks worked or allocated hours worked per week.

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 (WKSWORK) 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 (ERN-VAL) 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 weeks (using a 20 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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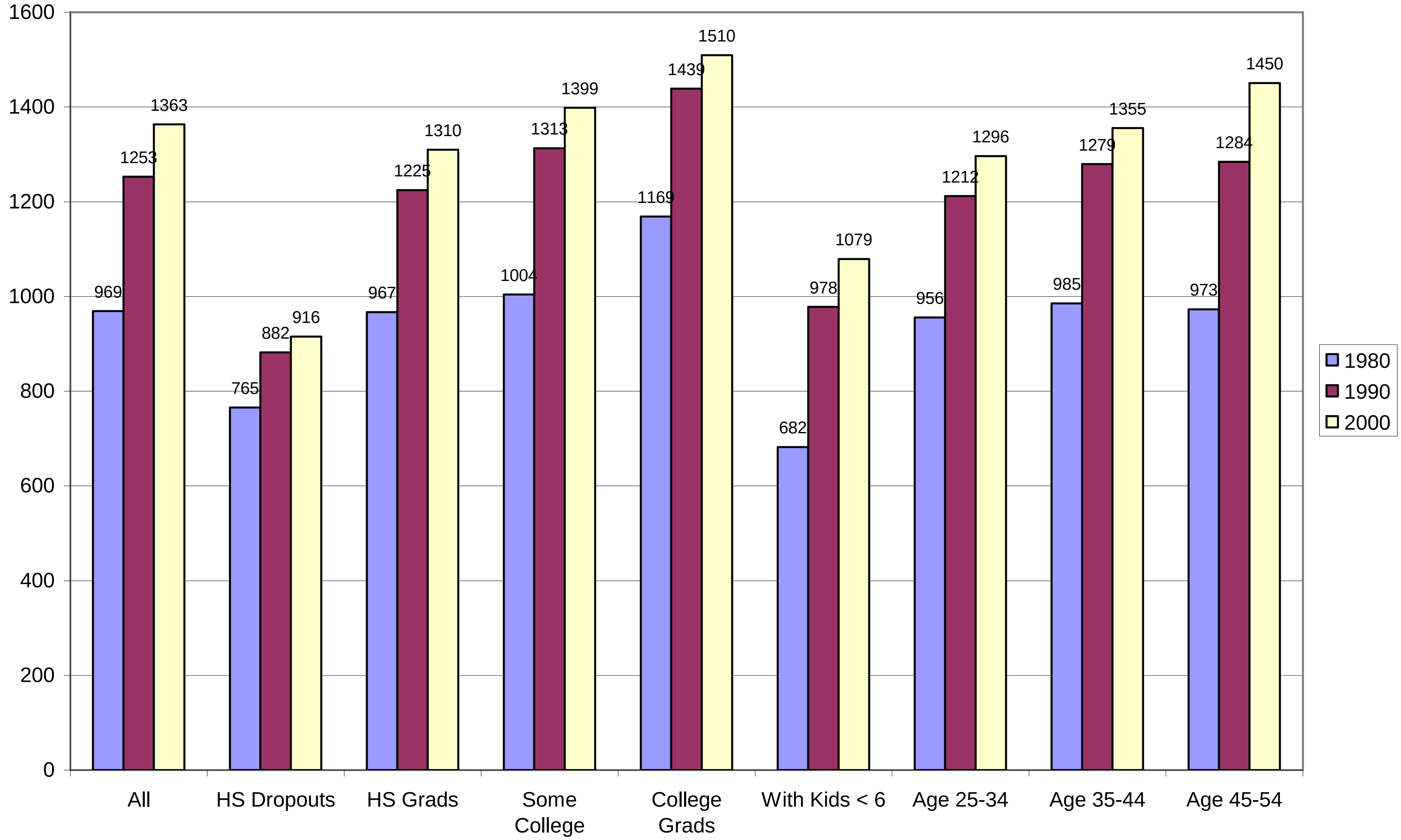
Figure 1: Annual Hours Trends for Selected Groups of Married Women



Note: Sample includes those with zero as well as positive work hours.

Table 1: 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 (at mean, computed from the basic regressions)												
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
Elasticities (at median hours and mean non-wage income, computed from median regressions)												
Own log wage	1.593	1.292	1.428	1.210	0.643	0.527	0.612	0.511	0.342	0.294	0.297	0.265
Spouse log wage	-0.758	-0.583	-0.737	-0.610	-0.285	-0.232	-0.270	-0.238	-0.229	-0.181	-0.209	-0.172
Non-wage income	-0.009	-0.010	-0.009	-0.010	-0.008	-0.006	-0.006	-0.006	-0.007	-0.004	-0.006	-0.003

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. All elasticities are significantly different from zero at the 1% level, two tailed tests.

Table 2: Selected Instrumental Variables Results for Married Women by Subgroup

	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
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^
Elasticities for Age Groups												
Age 25-34												
Own log wage	0.863	0.716	0.797	0.677	0.655	0.565	0.608	0.540	0.402	0.340	0.309	0.283
Spouse log wage	-0.378	-0.326	-0.407	-0.348	-0.237	-0.211	-0.258	-0.221	-0.204	-0.184	-0.221	-0.186
Non-wage inc (/1000)	-0.003	-0.004	-0.003	-0.004	-0.004	-0.004	-0.004	-0.004	0.001^	0.001^	0.001^	0.002^
Age 35-44												
Own log wage	0.784	0.763	0.760	0.706	0.614	0.603	0.630	0.589	0.393	0.400	0.389	0.367
Spouse log wage	-0.352	-0.339	-0.369	-0.381	-0.285	-0.246	-0.268	-0.254	-0.277	-0.219	-0.238	-0.208
Non-wage inc (/1000)	-0.009	-0.009	-0.009	-0.009	-0.009	-0.008	-0.007	-0.008	-0.005	-0.004	-0.004*	-0.003*
Age 45-54												
Own log wage	1.084	1.066	1.056	1.030	0.692	0.686	0.669	0.653	0.464	0.472	0.426	0.418
Spouse log wage	-0.339	-0.333	-0.347	-0.350	-0.190	-0.186	-0.214	-0.217	-0.171	-0.153	-0.169	-0.165
Non-wage inc (/1000)	-0.008	-0.008	-0.008	-0.008	-0.004*	-0.004*	-0.004^	-0.004^	-0.008	-0.007	-0.008	-0.007
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. All models include 8 region 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. All elasticities are significantly different from zero at the 1% level on two tailed test except as follows: * denotes significance at 5% and ^ denotes not significant.

Table 3: 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	
Variable	1980-1990	1990-2000	1980-1990	1990-2000	1980-1990	1990-2000
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
Spouse log wage	6.99	-29.74	5.92	-25.19	5.26	-22.35
Non-wage income	-2.32	-3.43	-1.65	-2.45	-0.76	-1.13
Education	15.50	9.55	17.90	11.12	33.51	28.21
Children	5.77	16.67	11.15	14.65	11.23	14.15
Age	-1.05	-19.56	0.88	-18.67	4.70	-6.84
Race-Hispanic	0.83	2.60	1.09	2.08	-0.81	-0.64
Spouse age	-0.15	-4.40	-0.74	-3.37	-3.54	-5.90
Spouse education	-3.36	-3.62	-1.50	-0.23	-2.99	-4.15
Spouse race-Hispanic	2.97	2.80	0.55	0.60	0.56	1.24
Region/MSA	-6.09	0.20	-10.75	-1.44	-4.78	-0.91
Total Actual Hours Change	283.56	110.37	283.56	110.37	283.56	110.37
Total Explained Change	105.63	116.39	107.98	120.25	99.10	97.00
Total Unexplained Change	177.93	-6.02	175.59	-9.88	184.46	13.36

Based on Model 4 in Table 1. Total Actual Hours Change is the change in the predicted hours where for each predicted hours are computed using that year's equation and that year's mean values for the explanatory variables

Table 4: 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 likely cohabitors: Elasticities												
Own log wage	0.856	0.774	0.811	0.730	0.557	0.502	0.524	0.466	0.401	0.383	0.363	0.342
Spouse log wage	-0.358	-0.324	-0.386	-0.354	-0.235	-0.219	-0.261	-0.250	-0.197	-0.165	-0.193	-0.167
Non-wage income (/1000)	-0.006	-0.006	-0.006	-0.006	-0.004	-0.004	-0.004	-0.004	-0.004	-0.003	-0.003	-0.002
Removing some married women from earlier samples (specification 1): Elasticities												
Own log wage	0.885	0.800	0.856	0.767	0.651	0.610	0.644	0.597	0.413	0.397	0.371	0.349
Spouse log wage	-0.378	-0.345	-0.397	-0.368	-0.255	-0.229	-0.256	-0.236	-0.213	-0.182	-0.206	-0.181
Non-wage income (/1000)	-0.006	-0.007	-0.007	-0.007	-0.006	-0.005	-0.005	-0.005	-0.005	-0.003	-0.004	-0.003
Removing some married women from earlier samples (specification 2)[a]: Elasticities												
Own log wage	0.826		0.836		0.594		0.621		0.352		0.339	
Adding unmarried people to later samples[a]: Elasticities												
Own log wage	0.835		0.840		0.578		0.596		0.347		0.319	
Using all women in all periods[a]: Elasticities												
Own log wage	0.800		0.761		0.578		0.548		0.318		0.258	
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. All models include 8 regional dummies, a metropolitan area dummy, age and age squared, 3
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. All elasticities are computed at the respective means of the sample for which they are estimated, and all elasticities are significantly different from zero at the 1% level on two-tailed tests.

Table 5: 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
Elasticities												
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
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. 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. All elasticities are significantly different from zero at the 1% level, two tailed tests.

Table 6: 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	0.610	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	-0.217	-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)	-0.002	-0.002	-0.005	-0.005	-0.003	-0.003	-0.003	-0.003	-0.004	-0.004	-0.004	-0.002^
Instrumental variables estimation of annual hours for those who worked												
Own log wage	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	-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)	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Instrumental variables estimation of annual hours for those who worked with selection correction												
Own log wage	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	-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)	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001^^	-0.001^^	-0.001^^	-0.001^^
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 1 for additional details. All elasticities are significantly different from zero at the 1% level except those marked with ^ (significant at 5%) or ^^ (not significant), all on two tailed tests.

Table 7: Results Using Grouped Data

	(1989-1991) - (1979-1981)		(1999-2001) - (1989-1991)	
Elasticities				
Own log wage	0.445**	0.898**	0.195	0.258
Spouse log wage	-0.417*	-0.652**	-0.174	-0.194
Non-wage income	0.027	0.027	-0.039*	-0.012
Own and Spouse Education and Age Cell Dummies Included?	No	Yes	No	Yes
Observations	129	129	129	129
R-squared	0.48	0.59	0.20	0.34

Notes: * 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: Means for Nonworkers and Those Working Less than 20 Weeks, Married Women Age 25-54

	1980			1990			2000		
	(1) Nonworkers	(2) LT 20 Weeks	(2) - (1) Difference	(1) Nonworkers	(2) LT 20 Weeks	(2) - (1) Difference	(1) Nonworkers	(2) LT 20 Weeks	(2) - (1) Difference
Less than Grade 12	0.253	0.190	-0.063	0.212	0.153	-0.058	0.168	0.108	-0.060
Grade 12	0.476	0.465	-0.011	0.443	0.450	0.007	0.351	0.339	-0.012
Some college	0.152	0.181	0.029	0.178	0.205	0.027	0.252	0.294	0.042
College graduate	0.118	0.164	0.045	0.168	0.192	0.025	0.230	0.260	0.030
Spouse less than Grade 12	0.245	0.205	-0.040	0.195	0.155	-0.040	0.149	0.109	-0.040
Spouse Grade 12	0.360	0.348	-0.012	0.352	0.376	0.024	0.296	0.303	0.007
Spouse some college	0.154	0.189	0.035	0.168	0.191	0.023	0.216	0.267	0.051
Spouse college graduate	0.241	0.259	0.018	0.285	0.278	-0.007	0.339	0.320	-0.019
Number of children age less than 1	0.070	0.091	0.021	0.084	0.091	0.008	0.075	0.081	0.006
Number of children age 1	0.098	0.094	-0.004	0.109	0.115	0.006	0.097	0.108	0.011
Number of children age 2	0.099	0.083	-0.016	0.112	0.089	-0.022	0.106	0.091	-0.014
Number of children age 3-5	0.315	0.288	-0.028	0.355	0.332	-0.023	0.327	0.287	-0.041
Number of children age 6-11	0.659	0.687	0.028	0.626	0.639	0.013	0.612	0.674	0.063
Number of children age 12-17	0.597	0.553	-0.043	0.425	0.427	0.002	0.433	0.456	0.024
Total children under 18	1.838	1.795	-0.042	1.710	1.693	-0.017	1.650	1.698	0.048
Age	37.543	35.319	-2.224	37.410	35.702	-1.708	38.619	37.308	-1.311
Spouse Age	40.029	37.816	-2.214	39.691	37.909	-1.782	40.746	39.539	-1.207

Table A2: 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	0.726	100585	0.666	99557	0.636	86402	-0.060	-0.030
Total								
Annual hours	1081.3	100585	1330.3	99557	1451.7	86402	249.1	121.3
Worked positive hours	0.695	100585	0.775	99557	0.799	86402	0.081	0.023
Annual hours conditional on working	1556.9	69986	1716.1	77263	1817.9	68688	159.2	101.8
Married								
Annual hours	969.4	64001	1253.0	58987	1363.4	48733	283.6	110.4
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	1397.1	26888	1519.2	32458	1615.3	30754	122.1	96.1
Worked positive hours	0.790	26888	0.814	32458	0.840	30754	0.024	0.027
Annual hours conditional on working	1768.3	21246	1867.3	26382	1922.7	25674	98.9	55.4
Men								
Proportion married	0.742	92365	0.658	91496	0.625	80193	-0.084	-0.033
Total								
Annual hours	2025.2	92365	2009.5	91496	2033.1	80193	-15.7	23.6
Worked positive hours	0.948	92365	0.938	91496	0.921	80193	-0.010	-0.017
Annual hours conditional on working	2136.4	87856	2143.0	86249	2208.1	74295	6.6	65.1
Married								
Annual hours	2142.3	64001	2147.5	58987	2183.3	48733	5.3	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	1729.0	21597	1758.0	28461	1799.4	28229	29.0	41.4
Worked positive hours	0.890	21597	0.888	28461	0.867	28229	-0.002	-0.021
Annual hours conditional on working	1941.6	19337	1979.7	25529	2075.8	24782	38.1	96.1

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 A3: Mean Values of Selected Explanatory Variables, Estimation Sample of Married Women Age 25-54

	1979-1981	1989-1991	1999-2001	Changes: 1980-1990	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 weeks worked (using a 20 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.