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Abstract: This paper determines that the weaker positive pull of education into the labor market and weaker labor market conditions are the observed factors that contributed the most to the decline in the labor force participation rate (LFPR) between 2000 and 2004 among women ages 25–54. As is typical, however, unobserved factors contributed more than any single or combination of observed factors. Furthermore, if the unemployment rate rebounded to its level in 2000, the LFPR would still be 1.4 percentage points lower than it was in 2000.

JEL classification: J22, J11

Key words: female labor force participation, labor supply, labor force participation over the business cycle

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What's Up With the Decline in Female Labor Force Participation?

I. Introduction and Background

Since the late 1940s the percent of the male population participating in the labor force has been on a steady decline, while female labor force participation has been steadily increasing. Figure 1 illustrates these long-term trends. The decline in male labor force participation has been attributed to a variety of factors. The institution of Social Security in 1935; its expansion to include disability insurance and Medicaid; and the Revenue Act of 1942, which granted tax incentives for firms to establish private pension plans, have been found to have contributed significantly to the decline (for example, see Burtless and Moffitt 1984, Helmuth Cremer, et al. 2004, Gruber 2000, and Lumsdaine, et al. 1997). These policies provided both greater incentives to claim a work-inhibiting disability and to retire earlier from the labor market. Another explanation offered to explain the decline of male labor force participation among all age groups is the increase in female labor force participation. With labor supply decisions often made in a household (husband-wife) setting, the increase in family income from more wives working provides an income effect incentive for husbands to decrease their labor supply.

[Figure 1 here]

The rise in female labor force participation has several explanations, as well. A major determinant of the increase in labor force participation are the biotechnological advancements that have provided women greater control over and timing of child bearing decisions since the 1940s (see Bailey 2004). This greater flexibility, along with advancements in household technologies (such as the introduction of the dishwasher and microwave oven) have afforded women greater freedom and time to increase their educational attainment, providing yet another

reason to devote more time to the labor market (see Goldin 1995). Further, changing social attitudes about the role of women and the appropriateness of women (and wives) to work have increased the job opportunities and, thus, the incentives for women to enter the labor market (see Rindfuss et al. 1996).

While the on-going decline in male labor force participation and the long-lived rise in female labor force participation have received much attention over the years, there has been a more recent change in the trend of labor force participation among women since 2000 that begs further scrutiny. Figure 2 plots the change in labor force participation rates between 2000 and 2004 for women across age categories. The figure shows that the decline in labor force participation has occurred across all age groups, except those 55 and older. While the 16-19 and 55+ age groups deserve their own analyses, this paper focuses on the change in labor force participation of those women who comprise the bulk of the female labor force, those 25-54 years of age.[1] These women made up 69% of the female labor force in 2004.

[Figure 2 here]

The importance of identifying the source of the unprecedented decline in female labor force participation lies in the value of knowing whether the decline is the beginning of a new trend or whether it is temporary and likely to reverse itself. An important component of policy makers' expectations regarding productivity or output potential of the U.S., and, thus, appropriate policy action, is the formation of their expectations regarding available labor input, or the size of the workforce.[2] The results in this paper suggest that the decline in female labor force

[1] Kirkland (2002) has concluded that an increased emphasis on school work (rather than working while attending school) has contributed significantly to the decline in teen labor force participation. DiNatale (8 March 2005) attributes the rise in older women's labor force participation to the decline in retirement portfolios in 2001 and to better healthcare and longevity.

[2] Bradbury (2005) explores the implication of the lower labor force participation for assessing production slack in the economy.

participation rates was not entirely a response to a predictable change in macroeconomic conditions or to demographic changes. Consequently, a reversal is not obviously forthcoming or likely to be easily predictable.

Bradbury and Katz (2005) seem to be the only investigation of this decline in female labor force participation and identify that the decline is concentrated among more highly educated married women with young children.[3] The analysis in this paper delves deeper to disentangle changes in characteristics from changes in behavior, with given characteristics, of women over a long period of time. The results suggest that while both changes in observed characteristics and behavioral change have contributed to the decline in female labor force participation since 2000, unobserved, thus unpredictable, changes are the largest contributors. The analysis also indicates that while the higher average unemployment rate of 6% in 2004 has put downward pressure on the labor supply of women, if it were to regain its 2000 level of 4.3%, women's labor force participation rate (keeping everything else at their 2004 levels) would still be 1.4 percentage points lower than it was in 2000.

II. Theoretical and Empirical Construct

The Labor-Leisure Choice model assumes that a person chooses a combination of hours of leisure and income (or aggregate consumption bundle) in order to maximize utility. There is a trade-off between leisure and income in that consumption of more leisure (less work) results in less income. This utility maximization problem has a corner solution where the person chooses to consume the maximum number of leisure hours possible (work zero hours).[4] The decision to

[3] DiNatale (1 February 2005) provides a much more cursory glance at the decline in labor force participation among working-aged women.

[4] The is another corner solution where the person chooses to work the maximum number of hours possible, but this is considered as practically infeasible.

work (or, participate in the labor market) boils down to the evaluation of what the market is willing to pay a person for his/her time relative to the value that person's time generates (in terms of additional utility) when consumed as leisure. This labor force participation decision can be expressed mathematically as:

$$W_i - MRS_{i,H=0} \begin{cases} > 0 \Rightarrow LFP = 1 \\ \leq 0 \Rightarrow LFP = 0 \end{cases}, \tag{1}$$

where W_i is the market wage that person *i* can earn in the market, $MRS_{i,H=0}$ is person *i*'s reservation wage (i.e., the utility gained at zero hours of work), and *LFP* is a binary choice variable that is equal to 1 if the person is a labor force participant and equal to 0 if the person is not in the labor force.

This theoretical construct translates into an operational estimation framework by assuming that the difference between a person's market wage and reservation wage can be represented by a linear function of observable characteristics about that person and an unobservable random component:

$$I_i^* = W_i - MRS_{i,H=0} = \beta_0 + \beta_1' X_{W,i} + \beta_2' X_{R,i} + \varepsilon_i = \begin{cases} > 0 \Rightarrow LFP = 1 \\ \leq 0 \Rightarrow LFP = 0 \end{cases}. \tag{2}$$

$X_{W,i}$ is a vector of observable characteristics that determine what wage person *i* could expect to earn in the market. One of the most important human capital characteristics determining labor market earnings is the woman's education level. Labor market experience is also important and will be proxied by age. Age squared is also included as a regressor in order to capture the concavity of the experience/age-labor force participation profile. Since living with a disability increases the cost (ceteris paribus) of participating in the labor market and may reduce the market wage available (see Hotchkiss 2003, Ch. 3), a variable indicating the amount of disability income being received (if any) is also included as a regressor. The current labor

market condition is also important in determining the value of entering the labor market; as the probability of obtaining a job declines, the value of the market wage declines. Current labor market conditions will be proxied by the state unemployment rate.

$X_{R,i}$ is a vector of observable characteristics that determine the value of person *i*'s time out of the labor market. Factors that are expected to affect the value of a woman's time out of the labor market include whether she is married, how many children she has, and the amount of income she has access to in the absence of her earnings (i.e., non-labor income, including any spousal earnings). In addition to the *X* variables already discussed, indicators for the woman's race is included in order to capture any differential labor market returns experienced across race (e.g., as a result of discrimination) and to capture any cultural or social differences that might affect the marginal valuation of time spent out of the labor market.

ε_i is the random component, and assuming that $\varepsilon_i \sim N(0,1)$ means that the parameter coefficients in equation (2) are determined via maximum likelihood (ML) probit estimation.[5]

III. Data and Estimation Strategy

The theoretical construct above indicates that changes in observed labor force participation rates can arise from three sources. One source is change in characteristics. For example, a woman's characteristics may change by her having children (which would be expected to raise her reservation wage, ceteris paribus) or by her attaining more education (which would raise her expected market wage). These changes in characteristics would be reflected in changes in the *X*s. While the unemployment rate is not a characteristic of the woman

[5] In a model of labor force participation of women, it might be prudent to model that decision jointly with that of her spouse (if married). For example, see Hotchkiss, Kassis, and Moore (1997). In the present paper, it is assumed that labor supply decisions are made at an individual, rather than family, level and the labor supply of other family members enters into a women's labor force participation decision in the form of higher non-labor income. A joint labor force participation analysis will be the subject of future research.

making the labor force participation decision, per se, it is a characteristic of the environment in which the decision is made.

A second source of change is a change in behavior; this would be a change in the way a woman's characteristics translate into her observed labor market participation decision. These changes will be reflected in changes in the estimated parameter coefficients, given a specific set of characteristics. Changes in parameter coefficients in a labor force participation equation can be thought of as reflecting changes in the marginal utility generated by the characteristics. For example, if the additional utility from participating in the labor market as a married woman increases (say, as the result of a decrease in relative market returns for men), then the parameter coefficient on the marriage indicator variable will increase. Or, if discriminatory behavior against women declines, the labor market return to a college degree might increase, increasing the marginal utility from participating in the labor market for a woman with a college degree. This change would manifest itself in an observed change in behavior among college women (greater labor force participation), and a larger positive parameter coefficient on the college degree indicator variable. A change in the responsiveness to labor market conditions is also a behavioral change that can affect observed labor force participation. A change in responsiveness will be reflected through a change in the estimated parameter coefficient associated with the state unemployment rate.

The third source for change in labor force participation decisions is the force of unobservables. There are innumerable factors that enter into a woman's decision to participate in the labor market that are not observed and manifest themselves in the estimated intercept term. These factors might include changes in women's preferences not captured by observables or changes in the labor market structure that affect the labor market valuation of human capital

characteristics, thus the market wage. Unfortunately, this third source does not typically result in transparent policy implications.

The March Current Population Survey is used to evaluate changes in labor force participation behavior of women between the ages of 25 and 54. The data will cover the years 1976 through 2004, with the focus of the analysis being on the period 2000 through 2004. These data are used for two primary reasons. First, these are the data from which the Bureau of Labor Statistics estimates and reports the labor force participation rate. Second, it provides a consistent, long-running, and large sample on which to obtain parameter estimates. These data are cross-sectional, so separate labor force participation equations will be estimated for each year in order to be able to "decompose" the changes in the labor force participation rate into changes in behavior (differences in estimated parameter coefficients across years) and changes in characteristics (differences in regressor values across years).[6]

IV. Results

A. 1994 to 2004

Table 1 presents sample means and estimated marginal effects from the ML probit labor force participation estimation for the years 2000 and 2004. This table provides the first clues as to how changes in characteristics and behavior (ceteris paribus) have impacted labor force participation decisions between 2000 and 2004. For example, women in 2004 are slightly more likely to have at least a college degree than they were in 2000. Given that more education

[6] An alternative strategy might be to construct a synthetic panel of cohorts to determine whether the observed behavior is the result of collective changes within a certain group of women. A typical cohort definition is based on year of birth. The additional information that cohort identification might provide to the analysis was explored, but it was determined that, except for those older than 55 years, group behavior did not vary significantly across the sample time period. All analyses are performed using the March supplement weight, since this is the only weight that is valid since 2002 and since some of the regressors come from the supplemental part of the survey. The results are essentially unchanged if the analyses are performed un-weighted.

increases the returns to supplying labor, this increase in education raises the probability of being in the labor force. However, the responsiveness of labor force participation to education declined from 2000 to 2004. Whereas, in 2000, the probability of a college graduate participating in the labor force was 31 percentage points higher than for someone with less than a high school degree (the excluded group), that probability was only 30 percentage points higher in 2004. In other words, education (both college and high school) were providing less of a pull into the labor market in 2004 than in 2000, which put downward pressure on labor force participation decisions.

[Table 1 here]

Furthermore, the higher unemployment rate in 2004 put downward pressure on labor force participation (the negative marginal effect in 2000 means that for every one percent increase in the unemployment rate, the average probability of participating in the labor market declines by 1.9 percentage points). But, women were also apparently less sensitive to labor market conditions in 2004 (evidenced by the smaller negative marginal effect), meaning that worsening labor market conditions had less of an effect on labor force participation in 2004 relative to 2000.

In order to determine how much of the observed decline in labor force participation among women is due to changes in characteristics and to changes in behavior (i.e., parameter coefficients), labor force participation in each year is simulated using a common set of parameter coefficients. For example, the average probability of women in 2004 participating in the labor market is calculated assuming the women in that year behaved as women did in, say, the year 2000. The deviation in the simulated labor force participation (using 2004 women's characteristics and 2000 parameter coefficients) and the actual labor force participation in 2004

indicates how much of the observed difference in labor force participation between 2000 and 2004 was due to changes in behavior and how much was due to changes in characteristics. This decomposition technique is described in more detail below.

Figure 3 plots selected results from this simulation exercise. First of all, separate probit models were estimated for each year between 1994 and 2004 in order to generate year-specific parameter coefficients ($\hat{\beta}^t$).[7] Then, these year-specific parameter coefficients were combined with each year's sample characteristics (X_i^t) to simulate the expected labor force participation decision of women in each year, given the behavior across different years.

[Figure 3 here]

The thickest solid line with dots reflects the labor force participation predicted for each year's sample of women, given their own parameter coefficients (this is the average across *i* of $\Phi(X_i^t \hat{\beta}^t)$ for the sample of women in year *t*, where Φ is the standard normal cumulative distribution function). This sample average probability of participating in the labor market is analogous to the population labor force participation rate. The line with short dashes reflects the predicted labor force participation for the 1994 sample of women in each year (*t*) assuming that they behaved as the women in year *t* behaved (this is the average across *i* in year *t* of $\Phi(X_i^{1994} \hat{\beta}^t)$). The line with long dashes is the average of $\Phi(X_i^{2000} \hat{\beta}^t)$, and the solid thin line is the average of $\Phi(X_i^{2004} \hat{\beta}^t)$.

The distance between two lines reflects differences in the characteristics of women holding the responsiveness to those characteristics (or, behavior) fixed. For example, the vertical

[7] The comparison only goes back to 1994 in this figure since there was a major CPS questionnaire change in 1994 that has been shown to have changed the classification of female labor force participants. Analyses of earlier years will be explored below.

distance between the line with short dashes and the line with long dashes measures the difference in predicted labor force participation between 1994 and 2000 that is accounted for by differences in women's characteristics in those two years. Moving along any of the lines shows how the labor force participation decisions of any one sample of women would have changed given the estimated parameter coefficients across the years; this indicates the importance of changes in behavior across the years in determining labor force participation.

Comparing the predicted and simulated labor force participation probabilities, we see that the bulk of the decline in predicted labor force participation between 2000 and 2004 derived from a change in characteristics, rather than a change in behavior. In other words, from 2000 to 2004, characteristics changed in such a way as to reduce labor force participation from 77.7% to 74.2% (a 3.5 percentage point decline, holding behavior constant at 2000 values). Furthermore, behavior changed in such a way to put *upward* pressure on labor force participation from 74.2% (2004 women behaving like 2000 women) to 75.7% (a 1.5 percentage point increase). These influences resulted in a net decline in labor force participation between 2000 and 2004 of two percentage points.[8] In contrast, labor force participation increased slightly over the entire 1994-2004 time period by 0.4 percentage points. Characteristic changes alone would have *increased* predicted labor force participation by 1.2 percentage points, while behavioral changes alone would have *reduced* labor force participation by 0.8 percentage points. In other words, between 1994 and 2004, the characteristics of women (e.g., fewer children, less likely to be married, more likely to be a college graduate) put upward pressure on labor force participation, but behavioral changes added downward pressure.

[8] The algebraic decomposition of the net change in the expected labor force participation between year t and year t-k is expressed as: $\Phi(X_i^t\hat{\beta}^t) - \Phi(X_i^{t-k}\hat{\beta}^{t-k}) = \left[\Phi(X_i^t\hat{\beta}^t) - \Phi(X_i^t\hat{\beta}^{t-k})\right] + \left[\Phi(X_i^t\hat{\beta}^{t-k}) - \Phi(X_i^{t-k}\hat{\beta}^{t-k})\right]$. The decomposition can be performed using different endpoints as the base case. Here, the latter year (i.e., *t*) is used as the point of reference. Generally, the conclusions are essentially the same, even if some of the details of the decomposition may vary, if the earlier year is used as the point of reference.

B. The 1970s and 1980s

The results for the 1994-2004 time period are in sharp contrast to the changes observed for women during the 1970s and 1980s. Figure 4 depicts the same simulation described above for different year groups; 1976 to 1982 in panel (a) and 1984 to 1993 in panel (b).[9] Two main observations are worth highlighting from these figures. First, both sets of years saw a much stronger impact on labor force participation from both characteristic changes (movement between the lines) and behavioral changes (movement along each line). Second, the slowing in the impact of both characteristic and behavioral changes is evident in the early 1990s.[10]

[Figure 4 here]

Table 2 summarizes the changes depicted in Figures 3 and 4. The first column of numbers shows the net change in labor force participation rates, the second column shows how labor force participation would have changed from changes in characteristics only (holding coefficients constant), and the third column shows how labor force participation would have changed from changes in behavior only (measured by differences in parameter coefficients). For the 1970s and 1980s, both behavior and characteristics changed in such a way to put upward pressure on labor force participation, with changes in behavior contributing the most to the net change over the periods.[11] In the 1990s, however, while characteristic changes (e.g., higher educational attainment, less marriage, fewer children) continued to put upward pressure (albeit

[9] The analyses for these earlier years differs only from the 1994-2004 analysis in that there is no regressor for disability income; this variable is not available in the CPS until 1989. The analysis does not start earlier than 1976 since a person's non-labor income is not calculable (without matching respondent records) prior to this survey year. Also, 1983 is excluded due to erratic estimation results.

[10] Sample means and estimated marginal effects for select years are contained in the Appendix (Table A2).

[11] Blau and Kahn (2005) document and investigate the source of changes in hours of work among women between 1980 and 2000. Behavioral changes are identified as the major contributor over that time to changes in hours of work, as well.

by a smaller amount) on labor force participation, behavioral changes dampened the impact of those characteristic changes by contributing downward pressure.

[Table 2 here]

C. Comparison with Men

One interpretation of the observed recent decline in female labor force participation is that women are losing ground in their efforts to compete with and to make comparable contributions to the labor market as men (for example, see Bradbury and Katz 2005). An alternative interpretation, given that the labor force participation rate of men has been declining steadily for decades (see Figure 1), is that women have achieved as much parity regarding labor force participation decisions as they and their partners want and that the same forces driving labor force participation of men downward are now acting upon those decisions of women. For example, the income effect of rising real wages may now dominate the substitution effect for women. One way to explore how similar the recent experience of women is to that of men is to perform the same analysis described above for samples of men over the same time periods, and to compare those results to those obtained for women. Table 3 decomposes the net changes in male labor force participation across different time periods into the contributions made by changes in characteristics and changes in behavior.

[Table 3 here]

The first thing to notice in this table is that behavioral changes have consistently contributed downward pressure and have been largely responsible for the decline in the labor force participation of men over each time period. While the behavior of women changed through the 1970s and 1980s to provide upward pressure on labor force participation, their behavior

changed in the 1990s to look more like the changes that have been occurring in the behavior of men across all time periods, putting downward pressure on participation decisions. By contrast, however, characteristic changes of men continued to push participation downward, while the characteristics of women continued to contribute positively to their labor force participation. The net result is that the movement of labor force participation rates of men and women since the late 1990s have taken more parallel, rather than converging, paths.

D. Which Characteristics?

The bulk of the decline in labor force participation rates among both men and women between 2000 and 2004 is accounted for by change in characteristics. The difference in average characteristics between 2000 and 2004 in Table 1 provides a suggestion as to which characteristic changes might have been most influential in lowering labor force participation of women between these two years.[12] Specifically, declines in characteristics positively influencing labor force participation, or increases in characteristics negatively influencing labor force participation are candidates. These would include the decline in the percent of high school graduates, the decline in the percent of blacks, as well as the increase in number of children less than six, the increase in the percent Hispanic, and the rise in the unemployment rate.

Figure 5 simulates what the average probability of labor force participation would have been in 2004 if women's characteristics indicated on the horizontal axis equaled the average for women in 2000. The hypothetical question being asked by this simulation is: What would the average probability of labor force participation have been in 2004 if women's characteristic indicated on the horizontal axis equaled the average for women in 2000 (holding all other characteristics at their 2004 levels)? The most important single characteristic contributing to the

[12] The sample means and estimated marginal effects for men, for selected years, are in the Appendix, Table A3.

decline in the labor force participation rate between 2000 and 2004 is the rise in the unemployment rate. However, even if the unemployment rate were to regain its 2000 level of 4.3 percent, women's labor force participation would only rise (keeping everything else at their 2004 levels) to 76.2 percent, which is still 1.4 percentage points below the labor force participation rate for women in 2000.

[Figure 5 here]

E. Which Behavior?

The results presented in Table 2 indicated that most of the behavioral change between 2000 and 2004 among women put *upward* pressure on their labor force participation decisions. However, there were some behavioral changes that individually contributed to the lower observed labor force participation in 2004. Looking at the estimation results for 2000 and 2004, those variables on which the marginal effects became less positive or more negative are the candidates for having lowered labor force participation (see Table 1). For example, the smaller positive marginal effect on the college education dummy variable for women means that a college degree had less of a pull into the labor market for women in 2004 than it did in 2000. Other factors pulling the predicted labor force participation for women lower include responses among high school graduates, Hispanics, and the impact of disability income. In contrast, between 2000 and 2004 predicted labor force participation increased (ceteris paribus) among women who are married, have children, have more non-labor income, and face given local labor market conditions (the state unemployment rate).

Figure 6 plots the predicted labor force participation rate in 2000 and in 2004 for women along with simulated 2004 labor force participation that would result from changing one

coefficient at a time. The hypothetical question related to the simulations presented is: What would the average probability of labor fore participation have been in 2004 if women's behavior matched that in 2000 with regard to the characteristic indicated along the horizontal axis (keeping all other behavior at its 2004 level)? For example, if college graduates responded in 2004 like they did in 2000, leaving everything else about 2004 women and their behavior unchanged, the labor force participation rate would have been 76.1 percent instead of the actual 75.7 percent. Regarding women's response to labor market conditions, if women in 2004 were as sensitive to changes in the unemployment rate as they were in 2000, the labor force participation rate would have actually been only 65 percent in 2004.

[Figure 6 here]

Like changes in characteristics, not any single (or combination of) observed behavioral change can account for the full two percentage point drop in the participation rate from 2000 to 2004. The reason is that behavioral changes unexplained by observed factors are largely responsible for the observed decline in labor force participation rates. These unexplained behavioral changes manifest themselves in the estimate of the intercept term. Replacing the estimated 2004 intercept term with that estimated for 2000 (leaving all other parameter coefficients and characteristics at their 2004 values) results in a predicted labor force participation rate of 88 percent. Unfortunately, there is no way to know exactly what the intercept term is capturing.[13]

[13] With unobservable factors making such a large contribution to observed behavior, a natural question is how well the model has done fitting the data. Comparing actual (reported by BLS) labor force participation rates for women ages 25-54, deviations of the average predicted labor force participation in each year range from 0.02 to 0.4 percentage points with the median deviation at 0.1 percentage points. The large contribution of the intercept term does not imply a poor fit of the model, it just means there are deviations in labor force participation probabilities across time that can not be identified through changes in observed characteristics.

Some have identified that labor force participation rates have fallen particularly dramatically among college educated, married women (e.g., Bradbury and Katz 2005). Certainly, highly educated women are more likely to marry highly educated men (Hotchkiss and Pitts 2005; Neal 2002; Herrnstein and Murray 1994) and would, therefore, likely feel more secure in leaving the labor market (with their husband's higher earning power and lower probability of unemployment). This suggests that interacting some of the regressors (e.g., education and marriage) may help take some of the explanatory power away from the intercept. Several alternative specifications and interactions were explored, resulting in practically no change in the results. Also, recall that the non-labor income measure includes a woman's spouse's earnings (if she is married). Therefore, it seems that any change in preferences between 2000 and 2004 that may be reflected in the estimates of the intercept term of the regression are not particularly correlated with changes in behavior related to marriage, children, or educational attainment.

F. A Closer at Labor Market Conditions - Going Forward

The conclusion from the preceding two sections is that not any single observable characteristic or behavioral change would overwhelm the influence of the change in unobservables between 2000 and 2004 in order to return the labor force participation rate of women to the level seen in 2000. Two of the most dramatic changes between these years, however, involved the rise in the unemployment rate and the decline in sensitivity to labor market conditions. Looking more closely a this issue of sensitivity to labor market conditions, Figure 7 plots the average marginal effect of a one percentage point change in the state unemployment rate on the probability of participating in the labor force in each year from 1977

to 2004.[14] The figure plots this average marginal effect for both men and women and also plots on the secondary axis the average of the state unemployment rates in each year.

[Figure 7 here]

There are several striking observations from Figure 7. First, as expected, the marginal effects are always negative; an increase in the unemployment rate reduces a person's likelihood of participating in the labor market.[15] Second, labor force participation decisions of men are less sensitive to labor market conditions (smaller negative marginal effect) than are the labor force participation decisions of women. And, third, the years 1999 through 2004 were quite unique for women relative to earlier years. In no other year was women's sensitivity to labor market conditions so strong as in 1999 and 2000. And in no other year was women's sensitivity weaker than in 2003 and 2004. These years were also notable for their relatively low (1999 and 2000) and relatively high (2003 and 2004) average state unemployment rates. This leads to the fourth observation that labor market sensitivity tends to be counter-cyclical: less sensitivity (smaller negative number) during years of higher unemployment rates.

Rather than just consider the impact on 2004 labor force participation of changing only one of these factors (the unemployment rate *or* labor market sensitivity), what if both of them returned to their 2000 levels? Figure 8 plots the actual labor force participation rates in 2000 (77.7%) and in 2004 (75.7%), plus what the labor force participation rate would be assuming 2004 characteristics and behavior, except for changing the unemployment rate and/or women's sensitivity to labor market conditions. The first simulation is what is seen in Figure 5: a 76.2 percent labor force participation rate (LFPR) if only the unemployment rate returned to its 2000

[14] States were not all individually identified in the CPS until 1977. The earlier analyses average the unemployment rates for those states that were combined in 1976. Also, throughout this paper the state unemployment rate for March was used. The results are nearly identical if a lagged unemployment rate (e.g., February) was used.
[15] The model structure assumes a symmetric labor force participation response to increases and decreases in the unemployment rate.

level. The second simulation is what is seen in Figure 6: a 65 percent LFPR if only the responsiveness of women to changes in the unemployment rate returned to its 2000 level. The third simulation indicates that if both the unemployment rate and women's labor market sensitivity returned to their 2000 levels, the LFPR would be 68.7 percent.

[Figure 8 here]

Because of the uniqueness of both the low unemployment rate and strong labor market sensitivity in 2000, assuming a return to the environment and behavior that existed in 2000 may not be a very realistic. To get an idea as to what might be a more reasonable future path of labor force participation rates for women, Figure 8 also presents two additional scenarios. The first assumes the low 2000 unemployment rate, but applies a 1994-1998 average labor market sensitivity. Under this scenario, the labor force participation of women (assuming everything else stays at its 2004 values) would be 71 percent, still below the 75.7 percent LFPR of 2004. The second, even more conservative, scenario assumes a 1994-1998 average unemployment rate and 1994-1998 average labor market sensitivity. In this case, labor force participation would only be 68.5 percent.

While both the influence of current labor market conditions and the responsiveness of women to those conditions are relatively strong, the simulations in Figure 8 are consistent with the earlier conclusion that even significant changes among observable factors will not overcome the gap that emerged between labor force participation rates in 2000 and 2004.

V. Conclusions

The unprecedented two percentage point decline in the labor force participation rate (LFPR) for women, ages 25-54, between 2000 and 2004 is explained by changes in both

behavior and characteristics, with weaker labor market conditions in 2004 being the characteristic providing the greatest single downward pressure. However, if the unemployment rate had been at the 2000 level of 4.3 percent in 2004 (holding every else at 2004 levels), the LFPR of women would still have been 1.4 percentage points lower than the LFPR in 2000. Other characteristic changes that contributed to the decline in female labor force participation included a lower percent of high school graduates, a greater percent of Hispanic women, and women having more children under the age of six, on average.

Among observable behavioral changes, the largest contributor to the LFPR decline was the weaker pull of education into the labor market. The lower probability of Hispanic women participating in the labor market in 2004 and the stronger push of disability income on women out of the labor market also contributed to the decline. One behavior that changed quite dramatically between 2000 and 2004 was women's sensitivity to labor market conditions. In 2000 a one percentage point drop in the unemployment rate (ceteris paribus) would have led to an increase in labor force participation of 1.9 percentage points, whereas the same drop in the unemployment rate in 2004 would have led to only a 0.3 percentage point increase in the LFPR. The combined impact of the labor market returning to its average 1994-1998 conditions and the average sensitivity to labor market conditions seen between 1994-1998 would result in a LFPR of 68.5 percent, lower than in 2004.

While changes in specific, observable behavior and characteristics can be identified as contributing to the decline in female labor force participation since 2000, it's important to realize that there remains one key determinant of labor force participation decisions about which the analysis in this paper has little to say. That is, unobservable, or unexplained behavior. Even though there are very clear observable factors that have worked to reduce female labor force

participation, there are other observable factors that have been working to increase it. For example, women's response to changes in non-labor income, marriage, children, and labor market conditions have provided less of a push out of the labor market in 2004 than in 2000. Taking into account the impact of all observable characteristics and behavioral changes between 2000 and 2004, it is change in unobservable factors that has had the strongest impact on the decline in labor force participation rates over this time period. The large role that unobservables play in the determination of labor force participation is not unique to the 2000-2004 time period, nor is it unique to women.

The presence of unobservables is not very satisfying or informative from a policy perspective. Nonetheless, their large role in the determination in labor force participation rates suggests that a rebound of the labor market to the environment that existed in 2000 is not likely to cause female labor force participation to rebound to 2000 levels, without changes in unobservable factors that can not be predicted. It appears that the pull of college education into the labor force began to weaken for women in the late 1990s, but has slowed in its decline. Also, the push for women out of the labor force due to marriage and children continues to weaken, as does the push resulting from higher non-labor income. Indeed, it is striking how, since 2000, the labor force participation behavior of women appears to be moving in parallel to that of men, albeit with a significant gap in labor force participation rates that may or may not ever close. Further investigation of how labor force participation decisions are made in a family context and how these joint (spousal) decisions have changed over time is the next obvious step in the ongoing scrutiny of the declining labor force participation rates of women.

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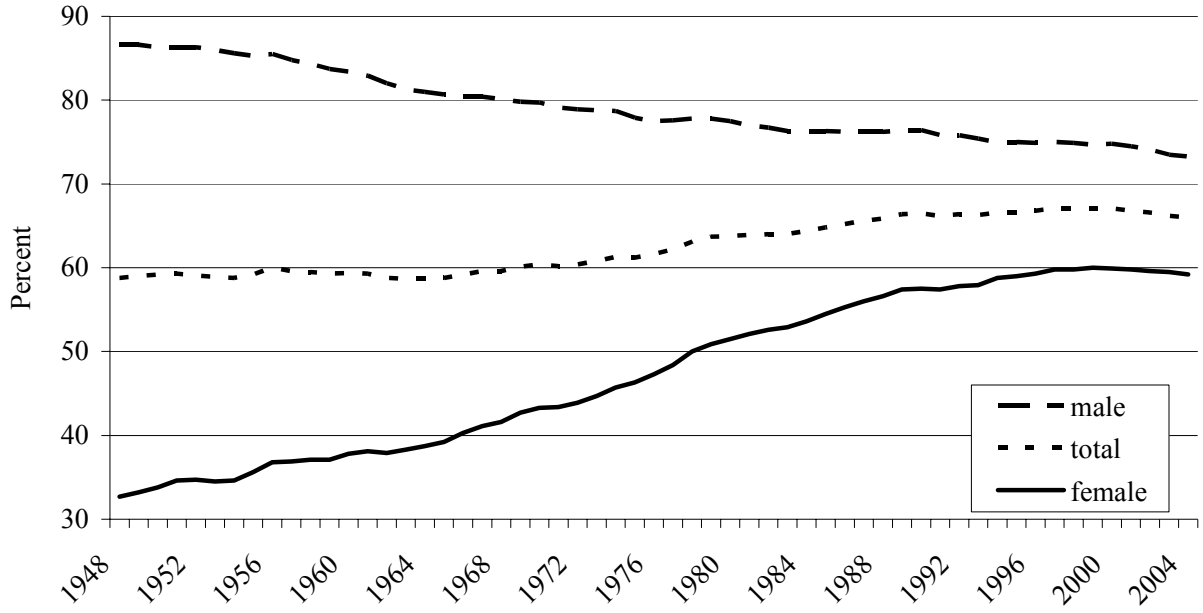
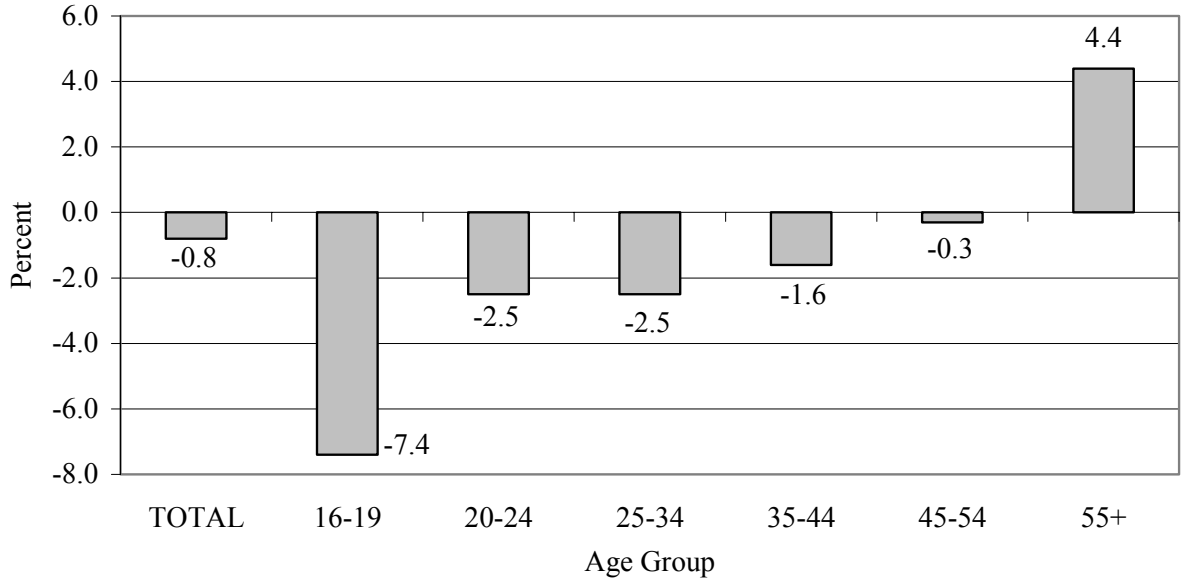
Figure 1. Labor Force Participation Rates Over Time



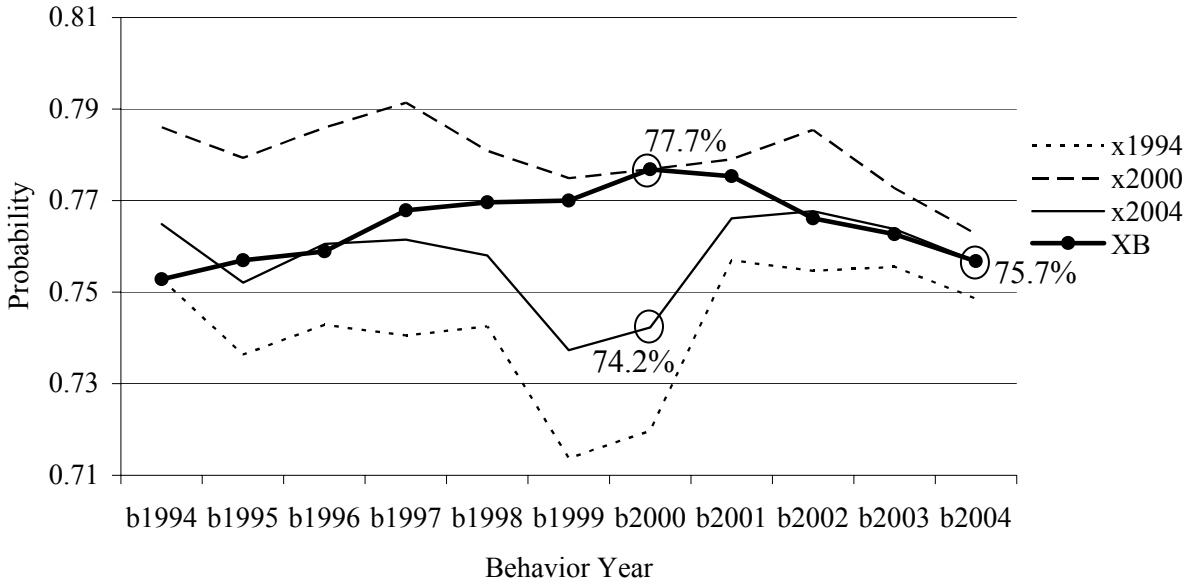
Source: Bureau of Labor Statistics.

Figure 2. Change in the Female Labor Force Participation Rate by Age Group, 2000-2004



Source: Bureau of Labor Statistics.

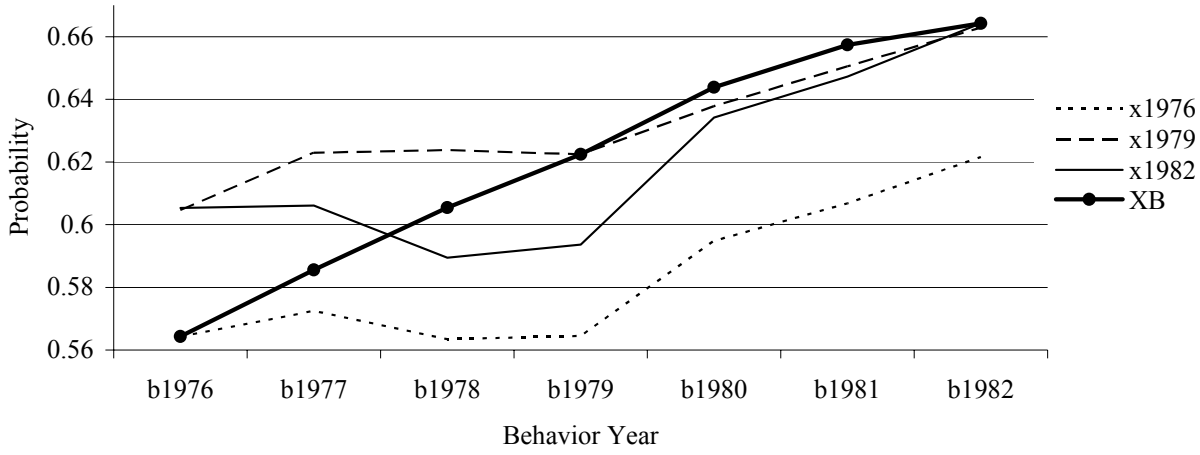
Figure 3. Actual and Simulated Labor Force Participation of Women Ages 25-54: 1994, 2000, and 2004.



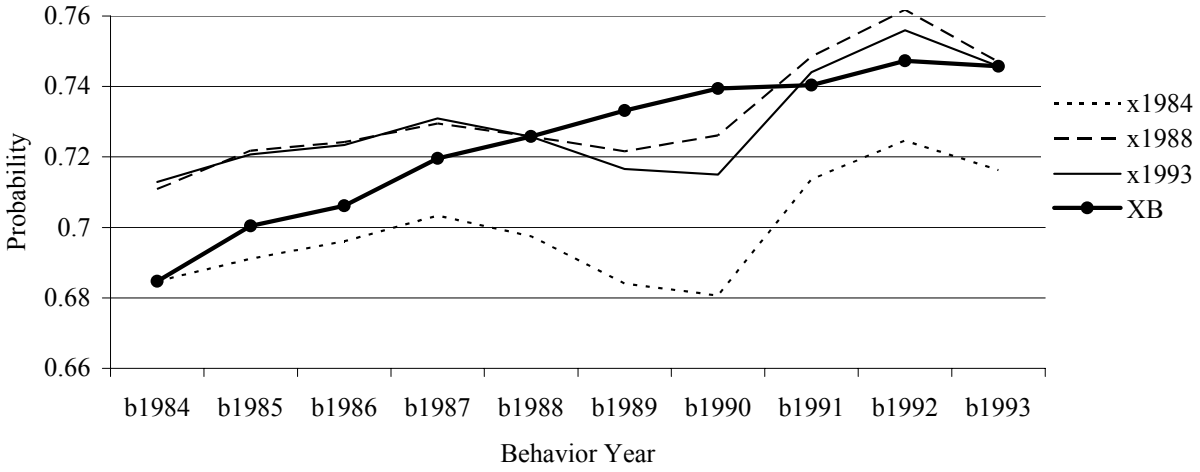
Notes: The "x" corresponds to which year characteristics and the "b" corresponds to which year parameter coefficients (betas) are used in the calculation of the average predicted labor force probability. "XB" means that the characteristics and parameter coefficients for the same year are used to construct the labor force probability.

Figure 4. Actual and Simulated Labor Force Participation of Women Ages 25-54: 1976-1993.

(a) 1976, 1979, and 1982.

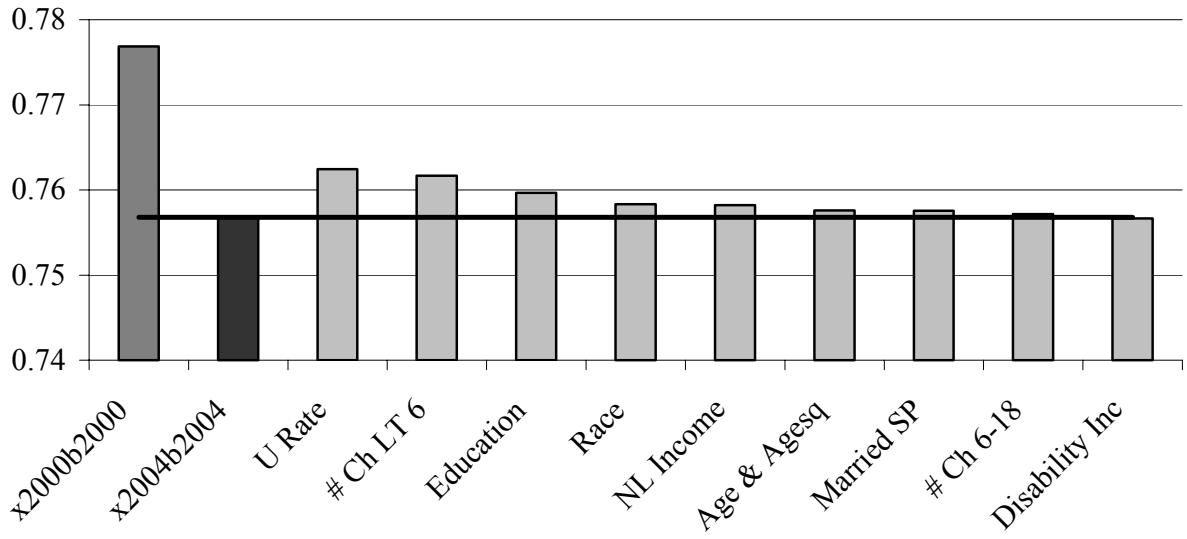


(b) 1983, 1988, and 1993.



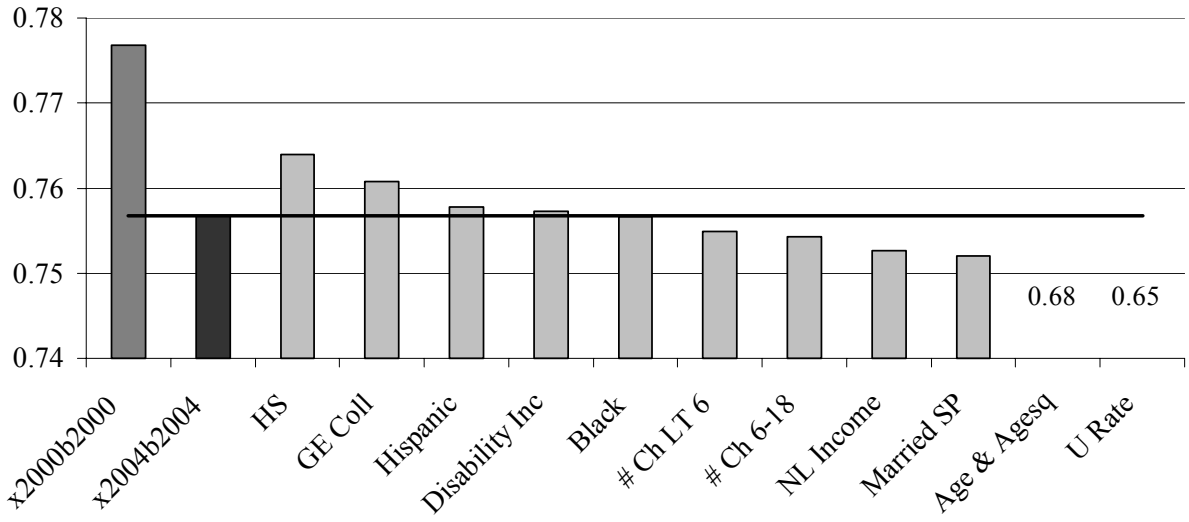
Notes: See notes to Figure 3.

Figure 5. Simulated Labor Force Participation Probabilities for Women in 2004 (2004 characteristics except for that indicated).



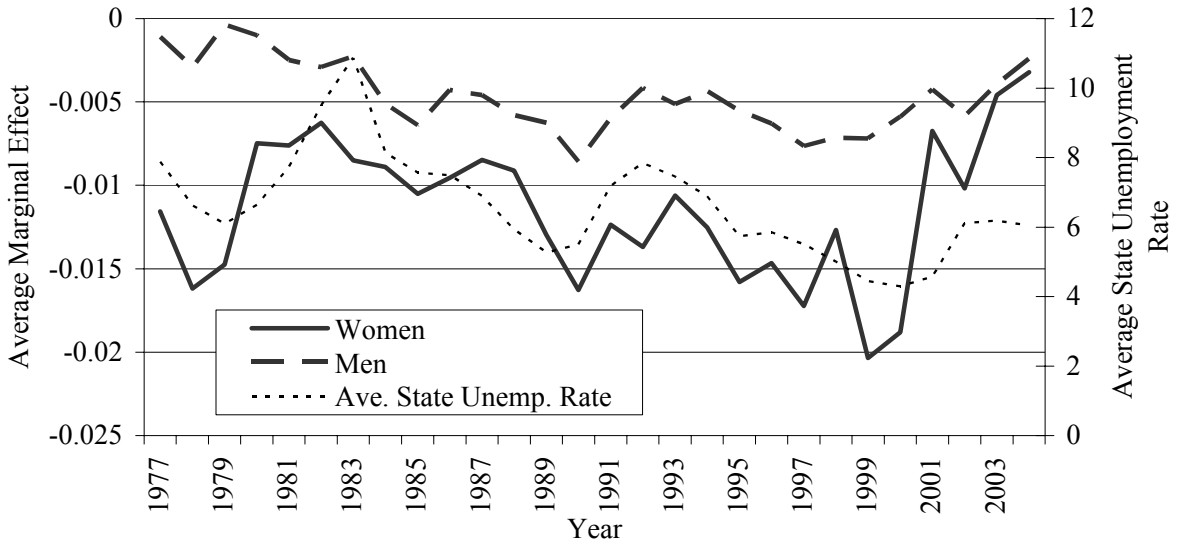
Note: Predicted labor force participation probabilities were calculated for each woman, then averaged across the sample. The simulation asks the question: What would the average probability of labor force participation have been in 2004 if women's characteristic indicated on the horizontal axis equaled the average for women in 2000?

Figure 6. Simulated Labor Force Participation Probabilities for Women in 2004 (2004 behavior except for that indicated).



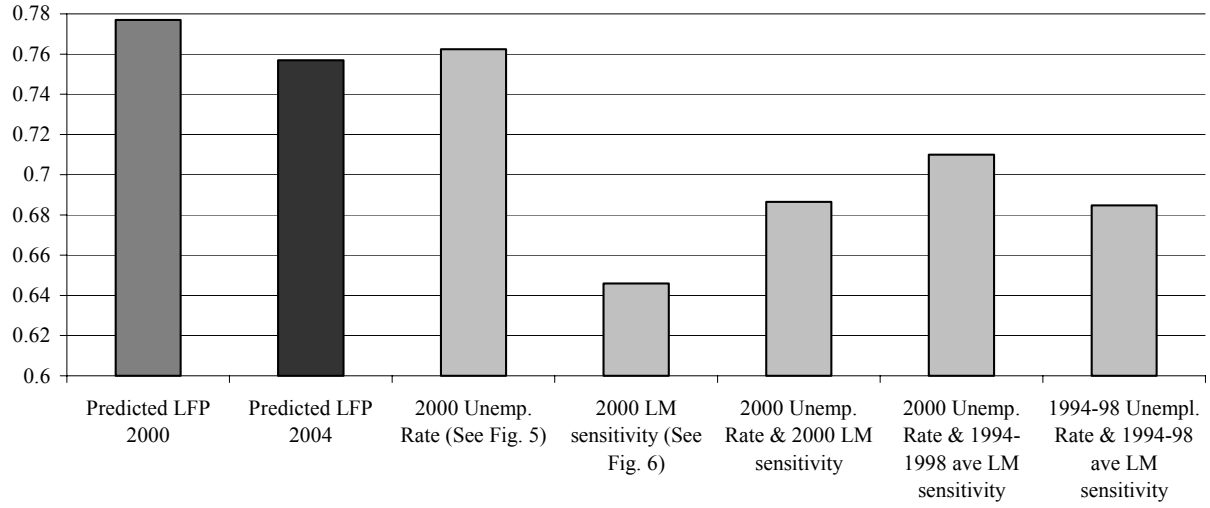
Note: Labor force participation probabilities are calculated for each women, then averaged across the sample. The simulation asks the question: What would the average probability of labor force participation have been in 2004 if women's behavior matched that in 2000 with regard to the characteristic indicated along the horizontal axis?

Figure 7. Average Marginal Effect for Men and Women of a One Percentage Point Change in the Unemployment Rate on the Probability of Participating in the Labor Market, 1977-2004.



Note: Each year's marginal effect is calculated using parameter coefficients generated from estimation of a ML probit models of labor force participation separately for each year. In each year, the marginal effect is calculated separately for each observation then averaged across the sample to obtain the average marginal effect. A marginal effect of -0.02, for example, means that a one percentage point increase in the unemployment rate will decrease the probability of participating in the labor market by two percentage points.

Figure 8. Average Predicted Labor Force Participation (LFP) in 2000 and 2004, and Simulated LFP Assuming 2004 characteristics, except as noted.



Note: Labor force participation is predicted for each woman in the 2004 sample, then averaged across the sample.

Table 1. Sample Means and Marginal Effects for 2000 and 2004.

	Weighted Sample Means		Average Marginal Effect on Labor Force Participation	
Characteristic	**2000**	**2004**	**2000**	**2004**
Age	**39.4**	**39.7**	**0.0058**	**0.0079**
Age Squared	**1618.43**	**1649.56**	--	--
# Children LT 6	0.285	0.293	-0.0998	-0.1002
# Children between 6-18	0.729	0.718	**-0.0177**	**-0.0154**
Married, Spouse Present	**63.4%**	**62.6%**	**-0.0324**	**-0.0273**
High School Graduate	**60.9%**	**58.9%**	**0.2282**	**0.2204**
College Degree or More	**28.2%**	**30.4%**	**0.3089**	**0.3040**
Non-labor Income (/yr)	$43,496	$43,047	**-7.7×10^{-7}**	**-7.3×10^{-7}**
Hispanic	**5.4%**	**7.3%**	**-0.0501**	**-0.0664**
Black	13.4%	13.3%	**0.0041**	**0.0055**
Disability Income (/yr)	$68.20	$67.57	**-3.3×10^{-5}**	**-4.5×10^{-5}**
State Unempl. Rate	**4.29%**	**6.04%**	**-0.0188**	**-0.0032**
N	29,718	47,738		

Notes: All means and marginal effects in bold are significantly different from one another at least at the 95% confidence level across years. All dollar values are inflated to 2004 values using the CPI. The marginal effects are calculated for each individual then averaged across the sample. ML probit parameter coefficients and their standard errors are reported in the Appendix, Table A1.

Table 2. Net Changes in Predicted Labor Force Participation and the Contribution of Changes in Behavior and Characteristics, Women Ages 25-54.

Year Span	Net Change in Predicted Labor Force Participation (percentage points)	Portion of Net Change Accounted for by Changes in Characteristics (percentage points)	Portion of the Net Change Accounted for by Changes in Behavior (percentage points)
1976-1982	+9.9	+4.1	+5.8
1984-1993	+6.1	+2.8	+3.3
1994-2004	+0.4	+1.2	-0.8
2000-2004	-2.0	-3.5	+1.5

Table 3. Net Changes in Predicted Labor Force Participation and the Contribution of Changes in Behavior and Characteristics, Men Ages 25-54.

Year Span	Net Change in Predicted Labor Force Participation (percentage points)	Portion of Net Change Accounted for by Changes in Characteristics (percentage points)	Portion of the Net Change Accounted for by Changes in Behavior (percentage points)
1976-1982	-0.14	-0.02	-0.12
1984-1993	-1.25	-0.09	-1.16
1994-2000	-1.61	-0.27	-1.34
2000-2004	-1.91	-1.57	-0.34

Appendix: Additional Tables

Table A1: ML Probit Estimates for 2000 and 2004: Women Ages 25-54.

Dependent Variable = Probability of Labor Force Participation		
Characteristic	**2000**	**2004**
Age	0.0500 (0.0125)	0.5864 (0.101)
Age Squared	-0.0007 (0.0002)	-0.0008 (0.0001)
# Children LT 6	-0.3655 (0.0163)	-0.3478 (0.0130)
# Children between 6-18	-0.0649 (0.0102)	-0.0535 (0.0081)
Married, Spouse Present	-0.1198 (0.0231)	-0.0953 (0.0190)
High School Graduate	0.6752 (0.0275)	0.6331 (0.0234)
College Degree or More	1.0039 (0.0327)	0.9483 (0.0268)
Non-labor Income ($000/yr)	-0.0028 (0.0002)	-0.0025 (0.0001)
Hispanic	-0.1737 (0.0431)	-0.2172 (0.0267)
Black	0.0152 (0.0309)	0.0193 (0.0241)
Disability Income (/yr)	-0.0001 (0.00002)	-0.0002 (0.00002)
State Unempl. Rate	-0.0689 (0.0111)	-0.0112 (0.0078)
Intercept	-0.0015 (0.2418)	-0.5479 (0.1994)
N	29,718	47,738

Note: Standard errors are in parentheses. All coefficients are significantly different from zero at least at the 95 percent confidence level, except 2000: Black and Intercept, and 2004: Black.

Table A2. Sample Means and Marginal Effects for 1977, 1984, and 1994: Women Ages 25-54.

	Weighted Sample Means			Average Marginal Effect on Labor Force Participation		
Characteristic	**1977**	**1984**	**1994**	**1977**	**1984**	**1994**
Age	38.3	37.4	38.3	0.0061	0.0085	0.0104
Age Squared	1545.65	1474.06	1535.84	--	--	--
# Children LT 6	0.323	0.338	0.329	-0.1922	-0.1542	-0.1155
# Children between 6-18	1.090	0.816	0.739	-0.0317	-0.0412	-0.0347
Married, Spouse Present	75.8%	69.5%	64.5%	-0.0919	-0.0489	0.0093
High School Graduate	59.9%	63.0%	63.7%	0.1603	0.2143	0.2642
College Degree or More	14.8%	19.5%	23.7%	0.2750	0.3283	0.3628
Non-labor Income (/yr)	$43,384	$38,103	$37,566	-2.3×10^{-6}	-1.7×10^{-6}	-1.3×10^{-6}
Hispanic	2.0%	3.1%	4.7%	0.0253	-0.0289	-0.0551
Black	11.1%	11.9%	12.9%	0.0405	0.0187	-0.0178
Disability Income (/yr)	--	--	$60.82	--	--	-1.4×10^{-5}
State Unempl. Rate	7.88%	8.14%	6.88%	-0.0116	-0.0089	-0.0125
N	25,578	32,796	33,411			

Notes: All means and marginal effects across years are significantly different from one another at least at the 95% confidence level, except the sample means for age and age squared and number of children less than six (1977 vs. 1994); and the number of children less than 6 and non-labor income (1984 vs. 1994). The marginal effects are calculated for each individual then average across the sample. All estimated parameter coefficients are significantly different from zero at least at the 95% confidence level except for the coefficient on Hispanic and the intercept (1977); Hispanic and Black (1984); and Married Spouse Present (1994). All dollar values are inflated to 2004 values using the CPI.

Table A3. Sample Means and Marginal Effects for 1977, 1984, 2000, and 2004: Men Ages 25-54.

	Weighted Sample Means				Marginal Effect on Labor Force Participation			
Characteristic	**1977**	**1984**	**2000**	**2004**	**1977**	**1984**	**2000**	**2004**
Age	38.2	37.4	39.4	39.6	0.0051	0.0052	0.0003	0.0043
Age Squared	1541.75	1467.60	1617.29	1639.64	--	--	--	--
# Children LT 6	0.345	0.338	0.273	0.272	0.0052	-0.0015	0.0169	0.0136
# Children between 6-18	0.939	0.673	0.593	0.570	0.0007	-0.0010	0.0095	0.0123
Married, Spouse Present	78.4%	70.1%	62.2%	59.9%	0.0821	0.0839	0.0734	0.0941
High School Graduate	51.7%	55.2%	58.7%	57.4%	0.0550	0.0804	0.1030	0.0807
College Degree or More	23.1%	26.5%	29.2%	29.6%	0.0716	0.1029	0.1477	0.1291
Non-labor Income (/yr)	$17,104	$18,895	$25,646	$25,448	-8.3×10^{-7}	-7.2×10^{-7}	-4.9×10^{-7}	-4.4×10^{-7}
Hispanic	1.8%	2.8%	5.0%	7.1%	-0.0573	-0.0767	-0.0278	-0.0262
Black	9.5%	10.2%	11.6%	11.1%	-0.0258	-0.0345	-0.0524	-0.0769
Disability Income (/yr)	--	--	$100.63	$89.79	--	--	-1.5E-05	-1.5E-05
State Unempl. Rate	7.9%	8.1%	4.%	6.1%	-0.0011	-0.0051	-0.0059	-0.0024
N	27,687	30,216	27,874	42,917				

Notes: All means and marginal effects across years are significantly different from one another at least at the 95% confidence level, except the sample means for number of children less than six (1977 vs. 1994); greater than or equal to college (1984 vs. 1994); and number of children less than six, greater than or equal to college, non-labor income, and black (2000 vs. 2004). The marginal effects are calculated for each individual then average across the sample. All estimated parameter coefficients are significantly different from zero at least at the 95% confidence level except for the coefficient on Hispanic and the intercept (1977); Hispanic, Black, and Other Race (1984); and Married Spouse Present (1994). All dollar values are inflated to 2004 values using the CPI.