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THE EARNED INCOME TAX CREDIT AND THE LABOR SUPPLY OF MARRIED COUPLES

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Abstract

In tax year 1997, 18.1 million taxpayers are expected to take advantage of the EITC, at a total cost to the federal government of about 25 billion dollars. The EITC transfers money to lower-income working families with children. The credit is refundable so that a taxpayer with no federal tax liability, for example, would receive a tax refund from the government for the full amount of the credit. Advocates argue that this redistribution occurs with much less distortion to labor supply than is caused by other elements of the welfare system. In particular, the credit is said to encourage labor force participation.

In this paper, we consider the impact of the EITC on the labor supply decisions of married couples. The EITC looks strikingly similar to the standard AFDC program for the vast majority of secondary earners. This occurs because the credit is based on *family* earnings. We study the labor supply response of married couples to the 1986, 1990 and 1993 expansions in the earned income tax credit using CPS data from 1984-1996. We present two different approaches to estimating the impact of these EITC expansions on labor supply. First, we evaluate the expansion of the EITC using quasi-experimental methods where we compare changes in labor supply among EITC eligible and ineligible groups. Second, we estimate reduced form labor supply models that use both cross-sectional and time variation in taxes, gross wages, and income to identify wage and income effects.

Our results suggest that the EITC expansions over the past decade *increased* the likelihood of married men's labor participation only slightly but *reduced* the likelihood of married women's labor force participation by up to a full percentage point. Further, we find evidence that taxpayers already in the labor force respond to the disincentives in the flat and phase-out regions by reducing their annual hours worked. Overall, the evidence suggests that family labor supply fell after the expansion of the EITC.

1. INTRODUCTION

After major expansions in the tax acts of 1986, 1990, and 1993, the Earned Income Tax Credit (EITC) has become the largest cash-transfer program for non-elderly lower-income families. In tax year 1997, 18.1 million taxpayers are expected to take advantage of the EITC, at a total cost to the federal government of about 25 billion dollars. Just one decade earlier, only 7 million taxpayers claimed 2 billion dollars of the EITC. By the year 2000, the EITC is projected to benefit 19 million taxpayers and cost almost 30 billion dollars [Ways and Means Committee 1996].[1]

The EITC transfers money to lower-income working families with children. The credit is refundable so that a taxpayer with no federal tax liability, for example, would receive a tax refund from the government for the full amount of the credit. In 1996, the maximum credit was $2,152 for a taxpayer with one child and $3,556 for a taxpayer with two or more children. Advocates argue that this redistribution occurs with much less distortion to labor supply than is caused by other elements of the welfare system. In particular, the credit is said to encourage labor force participation.

In fact, the EITC creates a complicated and ambiguous set of labor supply incentives. Standard labor supply theory does indeed predict that the EITC will encourage labor force participation. This occurs because the EITC is available only to taxpayers with earned income. But theory also predicts that the credit reduces the number of hours worked by most eligible taxpayers already in the labor force. While the credit initially increases with income, producing offsetting income and substitution effects on hours worked, over seventy percent of recipients have incomes in regions in which the credit is constant (and therefore produces only a negative income effect on labor supply) or is being phased out (producing negative income and substitution effects). Moreover, the phase-out of the credit alters the budget set in such a way that some taxpayers with

[1]In contrast, federal spending on Temporary Assistance to Needy Families (TANF), which block grants Aid to Families with Dependent Children (AFDC), is fixed at 16.4 billion dollars per year through the year 2001 [U.S. House Ways and Means Committee 1996].

incomes beyond the phase-out region may choose to reduce their hours of work and take advantage of the credit. In fact, cumulative marginal tax rates can be quite high in the phase-out region. In 1996, a taxpayer with two children and income between $11,610 to $28,495 faces a net marginal tax rate of 50 percent.[2]

In previous work, Eissa and Liebman (1996) examined the labor supply response of unmarried women with children to the 1987 expansion of the EITC passed as part of the Tax Reform Act of 1986 . That analysis found that while unmarried women with children were more likely to enter the labor market after the expansion, they did not work fewer hours once they entered the labor market. The results imply that due to this expansion, by 1989 female household heads worked 37 more hours per year than in 1985.

In this paper, we consider the impact of the EITC on the labor supply decisions of married couples. Our interest in married couples derives from several observations. The first observation is that the EITC looks strikingly similar to the standard AFDC program for the vast majority of secondary earners. This occurs because the credit is based on *family* earnings. To see how this effect operates, consider a family with earnings just beyond the flat region by virtue of the primary earner's income. In that case, the family receives the maximum credit if the non-working spouse remains out of the labor force. If the the secondary earner chooses to work, the family loses benefits at the rate of 17.68 and 21 cents per dollar of earnings. In fact, the secondary earner could face total marginal tax rates on the order of 50 percent upon entering the labor force. The second observation is that the potential labor supply response is likely to be likely to be substantial for affected groups as empirical research suggests that the labor force participation of secondary earners, typically married women,

[2]We assume that the full incidence of payroll taxes falls on the worker. The net marginal tax rate is the share of the worker's marginal revenue product that is paid in taxes and lost benefits. A worker whose gross pay is $10 an hour would have a marginal revenue product of $10.765, since the employer pays half of the OASDHI payroll tax. After subtracting $1.50 for federal income tax, $.60 for state income tax, $.765 for the employee's share of OASDHI, and $1.768 in lost EITC payments, the taxpayer has a net of tax and benefits hourly wage of $5.367. Dividing the total tax and lost benefits $5.398 by $10.765 yields a marginal tax rate of 50.1 percent. If some of employee compensation is in untaxed benefits then this is an overstatement of marginal tax rates.

is particularly sensitive to taxes [Triest 1992].[3] The final observation is that these incentives affect a significant portion of the EITC population: in 1994 married couples represent about one-third of recipients or about 40 percent of the phase-out population [General Accounting Office (GAO) 1996].

We study the labor supply response of married couples to the 1986, 1990 and 1993 expansions in the earned income tax credit using CPS data from 1984-1996. We present two different approaches to estimating the impact of these EITC expansions on labor supply. First, we evaluate the expansion of the EITC using quasi-experimental methods where we compare changes in labor supply among EITC eligible and ineligible groups. Second, we estimate reduced form labor supply models that use both cross-sectional and time variation in taxes, gross wages, and income to identify wage and income effects.

We examine the impact of the EITC on standard measures of labor supply (labor force participation, total hours worked, and hours worked conditional on working) separately for the husband and wife. Our main estimates are based on a sample of married couples with less than 12 years of schooling, chosen because they are most likely to be affected by the EITC. Our results suggest that the EITC expansions over the past decade *increased* the likelihood of married men's labor participation only slightly but *reduced* the likelihood of married women's labor force participation by up to a full percentage points. Women whose husband's earnings are beyond the phase-in region are more than 2 percentage points (6 percent) less likely to participate in the labor force because of the credit.

Further, we find evidence that taxpayers already in the labor force respond to the disincentives in the flat and phase-out regions by reducing their annual hours worked. In couples with family earnings in the phase-out region, married women are predicted to work as much as 172 fewer hours per year. Overall, the evidence suggests that family labor supply fell after the expansion of the EITC.

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[3]Although two-thirds of married women are labor market participants, about 81 percent reported earnings that were less than their spouses' in the 1995 March Current Population Survey.

The remainder of the paper is as follows. Section 2 describes the important features of the EITC, reviews the existing literature, and discusses the expected effects of the credit on family labor supply. Section 3 outlines our empirical methodology. Our data is summarized in Section 4. Sections 5 and 6 present our results. Concluding remarks are provided in section 7.

2. Background

2.1 Operation and History of the EITC

The earned income tax credit began in 1975 as a modest program aimed at offsetting the social security payroll tax for low-income families with children. After major expansions in the tax acts of 1986, 1990, and 1993, federal spending on the EITC (including both tax expenditures and outlays) is projected to be 1.7 times as large as federal spending on Temporary Assistance for Needy Families (TANF) in 1996.

A taxpayer's eligibility for the earned income tax credit depends on the taxpayer's earned income (or in some cases adjusted gross income), and the number of qualifying children who meet certain age, relationship and residency tests. First, the taxpayer must have positive earned income. Earned income is the sum of wage and salary income, business self-employment income, and farm self-employment income. Also, the taxpayer must have adjusted gross income and earned income below a specified amount (in 1996, maximum allowable income for a taxpayer with two or more children was $28,495). Second, a taxpayer must have a qualifying child: a child, grandchild, stepchild, or foster child under the age of 19 (or 24 if a full-time student) or permanently disabled who lived with the taxpayer for more than half the year.[4] Until 1991, the rules for EITC eligibility were more complicated and depended on the taxpayer's filing status.[5]

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[4]Beginning in 1994, a small credit is available to low-income workers without children.

[5]Before 1991, a taxpayer could claim the EITC only if he or she used a filing status of married filing jointly, head of household, or surviving spouse. A married taxpayer could claim the EITC only if he or she claimed a dependent child on his or her tax return, and the child lived with the taxpayer for more than six months during the year. An unmarried taxpayer filing as head of household did not have to claim the child as a dependent in order to be eligible for the EITC,

The credit is refundable so that a taxpayer with no federal tax liability, for example, would receive a tax refund from the government for the full amount of the credit. Taxpayers may also receive the credit throughout the year with their paychecks; but in 1989, the most recent year for which data are available, less than one-half of one percent of all EITC recipients availed themselves of this early payment option [GAO 1992].

The amount of the credit to which a taxpayer is entitled depends on the taxpayer's earned income, adjusted gross income, and, since 1991, the number of EITC-eligible children in the household. There are three regions in the credit schedule. In the phase-in or subsidy region, the family receives a credit equal to the subsidy rate times their earnings. In the flat region, the family receives the maximum credit. In the phase-out region, the credit is phased out at a some phase-out rate.

Table 1 summarizes the parameters of the EITC over the history of the program. The real value of the credit increased only modestly in the early years and was mostly due to inflation[6]. The 1987 expansion of the EITC, passed as part of the Tax Reform Act of 1986 (TRA86), represents the first major expansion of the EITC. TRA86 increased the subsidy rate for the phase-in of the credit from 11 percent to 14 percent and increased the maximum income to which the subsidy rate was applied from $5000 to $6080. This resulted in an increase in the maximum credit from $550 to $851 ($788 in 1986 dollars). The phase-out rate was reduced from 12.22 percent to 10 percent. The higher maximum credit and the lower phase-out rate combined to expand the phase-out region. Taxpayers with incomes between $11,000 and $15,432 became eligible for the credit and faced its phase-out marginal tax rate for the first time in 1987. The constant or flat region was

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but, in order to file as head of household, the taxpayer must have paid more than half the cost of keeping up the home. Therefore, both married filers (through the rules for claiming a dependent) and head of household filers were required to meet a support test. AFDC payments are not considered support provided by the taxpayer. Consequently, a taxpayer with $6000 in AFDC income and $5000 in earned income was not eligible for the EITC under pre-1991 rules.

[6] The EITC was first indexed to inflation in 1987.

lengthened in 1988, further extending the phase-out region to $18,576.[7]

The 1991 expansion, contained in the Omnibus Reconciliation Act of 1990 (OBRA90), increased the maximum credit, and introduced separate credit rates for families with two or more children. By 1993, a family with two or more children could receive a maximum credit of $1,511, $77 more than a family with one child.

The largest expansion over this period was contained in the Omnibus Reconciliation Act of 1993 (OBRA93) legislation. The 1993 expansion of the EITC, phased in between 1994 and 1996, led to an increase in the subsidy rate from 19.5 percent to 40 percent (18.5 to 34 percent) and an increase in the maximum credit from $1,511 to $3,556 ($1,434 to $2,152) for taxpayers with two or more children (taxpayers with one child). This expansion was substantially larger for those with two or more children. The phase-out rate was also raised, from 14 percent to 21 percent (13 to 16 percent) for taxpayers with two or more children (taxpayers with one child). Overall, the range of the phase-out was expanded dramatically, such that by 1996 a couple with two children would still be eligible with income levels of almost $30,000.

2.2 Expected Effects of the EITC on Family Labor Supply

The effect of the EITC on family labor supply depends on the model of labor supply assumed to hold at the household level and on the distribution of earnings within the family. In our analysis, we rely on the static labor supply model in which a taxpayer facing a fixed wage chooses hours of work to maximize utility over leisure and after-tax income.

It is instructive to begin with the impact of the EITC on an unmarried taxpayer. Figure 1 shows how

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[7]The 1987 expansion of the EITC also interacted with other tax changes implemented after the Tax Reform Act of 1986 (TRA86). The tax schedule was collapsed from 11 to 2 nominal brackets and some taxpayers at the bottom of the income distribution found their marginal rates rose from 0 and 11 percent to 15 percent, while other found their marginal rates fell from between 16 and 24 percent to 15 percent. TRA86 also increased exemption amounts and the standard deduction.

the introduction of an EITC shifts the budget constraint of an otherwise untaxed individual from ADE to ABCDE. Under the new budget constraint, every choice of hours (or equivalently pre-tax earnings) produces at least as much after-tax earnings (and utility) as it did before the earned income tax credit was introduced. The well-being of a taxpayer who does not work has not changed because the earned income tax credit is not available to a taxpayer with zero earnings. Thus any taxpayer who preferred working before will still prefer working, and some taxpayers may find that the additional after-tax income from the EITC makes it worth entering the labor force. The impact of the EITC on the labor force participation of unmarried taxpayers is therefore unambiguously positive.

The impact of introducing an EITC on the hours of work of a taxpayer already participating in the labor market depends on which region of the EITC the taxpayer was in before the credit was introduced. For a worker in the phase-in region of the credit (segment AB in Figure 1), the effect on labor supply is theoretically ambiguous: the credit subsidizes the worker's wage so that the substitution effect encourages additional hours while the income effect causes hours to decrease. For a worker in the constant or flat region (segment BC in Figure 1), there is only an income effect, reducing hours. In the phase-out region (segment CD), the EITC unambiguously reduces labor supply since there is both a negative substitution effect from the credit being phased out and a negative income effect from the additional income the credit provides to the taxpayer. Beyond the credit region, taxpayers may decide to reduce their hours of work and receive the credit. The overall effect on labor supply, therefore depends on the size of the increase in participation relative to the likely reduction in hours worked among labor market participants.

While the single earner case is quite straightforward, considering the expected effects of the EITC on married couple's labor supply is more complicated. Two common approaches to family labor supply exist in the literature. The most basic approach assumes that the wife takes her spouse's earnings as given and then determines her own work behavior, so that her hours of work are determined by her own wage and the

family's unearned income that includes the husband's earnings. The husband, on the other hand, takes no account of the wife's earnings in deciding how many hours to work.

In this case, the effect of the credit on the labor supply of primary earners is the same as single taxpayers: labor supply is predicted to increase and hours of work for those in the flat and phase-out ranges of the credit are expected to decrease. Existing research, however, shows that male labor supply is largely unaffected by taxes and transfers [MaCurdy 1992], so this response may not be large. Secondary earners, on the other hand, have been found to be more responsive to changes in wages and income (Killingsworth and Heckman 1986, Mroz 1987). The impact of introducing an EITC on the participation and hours of work of a secondary earner already working depends on which region of the EITC the family was in before the credit was introduced. Because over 80 percent of married couples receiving the EITC have incomes beyond the phase-in region, the EITC is predicted to unambiguously reduce labor supply through negative income and substitution effects. In this case, the budget set for the secondary earner looks identical to that faced by AFDC recipients: The family is eligible for a substantial transfer if the woman does not work, that is "taxed away" as she increases her work effort.

A more general approach to family labor supply assumes that family members have common preferences. The husband and wife maximize a joint utility function subject to a common budget constraint. This model implies responses to taxes that are very similar to the secondary earner model. Treating family leisure as a composite good, the model predicts that an equi-proportionate change in the net wage for all family members can be shown to increase labor supply of all family members by an equal proportion. This model also allows tax changes to affect labor supply through additional channels. An increase in the after-tax wage generates an own compensated effect and a cross-compensated effect on the spouse. The cross-wage effect will be positive (negative) if leisure of the husband and wife are complements (substitutes). If the cross wage effect

is zero, an increase in the after-tax wage affects the spouse's labor supply only through an income effect.[8]

2.3 Previous Research

While a substantial amount of work has examined the effects of taxes and transfer programs on labor market participation, very little has examined the effects of the Earned Income Tax Credit.

Because the EITC changes the budget set in a straightforward manner one can, in principle, impute its effects using static labor supply elasticities from the literature. Several studies have used standard elasticity estimates from the literature [Browning 1995] and the negative income tax experiments [GAO 1993, Hoffman and Seidman 1990, and Holtzblatt et al. 1994] to predict the impact of the credit. Browning estimates that about half of the taxpayers in the phase-out regions of the credit will reduce hours of work by enough so that their total disposable income declines.

Simulating the effect of the EITC on labor supply using labor supply responses in the literature is problematic because the estimated responses may not applicable to the EITC population. Almost none of the labor supply research that examines the response of married couples focuses on lower-income individuals.[9] The simulated effects would be incorrect if responses to taxes vary by income. The work that examines lower-income individuals is either based on female heads of households, who exhibit very different labor supply behavior than secondary earners, or the negative income tax experiments (NIT). Extrapolating the NIT results to the more widely implemented EITC is difficult because the experiments were implemented for only a fixed time in a small number of cities [see Moffitt and Kehrer 1981].

Several studies have directly examined the labor supply effects of the EITC [Dickert, Hauser and Scholz

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[8]A third model that has been developed in recent years treats family supply decisions within a household bargaining model (McElroy 1990). The empirical implementation of these models is somewhat undeveloped and we do not consider them at this time.

[9]One exception is Hoynes (1996) who estimates the effect of AFDC benefits on the labor supply of married couples. This work suggests that low-income couples may have higher wage and income elasticities than the overall population of married couples.

1995, Eissa and Liebman 1996, Meyer and Rosenbaum 1997, Attanasio and MaCurdy 1997]. Eissa and Liebman examined the impact of the 1986 expansion of the EITC and found that while labor force participation of female heads of households increased, annual hours worked by taxpayers in the phase-out region did not decline as predicted by economic theory. They estimated that by 1989, labor force participation increased by up to 3.6 percentage points (from a base of 74 percent) and total hours increased by 37 hours per year. Meyer and Rosenbaum (1997) confirm these findings and further conclude that the EITC explains over half of the substantial increases in the labor force participation of single women with children over the past decade.

Two studies examine married couples. Dickert, Hauser and Scholz use SIPP data from 1990 to estimate the effects of the EITC on labor force participation and AFDC participation. Their results suggest that expanding the EITC leads to higher labor force participation rates for men and lower labor force participation rates for women. Because they use a single cross-section, the variation in the EITC comes purely through family size, and the identification of their wage and income effects derive from variation in demographics and wages.

Attanasio and MaCurdy (1997) use data from the Consumer Expenditure Survey to look at the effects of taxes on annual hours worked (for workers) and family consumption using a life-cycle consistent model of household labor supply. Their analysis focuses on the response of *workers* to changes in taxes where labor force participation is used only to adjust for selection. As such, their analysis does not examine the impact of the EITC on participation. They use an instrumental variables estimator where the instruments are polynomials in age and education, state dummies, and year dummies interacted with region. While their simulations suggest substantial effects of the credit expansion on hours worked, they do not provide any test statistics on the validity of their instruments.

3. Methods

We use two approaches to estimating the impact of the EITC on labor supply, including approaches based on policy "experiments," and reduced form labor supply equations. We present results from alternative estimation approaches for several reasons. First, it is important to see how robust our estimates are to alternative empirical models, each having different identification assumptions. Second, while using a policy experiment approach may appear to be attractive in this case, we find it difficult to find convincing comparison groups. Ultimately our interest is to use the labor supply results to make normative statements about the design of the EITC and other low income transfer programs. While illustrative, estimates of the effect of a particular expansion in the EITC are insufficient because they do not separate income and substitution effects.

Each of the empirical models has different identifying assumptions, discussed below in the context of the particular model. We mention here several assumptions that are maintained throughout our empirical work. We assume a static model of labor supply.[10] Empirical evidence suggests that unearned income is exogenous in labor supply of married women (Mroz 1987). We maintain the assumption of exogenous unearned income for both husbands and wives.[11] In addition, wives are assumed to be secondary earners in the household.[12] As such, husbands' unearned income includes cash transfers and asset income, while wives' unearned income adds the earnings of the primary earner. Although the EITC expansions changed the incentives to marry and have children (Dickert and Houser 1997) we assume no change in marriage or

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[10] Our results would be biased if tastes for work and saving are correlated (Heckman 1982) or if asset accumulation profiles are not flat over the life-cycle (Blundell 1986).

[11] Transfer income may not be exogenous to labor supply. Because we focus on lower-income families, we are especially concerned about the endogeneity of two types of transfer income– unemployment insurance and public assistance. We made two attempts to gauge the bias caused by ignoring this endogeneity: we dropped all couples which received unemployment insurance or public assistance, and we recomputed unearned income excluding these two sources. In neither case did estimates of the income effect change substantially. As a result, we present results that maintain the assumption of exogenous unearned income.

[12] CPS data shows that low educated women are predominantely secondary earners when measured by the share of family earnings they contribute. About 90 percent contribute less than half of the family earnings. We plan to relax this assumption in future work.

fertility.[13] To capture the group most likely to be affected by the EITC, we concentrate our empirical results on a sample of married couples with low education levels.

3.1 Tax Reforms as Quasi Experiments

Our first estimation strategy considers how labor force participation and hours worked of eligible married couples with children change following OBRA93, the most recent and largest expansion in the EITC. We rely on time to identify the responsiveness to the EITC. Since there may be underlying trends in participation or hours of work and there may be other policy or economic shocks that affect labor market outcomes, we use control groups to allow us to isolate the impact of the increase in the EITC from the other factors.

Throughout the analysis, married couples with children are the treatment group and similar married couples with no children are the control group.[14] This approach is similar to that used by Eissa and Liebman (1996). By widening the gap between the first and second child credit, the 1993 expansion creates different incentives for families of different sizes and allows an additional degree of variation to identify the EITC effect. The difference between the change in labor supply of eligible husbands (wives) with children and husbands (wives) with no children is our estimate of the EITC effect on participation. We therefore control for any contemporaneous shocks to eligible couples' labor supply through the change in the comparison groups' labor supply.. The validity of the comparison groups, and the experiment, rests on fairly restrictive assumptions: no contemporaneous shocks (other than the expansion in the EITC) to the relative labor market outcomes over

[13] To support our assumption of exogenous family structure, we rely on the findings of the substantial literature evaluating the effect of welfare programs on family structure (see reviews by Moffitt 1992, and Hoynes 1997). We also examined the CPS data between 1984 and 1996 and found an *increase* in the proportion of married couples without children, and a slight decrease in the proportion of both one child couples and two or more children couples.

[14] We also explored using treatment groups defined by having predicted family income (based on exogenous characteristics such as age, race, state, and education) below the EITC maximum. In practice, it is hard to find models that predict family earnings with significant precision. No results are provided for this model.

the period; and no underlying trends in participation or hours of work that differ between the two groups.

3.2 Estimating Wage and Income Effects Using the EITC and Other Tax Changes

The quasi-experimental approach above relies on family size (presence and number of children) and the timing of the policy change to identify the effect of the EITC. Here, we expand on that approach by using wages, non-labor income, and taxes to create variation in the size of the EITC "treatment." We use a tax simulation model to generate marginal and average tax rates that are used to calculate after-tax wages and net non-labor income. Our tax calculator simulates federal income taxes (including the EITC) and social security payroll taxes. We use data covering the period 1984-1996 thereby exploiting fully the federal tax reforms that occurred over this time. We separately analyze the impact on labor force participation and hours worked by taxpayers in the labor force.

Labor Force Participation

We start with the assumption that individuals make labor supply decisions by maximizing utility subject to a budget constraint that takes into account tax and transfer programs. As an approximation, suppose that individuals choose between not working, and working at some fixed level of effort. The employment decision results from comparisons of net of tax income in the no-work state to net income associated with labor market participation (at the fixed level).[15] Specifically, we model labor force participation as a function of net of tax non-labor income (net income in the no-work state) and the average net-of-tax wage associated with labor market entry at the fixed level. The wage effect on participation is expected to be positive and the income effect to be negative. We estimate models for entry at part-time or full-time employment.

These wage and income effects are identified by cross-sectional and policy variation. Net non-labor

[15]By standardizing the hours of work choice, we are effectively allowing for leisure to enter the utility function.

income and average net wages are a function of gross non-labor income (which for the wife includes the husband's earnings), gross wage rates, and the parameters of the tax system. Taxes depend on year, number of children, and the gross level of unearned income. Under our maintained assumptions, these factors are exogenous to the labor force participation decision and standard discrete choice models can be used.

Hours of Work

Static labor supply models with taxes imply that hours worked depend on the net wage and virtual income associated with the individual's observed hours of work. Estimating the effects of taxes on labor supply is notoriously difficult because of the endogeneity of marginal tax rates and virtual income to observed hours with non-proportional tax schedules, because of unobserved tastes for work, and because of measurement error in both the marginal tax and wage. Labor supply estimates based on OLS can be therefore be severely biased. (These are the very considerations that motivate the use of tax reforms as quasi-experiments.)

In this second approach, we use instrumental variables (IV) methods to address the endogeneity of the net wage and virtual income. Instrument sets used previously in the literature include the gross wage and taxable unearned income (Triest 1987), demographic characteristics such as education, age, home-ownership and region (Flood and MaCurdy, 1993), and tax parameters and demographics (Blundell *et al,* 1996). Using Monte Carlo simulations, Triest finds that "the instrumental variables estimator produces parameter estimates that are very similar on average" to the complete budget constraint estimator when the budget set is measured with error [Triest 1987]. Blomquist (1995) on the other hand argues that no estimator is uniquely best. In these models, it turns out that the form of measurement error in the data matter for the robustness of the estimator. Blomquist also rejects that demographic variables are valid instruments for wages and virtual income, arguing that they are subject to small-sample bias because the R^2s on the first stage are low. It is also hard to argue that transformations of observable characteristics are not correlated with the error term in the hours-worked equation.

We use two sets of instruments in our analysis. The first set, IV1, includes the EITC tax parameters, a variable for the location of the first non-EITC kink in the budget constraint, and EITC tax parameters interacted with education and cohort dummies. This instrument set is motivated by the Blundell et al approach[16]. Our second set, IV2, includes imputed marginal tax rates at $5,000 intervals up to $100,000. These tax rate calculations take account of the EITC, federal and social security payroll taxes.[17] To be valid, these instruments must be correlated with the endogenous variables (net wage and virtual income), but not with the error in the hours-worked equation. The instruments depend only on year, number of childrem and level of nonlabor income and are exogenous under the maintained assumptions in the paper. Nonetheless, to assess their validity, we present all relevant test statistics in the paper.[18]

4. Data

The data we use are from the 1985 to 1997 March Current Population Surveys. The March CPS is an annual demographic file of between 50,000 and 62,000 households. It includes labor market and income information for the previous year, so the data we have are for tax years 1984 to 1996. This provides us with

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[16]Following Blundell et al., we also included in our instrument set education and cohort dummies to capture non-tax changes in the gross wages for the period. In practice, we found those variables to be correlated with the residual in the hours equation and always failed the exogeneity test. This instrument set could also be expanded to include other parameters of the tax system that operate at points above the EITC. In practice, parameterizing these tax features can be very complicated because we use data spanning a period of 12 years.

[17]Specifically, we calculate the slope of the individual's budget set at $5,000 increments in their own earned income. By including these up to $100,000 in earned income, we intend to capture the curvature over the budget set. It is important to note that we use increments in earned income as opposed to hours worked to avoid possible confounding effects associated with individual wages. We do, however, include non-labor income in the calculation of the marginal tax rate at these earnings points. For women, because of the secondary earner model, this includes the earnings of the husband. Our instrument set therefore varies both over time and across taxpayers. The exogeneity of our instrument set then depends on how valid the assumption of exogenous unearned income is in practice.

[18]Yet a third possible method of estimating the labor supply responses is driven by the presence of several features of labor supply decisions with taxes. Nonlinear budget sets present several challenges noted extensively in the literature, including biased estimates driven by kink points and unobserved heterogeneity in tastes. IV methods do not address these problems because they linearize the budget constraint at observed hours. We choose not to present this approach in this paper and instead leave it to future work. We should point out that while constraints imposed to make nonlinear budget set models tractable appear to be binding and to heavily influence the results (Heckman 1982, MaCurdy et al. 1990), the expansions of the EITC and other tax policy reforms may actually allow us to relax some of the binding restriction.

a sample that covers all three of the EITC expansions outlined in Table 1. We choose to begin our time period just prior to the expansion in the Tax Reform Act of 1986 because it represents the first major expansion since the introduction of the EITC in 1975.

The CPS has information on households, families and individuals. However, the relevant unit of analysis for this study is the tax-filing unit. Our tax-filing units are based upon CPS families. Therefore, subfamilies (both related and unrelated) are allocated to separate tax-filing units from the primary family. We consider any member of the tax-filing unit who is under the age of 19 (or under 24 and a full-time student) to be a dependent child for tax purposes. We do not impose the support test for dependents because we do not have enough information to impose the EITC six-month residency test.

The sample includes married couples residing in the same household, who are between 25 and 54 years old. We exclude those couples where one spouse was ill or disabled, in the military, or in school full time during the previous year. We also exclude any couple with negative earned income (due to negative self-employment income), negative unearned income, or with positive earned income but zero hours of work.[19] The resulting sample size, after pooling all twelve years and including all education groups, is 182,958 observations.

Figure 3 plots the average EITC for the sample of married couples by family income and number of children for the years 1984, 1990, and 1996. The figures clearly show the average increase is large for many lower income families. To isolate the group most likely to receive the EITC, we limit our analysis to families with low education levels. Specifically, we limit the sample to couples where the wife has less than a high school education.[20] This reduces the sample size to 22,863 observations. Results for higher education groups

[19]We also exclude families with taxable unearned income in excess of 30,000 (in 1995 dollars). This group would not be eligible for the EITC in any year during this period. We drop couples where either the husband or wife has hourly earnings less than $2 or over $100 per hour (in 1995 dollars) or who derives more than half of their earned income from self-employment.

[20]Married female's education is highly correlated with their spouse's education (0.67 in our sample). We experimented with classifying groups based on husband education and the qualitative results were unchanged.

are included for comparison.

Table 2 presents summary statistics of the demographic characteristics of the low educated sample of married couples by presence and number of children. Separate statistics are presented for the husband and the wife. Men with children are younger, less likely to be non-white, and have lower wages and non-labor income compared to married men without children. All three groups of married men have similar levels of education and labor market attachment. Women with children (especially those with two or more children) have lower levels of labor supply than those without children. Like the men, married women with children are younger with lower non-labor income and wage levels compared to those without children.[21]

Although informative, means of demographic characteristics mask potentially important differences between couples with and without children. For example, figures 2a and 2b present the age distributions of men and women by education of the wife and presence of children. The figures show that married men and women with children are at very different points in the life cycle than those without children, which are either older or younger than couples with children. This is especially true for the low education group. In the regressions, we address the concern that labor supply patterns may exhibit cohort-specific shocks that vary by children.

5. Quasi-Experimental Results

5.1 Basic Findings

Table 3 presents unweighted sample means for labor force participation rates and annual hours worked for the experimental groups (with one and more than one child) and comparison group (no children) in the years before and after OBRA93, separately for males and females.[22] In each panel, the first column corresponds

[21]Starting with the 1992 CPS, the education variable coding changed. In order to have consistency across the years in our sample, we "back-coded" the education data from 1985-1991 to match the coding from 1992+.

[20] OBRA93 supplanted expansions passed as part of OBRA90. We refer to the OBRA93 expansion for ease of exposition.

to the labor supply prior to the 1993 expansion of the credit; the second column to the average after the expansion; and the third column to the change in participation. The difference-in-difference estimate of the participation response is in the last column. We define the before period as tax years 1989-1993, and the after period as 1994-1996. All results are for the low education sample.

These unconditional means are consistent with the expected effects of expanding the EITC. First, over the OBRA93 expansion, married men with children increased their labor force participation relative to those without children, with largest increases for those with two or more children. Panel A in Table 3 shows that the participation rate rose by 0.3 percentage points for men with at least two children and fell by 0.6 percentage points for men with one child. Men with no children decreased their labor supply by 1.3 percentage points, leading to an estimated participation response of 1.6 percentage points (with a standard error of 1.0) for married men with more than one child and 0.7 percentage points for married men with one child (with a standard error of 1.2). These participation effects are driven in large part by the significant reduction in the participation rate of the comparison group. This suggests that these results should be interpreted with caution because the estimates will depend heavily on the quality of the comparison.

Second, married women decreased their labor force participation, with largest reductions for those with two or more children. Panel B in table 3 shows that the participation rate fell by 2.6 percentage points for those with more than one child and by 0.1 percentage points for those with one children. Relative to the (again substantial) change by comparison group (married women without children), these figures suggest a participation response of -4.3 and -1.8 percentage points respectively.

Panels C and D present analogous figures for total hours worked during the year. Deriving predictions for hours of work are somewhat difficult and must take account of the distribution of taxpayers along the budget constraint before the expansion and the different incentives they face. However, over 80 percent of married taxpayers are in the flat to phase-out regions of the EITC, where hours worked are predicted to unambiguously fall. We should expect that hours fall for *working* men and women with children relative to

those with no children, and that hours fall more for taxpayers with more than one child. The net effect on total hours worked depends on the relative size of the participation and hours worked effects for *workers*. We present here only the total hours response.

The estimates show that hours worked for married men with children increased relative to those without children. The observed hours worked patterns are not inconsistent with that expected from the EITC expansion if the labor force participation response is stronger than the hours worked response. This would occur if these two margins have different elasticities as some evidence suggests (Triest 1992) or if individuals do not perceive the marginal effect of the credit and therefore respond only on the participation margin. Married women with children decreased hours relative to those without children.

Appendix table 1 shows that the labor force patterns observed for the low educated sample is observed neither for the high school group, nor the beyond high school group. In fact, the pattern for women with a high school degree and more than high school education is reversed: women with more than one child increased labor force participation more than those with only one child. Although total hours worked increased for essentially all groups, the relative increase in hours worked by males with more than two children is greatest for less educated men.

Overall these results suggest that the labor force participation and total hours worked by married couples did respond in a way that is consistent with the expansion of the earned income tax credit. Low education males with larger family sizes increased their participation rate by more than married males with smaller family sizes. As expected, the reverse held for their spouse's participation rates. Although the interpretation of these results is somewhat tenuous, we show in the next section that systematic differences in the observable characteristics of affected and comparison groups do not explain the observed behavior.

5.2 Regression Results for Policy Experiments

We compare couples affected by the EITC expansion to couples not affected (without children).

Because the groups differ in demographic characteristics, any observed differences in labor supply outcomes may reflect underlying observable and unobservable differences rather than a treatment effect. Controlling for demographic characteristics in a regression framework is important if the composition of the treatment or control groups changes over time and some demographic characteristics are correlated with the dependent variable. In addition, controlling for demographic characteristics reduces the residual variance of the regression and produces more efficient estimates. Our basic specification is quite standard:

$$y_{it} = f(\alpha + \beta Z_{it} + \gamma_0 kids_i + \gamma_1 post93_t + \gamma_2 (kids*post93)_{it})$$

where y is labor supply (measure as labor force participation and hours worked during the previous year). Z_{it} is a vector that includes the usual characteristics (family size, number of preschool children, age and education and their polynomials, unearned income, race and state dummies) to control for observable differences between the experimental and comparison groups. Unobservable differences are controlled for by the variable *kids* which is equal to 1 for any male (female) who is eligible for the credit, defined as having qualifying children. ***Post93*** is a dummy equal to 1 for any tax year after 1993. A test of the impact of the 1993 expansion of the EITC is a test that eligible, married men (women) with kids changed their participation after 1993 relative to married men (women) in the control group. It is a test that $\gamma_{2,}$, the coefficient on the interaction term between ***post93*** and ***kids***, is different from zero.

Table 4 presents results for labor force participation and annual hours in which we use the presence of any children as our measure of eligibility for the EITC. The estimated average treatment effects in this regression framework are very similar to the unconditional estimates in Table 3. Men increased labor force participation by 0.9 percentage points while women reduced their labor force participation by 3.1 percentage points.[23] Hours worked increased by 83 hours per year for men and fell by 34 hours per year for women.

[23]The probit is a nonlinear model; therefore, the coefficients cannot be used directly as marginal effects. Since the treatment effect variable (*kids*post93* interaction) is discrete, we calculate the effect of the OBRA93 by predicting two

These results suggest that any changes in the demographic composition of the treatment and control groups that occurred over time are not correlated with the treatment.

The coefficients on demographic characteristics all have the expected signs for both the participation and hours worked equations. Unearned income lowers labor supplied by both men and women. The number of children has a small on the labor supply of married men, but a large and strongly significant effect on the labor supply of married women. In our sample, older individuals have higher participation rates and annual hours younger individuals.

To exploit the variation in incentives by the number of children, we estimate a model allowing the EITC effect to vary withe the number of children. Panel B of Table 5 presents the results. The first row of the panel presents the average EITC expansion effects on all couples with children, the second row presents the marginal response of families with two or more children. The total increase in labor force participation of husbands with two or more children is 1.5 percentage points. The overall increase in their annual hours of work is 70.8. The results for wives are striking: they show that almost all the response in on the second child margin. Women with at least two children may be considered true secondary earners and so would be expected to reduce labor supply in response to the 70 percent increase in the maximum credit.

As with the unconditional estimates, the pattern of responses in the regression models differs in the other education groups (see Appendix table 2). Only women with less than 12 years of schooling reduced their participation after the OBRA93 expansions. For men, the labor force participation and hours responses are positive and largest for those with less than 12 years of education.

Overall, the difference-in-difference analysis suggests that changes in demographic characteristics do not explain the general pattern of labor force participation rates and hours of work suggested by the raw means.

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probabilities of participation, one with the interaction variable set equal to one and the other with the interaction term set equal to zero. The treatment effect is the average (over the sample of post 1993 men (women) with children) of the difference in the two probabilities of participation. We use the delta method to estimate standard errors.

Although imprecisely estimated, observed labor supply changes are consistent with the incentives in the expansions of the EITC.

5.3 Sensitivity Tests

To examine the robustness of the quasi-experimental results, we estimated several alternative specifications. Our fundamental concern lies in the quality of the comparison group. The question is whether the treatment effect is simply picking up different long run trends in labor supply trend between those with and without children.

Between 1989 and 1995, the national unemployment rate peaked at 5.1 percent for married men and from 10.0 for women who maintain families (both in 1992). During that period, the trough was at 3.0 percent for married men (1989) and 8.0 percent for women (1995). Such business cycle effects present a problem for the difference-in-differences approach because the choice of years before and after the policy expansion is somewhat arbitrary. We attempt to control for business cycle effects by including state unemployment rates in the regressions. Nonetheless, the choice of years might still affect the results if the state unemployment rate is not picking the total effect of the business cycle. In results not presented here, we find that changing the pre-OBRA93 period to 1989-1990 (instead of 1989-1993) leads to somewhat stronger participation responses in the direction predicted by the EITC expansion for both men and women.

As shown in figures 2a and 2b, the age distribution of those without children is very different from those with children. It is possible that the labor supply changes reflect cohort specific shocks that affect couples with children differently from couples with no children. We augment the basic regression by adding four ten-year birth cohort dummies separately for those with and without children. Panel A of Table 5 shows the results are unchanged: male participation and hours worked increased while female participation and hours worked decreased. Because we reject the equality of the expanded and basic specifications, we maintain the cohort

dummies in subsequent regressions.

Labor supply of married women has been increasing steadily over the past 3 decades (Economic Report of the President 1998). Our concern is that this trend varies by the presence of children in the household. If so then the identification of the estimated EITC effect will be confounded by the differential trends. Panel C in Table 5 presents regression results where we allow for linear time trends for couples with and without children.[24] We also allow for differential cyclical effects by estimating separate unemployment effects for couples with and without children. None of the specifications are statistically different from the no trend specifications. However, the labor force participation response of married women is sensitive to this specification. Controlling for the strongly negative (although statistically insignificant) time trend of 1 percentage point decline per year for those with children leads to a *positive* coefficient on the average EITC effect. In spite of this reversal, the total effect of the EITC expansion on women with two or more children is -0.6 percentage points.[25]

Overall, the Earned Income Tax Credit expansion passed as part of OBRA93 increased participation and hours worked by husbands and reduced participation and hours worked by wives. Between 1989 and 1996, the maximum EITC doubled on average for eligible taxpayers in the sample. We estimate an increase in husband participation rates of about 1 percentage point, and an *increase* in hours worked by about 70 hours. We also estimate a decrease in wife participation by about 3 percentage points, and hours worked by about 35

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[24]In this framework, we can not identify fully unrestrictive time effects for the treatment and control groups. Estimating the EITC effect with the linear trend amounts to looking for a shift in the trend. Similar results were found when we used quadratic time trends.

[25]To further investigate the participation results for married women, we estimated time trend equations for the 1984-1996 period. Our specification includes a general time trend, a separate trend for women with children and a separate trend for women with at least two children starting in 1994. We estimate a decline of 1.8 percentage points per year relative to trend starting in 1994 for women with at least two children (with a standard error of 0.6 percentage points). This evidence, again, is not inconsistent with an expanded credit for couples with two or more children leading to a reduction in the labor force participation of married women. We also take this as evidence that the results for married females are not driven by the redesign of the CPS in 1994 since that should affect the level, not the trend labor force participation.

hours. In results not presented here we find that family labor supply measures (total hours worked for working husband or wife) declined for married couples with children relative to those without children. Further, contrary to theoretical predictions, hours conditional on working increased for husbands with children relative to those without children.

Although controlling for observable characteristics and allowing for different behavior over time by couples with children do not alter our basic findings, we cannot address the more relevant concern: the validity of the comparison group. We therefore estimate the impact of the EITC using models that rely on the variation in after tax wages and income generated by the tax reforms and the sample of married couples with children.

6. Labor Force Participation and Hours of Work in the Presence of Taxes

In this section, we extend our previous analysis by using the extensive variation in after tax wages and incomes resulting from the three major tax acts over the past decade: TRA86, OBRA90 and OBRA93. Between 1984 and 1996, the federal marginal tax rate on the first dollar of taxable earnings fell from 11 percent to -40 percent for EITC eligible taxpayers with two or more children; and the maximum EITC transfer rose from $500 to $3556 in nominal dollars. The tax acts therefore provide substantial identifying variation in the variables of interest. Our tax calculator models the EITC, other federal taxes and social security taxes.[26]

We estimate separate labor force participation and hours-worked models using the sample of married couples with children between 1984 and 1996. We drop families without children because, as described above, we suspect that they face different trends in labor supply over the period that may be correlated with

[26]We assume that all married couples file jointly and take the standard deduction. At this time, our tax calculator does not include state income taxes. Therefore we do not model the presence of the state supplements to the EITC, now available in nine states. These are growing in importance, but were small relative to the federal credit during most of our sample. While in principle these simplifications could lead to measurement problems, in practice our estimated marginal tax rates are very highly correlated with those produced by NBER's TAXSIM model (which includes state taxes and models itemizers).

the tax changes. Further, married couples with children may have systematically different responsiveness to wage and income than their childless counterparts.[27]

6.1 Labor Force Participation

We specify the latent determinant of participation as:

$$P^*_{it} = \alpha + \gamma\, NetN_{it} + \beta\, w_{it}(1 - ATR_{it}) + Z_{it}\delta + \delta_1\, State + \delta_2\, time + \epsilon_{it}$$

where $NetN$ is net non-labor income, w is the gross hourly wage rate, ATR is the average tax rate, and Z is a vector of family and state characteristics similar to those used in the quasi-experimental results. The average tax rate is calculated as the change in net income over the change in gross earnings that results from entering the labor force. Our main results calculate the ATR at full-time (40 hours per week) full-year work. In specification tests, we also use the ATR at part-time (20 hours) full-year work. We assume normality of the disturbance and estimate separate probit equations for the husband and wife.

To account for missing wages for non-workers, we estimate log wage equations for the husband and wife accounting for potential sample selection bias. Variables used to predict wages include characteristics of the individual (age, education, race), state labor market variables (unemployment rate and average hourly wage), and geographic identifiers (metropolitan status). The selection is identified by family characteristics (number of children, presence of young children). We estimate separate wage regressions in each year to allow an unrestricted specification for changes in the wage structure. Because of skewness in the implied (log normal) distribution for wages, median as opposed to mean wages are predicted. To maintain a consistent stochastic specification, predicted wages are used for both workers and non-workers.[28]

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[27]While including married couples without children in the analysis would have the advantage of bringing in additional variation in net wages, elasticity estimates may be biased by different work preferences of married couples with and without children.

[28] Using actual wages of workers would reduce any measurement error induced by our predictions. However, this asymmetric treatment of workers and non-workers can induce systematic differences in the distribution of wages across the

Following the secondary earner model, the primary earner's (husband's) taxes are computed without taking account of the spouse's labor supply choice. For the husband, *NetN* is the family's after tax non-labor income, and *ATR* is a function of his hourly wage, nonlabor income and tax parameters (which vary by family size and year). For the wife, *NetN* includes her husband's observed earnings and family non-labor income, net of taxes. If the family is eligible for the EITC based on the husband's earnings, the wife's *NetN* will include their simulated EITC. In this way, her income effect is in part identified by variation in the family's simulated credit. The wife's average tax rate (*ATR*) is determined by her hourly wage, non-labor income, family size, and tax year. Her average tax rates will therefore depend on which EITC region her husband's earnings place the family. Table 2 shows that mean average net wages at 40 hours per week are about $10 for men and $5.5 for women.

Our average tax rates vary substantially over time and across families (through differences in family size, gross wages, and income). To illustrate the richness of this data, Figures 4a and 4b plot the mean, minimum and maximum average tax rate for men and women by the husband's gross hourly wage for the 1984, 1990, and 1996 tax years. The figures show that the substantial changes in the distribution of tax rates over the period of our analysis are concentrated near the top and bottom of the income distribution. The greatest change at the lower portion of the income distribution is driven by OBRA93's increase of the subsidy rate to 40 percent. Also evident in the figures is that married women's average tax rates are higher and exhibit more cross-sectional variability due to including the husband's earnings in her non-labor income.

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two groups. In particular, among workers, our predicted wage distribution is much more compressed than the actual distribution. Consequently, we overestimate wages at the low end of the distribution, and underestimate wages for those at the higher end of the distribution. Among those eligible for the EITC (e.g. low wage earners) using actual wages for workers can result in higher gross wages for nonworkers than nonworkers. While our main estimates use predicted wages for all, we present estimates where we use actual wages for nonworkers.

6.2 Labor Force Participation Results

Table 6 presents labor force participation estimates for husbands and wives in couples where the wife has less than a high school education (See appendix table 3 for analogous results for couples with more educated wives.) Each specification includes demographics, average net wages, net income, and state and time dummies. We present the marginal effects so the parameters can be interpreted as the effect of a unit change in continuous variables, and of a change from one to zero in discrete variables on the probability of working. Demographic variables have the expected effects. Married couples with more children, younger children, living in areas with higher unemployment rates are less likely to work. White women, ceteris paribus, are less likely to work than non-white women, while white men are more likely to work than non-white men.

As expected, higher average wages and lower non-labor income are associated with higher labor force participation. The parameter estimates imply that a $1 increase in average net wages raises husband participation by 0.3 percentage points (or 0.29 percent) and wife participation by 2.9 percentage points (or 4.2 percent). A $1000 increase in *NetN* is estimated to reduce husband participation by 0.5 percentage points (or -0.49 percent) and wife participation by 0.1 percentage points (or 0.2 percent). Using sample mean wages and non-labor income, the parameters for husbands imply an elasticity of labor force participation of 0.033 with respect to the wage, and -0.008 for income.[29] As expected, participation elasticities are higher for women (0.288 with respect to the wage and -0.038 with respect to income).[30]

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[29]Because participation rates are so high for men (about 96 percent), a relatively small change in participation can imply very different responsiveness when measured against the non-participation rate. Non-participation elasticities are 0.78 with respect to the wage and -0.36 with respect to income.

[30] Appendix table 3 presents the results of sensitivity tests for the labor force participation equations. Expanding the sample to include couples with a high school education generates similar but smaller estimates of labor supply elasticities. Assuming that workers enter the labor market in part-time work does not change the results for men but substantially reduces the wage effect for women. Finally, using the actual wage for workers also reduces the elasticities substantially. We believe that these estimates are biased toward zero by poor wage predictions: our average predicted wage is greater for non-workers than workers. This is a consequence of a compressed predicted wage distribution (with less mass in either tail) relative to the actual distribution. Until we improve on that estimation, we prefer to rely on the estimates that use predicted wages for all individuals.

We now use these wage and income elasticities to simulate the effect of EITC expansions on the labor force participation of married couples with children. For comparison with the quasi-experimental results presented in section 5, we examine the effect of the OBRA93 expansion. Starting with the sample of married couples during 1989-1993 (the pre-OBRA93 group) we first generate the average net wage and net income of each individual in the sample using current year tax law. We then use the post-OBRA93 EITC schedule and recalculate the average wage and net income assuming that all other tax parameters (as well as gross real wages and family structure) remain constant. Applying the parameter estimates in Table 6, we estimate the impact of OBRA93 on labor force participation to be much smaller than suggested by the quasi-experimental results. Married men are 0.1 percentage points more likely to participate in the labor force, whereas women are 0.5 percentage points less likely to be labor force participants.[31] [32]

Relatively modest average labor force participation effects mask substantial variation in the effects of the EITC, however. Tables 7a and 7b present simulated labor force participation responses based on two different groupings of married couples: percentiles of the husband's gross (predicted) hourly wage distribution and regions of the EITC (phase-in, flat, phase-out, above phase-out). The regions of the EITC are assigned using the 1996 EITC schedule, and are based on actual family earnings and adjusted gross income. Table 7a provides simulations of OBRA93 expansion in the EITC and Table 7b provides simulations of the combined effect of expanding the EITC through TRA86, OBRA90 and OBRA93.

The simulations show only low wage men respond the EITC expansion: we observe virtually no change

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[31]To gauge whether our quasi-experimental estimates are within bounds of the likely effects of the EITC expansion, we estimate the largest possible participation effects implied by our results. We find that the largest labor supply responses implied by our results are derived for a married couple in 1993 with two children and each the husband and wife earn the minimum wage and they have no other source of income: 0.6 percentage point increase in labor force participation by men; and a 2 percentage points decrease in the participation rate of women. We consider these to be upper-bound estimates of the effects of the expansion.

[32]Our simulations may be underestimating the effects of expanding the EITC because we over-predict wages at the bottom of the wage distribution. In future work we plan to use a simple bootstrapping procedure to better approximate the wage distribution at the bottom.

in the employment rate of men beyond the 40th percentile after OBRA93. At higher percentiles of the wage distribution, the EITC changes become progressively smaller so it is not surprising that we observe no change in the participation at the upper end of the wage distribution. Even low-wage men respond only modestly, however, increasing participation by at most 0.2 percentage points. Women show larger responses to the EITC expansion. Because her eligibility depends on earnings not wages, we see responses for women throughout the wage distribution.

A more interesting classification is that in the bottom panel of table 7a. That simulation shows, as predicted, that the EITC reduces the participation rate of women who are beyond the phase-in region of the EITC, who make up the vast majority of eligible secondary earners. In the phase-in region, we observe increases in labor force participation by married women.

Between 1984-1996, the maximum credit grew from $500 to $3556 (in nominal dollars). Table 7b shows that women in the phase-in region and all married men entered the labor force in greater numbers following the decade long expansion of the credit. Overall, the expansion increased the labor force participation rate of men only slightly (by just over half a percentage point), but reduced the participation rate by married women by almost a full percentage point. This reduction is clearly concentrated in women beyond the phase-in region of the EITC, who reduced their rate of employment by over two percentage points (bottom panel).

Overall the labor supply results are quite modest so most of the EITC transfer translates into increases in a family's disposable income. OBRA93 increased the average EITC transfer by 532 dollars. After accounting for higher husband earnings and lower wife earnings, the net EITC transfer is 492 dollars. Only $40 or 8 percent of the transfer is lost through labor supply distortions. We should note that these calculations represent lower bound estimates of the transfer lost through changes in labor supply because they do not take account for the fewer hours worked by taxpayers remaining in the labor force. We turn to that analysis next.

6.3 Instrumental Variables Estimation of Annual Hours Worked

In the instrumental variable estimation, we concentrate on the determinants of hours worked for the sample of workers. We estimate the equation:

$$h_{it} = \alpha + \gamma\, virtinc_{it} + \beta \ln(netwage_{it}) + \delta\, Mills_{it} + Z_{it}\delta_1 + + \delta_2\, state + \delta_3\, time + \varepsilon_{it}$$

where h is annual hours worked and Z is a vector of demographic and state controls. The net wage and virtual income measures are evaluated at the person's observed hours of work and are calculated using our tax simulation model. Following the secondary earner model, marginal tax rates for husbands (and net wages and virtual income) are computed with no account for the woman's labor supply choice. To calculate the wife's net wage and virtual income, we include her husband's observed earnings and other family unearned income. Thus her first-hour marginal tax rate will depend on his earnings level.

The hours-worked equation is estimated using only the sample of workers where we observe gross hourly wages. To control for possible selection into the labor force participation for women, we estimate a first stage labor force participation equation and construct the inverse mills ratio predicted *(Mills)* which is then included in the second stage hours equation. While the mills ratio is generally statistically significant in the woman's hours equation, controlling for this sample selection does not have substantive effects on the estimated wage and income elasticities.[33]

Marginal tax rates vary both cross-sectionally and over time. Figures 5a and 5b show mean, minimum and maximum marginal tax rates by year and the man's actual earnings. Married women face higher marginal tax rates than their spouses because couples are assumed to file married-joint tax returns and the wife is the secondary earner. The marginal rates observed in the cross-section mimics closely the federal income and

[33]The selection equation is estimated using full interactions between education, tax year, and birth cohort. As an alternative, we used estimates of the labor force participation model presented above to generate the Mills ratio. In practice, however, that approach relies heavily on functional form as there are no valid exclusion restrictions identifying the hours equation. Surprisingly, the results are more sensitive for men than for women to the specification for the mills ratio.

payroll tax schedule. For example, consider the husband's marginal tax rates in 1996. The maximum tax rate is highest at the low earnings levels, reflecting the 21% phase-out rate up to about $30,000. The next step down in the maximum rate is where the social security maximum is reached. A similar pattern is observed in the mean marginal tax rate.

Our two instrument sets also vary cross-sectionally and over time. Instrument set 2 (IV2) includes a vector of marginal tax rates for each person in the sample taking account of current year tax parameters and individual non-labor income. Because of the EITC and the personal exemption, the tax parameters vary by the number of children in the tax-filing unit. The shape of this vector closely resembles the profiles in Figures 5a and 5b where tax rates start out negative, rise with the high marginal rates in the phase-out range, and then fall as income increases beyond the range of the credit.

6.4 Results for Hours Worked

Table 8 presents estimates of the man's annual hours equation, using our low education sample (those where the wife has less than a high school education) of married couples with children. Each of the specifications include controls for the number of children, number of preschool children, race, education, ten year birth cohort, state unemployment rate, and time and state dummies.[34] The demographics show the expected patterns. Higher hours of work are found for whites, and those living in states with lower unemployment rates. We start by presenting OLS estimates that ignore the endogeneity of net wages and virtual income (column 1). The results here are familiar and reflect the negative (positive) relationship between hours of work and net wages (virtual income) generated by the tax system. The next two columns present our two sets of instrumental variables estimators. The first set of instruments (IV1) include controls

[34]The 10 year birth cohorts are defined as 1930-1939, 1940-1949, 1950-1959 and 1960-1969. Because of the controls for time and cohort, we do not include any controls for age. The results are not sensitive to omitting full age effects.

for EITC parameters and interactions of those tax parameters with education and birth cohort. The second instrument set, IV2, includes the vector of 21 marginal tax rates evaluated at $5,000 earnings increments from $0 to $100,000.

As expected, using the instruments change the net wage and virtual income coefficients substantially. These estimates imply uncompensated wage elasticities of 0.06 (IV1) to 0.07 (IV2), and an income elasticity of -0.03, quite reasonable in comparison to empirical estimates in the literature.

The last 3 row of the table present two tests statistics: an F statistic testing the joint significance of the set of instruments from the first stage regression, and an overidentification test.[35] The F stats suggest that our instruments are highly correlated with the endogenous variables. Whereas IV1 marginally passes the exogeneity test, IV2 does not fare as well. For IV1, the endogeneity comes in primarily through the demographic variables included in the instrument set. An instrument set that excludes demographics and includes only EITC- parameters passes on exogeneity, but is not highly correlated with net wages and virtual income. In IV2, unearned income is the source of endogeneity. When we exclude unearned income from the calculation of the marginal tax rates in IV2, the instruments generally pass the exogeneity test but become weaker. In all cases, however, our estimates remain remarkably robust, which gives us confidence that our IV1 and IV2 estimates are to be believed.

Table 9 presents the same specifications for women. Generally, we find that married women have higher responsiveness to changes in wages and income than married men. However, the estimated elasticities vary substantially with the instrument set. The uncompensated wage elasticity is between 0.52 (IV1) and 0.08 (IV2), although statistically insignificant in the latter case. The estimated income elasticity is between -0.41 (IV1) and -0.04(IV2).

---

[35]Specifically, we regress the residuals of the IV estimated equation on all predetermined variables in the model including both exogenous variables and the instruments. The statistic is distributed chi-squared where the number of degrees of freedom equal the number of over identifying restrictions, which equal 28 for IV1 and 19 for IV2.

The test statistics at the bottom of the table show the instruments perform better with the sample of men than women. As with men, however, unearned income seems to cause the endogeneity of the instruments. Excluding husband's income from the wife's calculated net wage and virtual income, while inconsistent with our theory, generates weaker, but more exogenous instruments.[36]

We also estimated IV hours equations for those with higher education levels. The results, shown in appendix table 4, suggest that wage and income elasticities are somewhat larger and more precisely estimated when the models are estimated for those with a high school degree or less. Using IV2, uncompensated wage elasticities are 0.17 for men and 0.25 for women. Income elasticities are -0.02 for men and -0.10 for women.

To gauge the effect of the EITC on our sample of workers, we simulate the change in net wages and virtual income that would result from a given expansion in the EITC, assuming no other changes in taxes, family structure or wages. Tables 10a and 10b present simulated response to the OBRA93 expansion, and the 1984-1996 expansion, respectively. The top panel groups the effects by deciles of husbands' gross (actual) wage while the bottom panel classifies families according to their location along the 1996 EITC schedule. The tables also include simulations based on IV1 and IV2.

Our results suggest that OBRA93 led women to work 26 fewer hours each year, while the full expansion led women to work 40 fewer hours each year (or 2 percent). Because of the relatively wide range in estimated elasticities, we generate hours worked reduction on the order of -0.6 to -2 percent by women between 1984 and 1996. As expected, this mean effect masks much larger effects for low wage (and low hours) workers. While women in the phase-in worked substantially more hours after the expansions, women in the phase-out worked equally less hours. Because relatively few women are in the phase-in region, the

[36]In results not presented here, we also estimated models other instruments seen in the literature. We found demographic variables (education, education*age) to be substantially weaker in the first stage relative to IV2. The estimates of the wage and income effects were quite unstable in these specifications, reflecting the weak first stage. We also used gross wages and non-labor income as instruments. These were very strong in the first stage but failed the exogeneity tests. The estimated wage and income effects in this case were relatively stable and similar to those based on IV2.

average effect remains negative. The tables also show that women married to lower wage men reduced their work hours substantially more than women married to higher wage husbands. Women with husbands the bottom quarter of the gross wage distribution worked 80 fewer hours (4 percent) because of the 1984-1996 EITC expansion. Similar hours-worked patterns emerge for men but in smaller magnitudes than by women.

7. Conclusions

Between 1984 and 1996, the maximum earned income tax credit increased from $773 to $3556 (1995 dollars) for a family with two or more children. Also, taxpayers with income between $14,667 to $28,495 became eligible for the credit.

We examine the impact of the EITC expansion on the labor force participation, hours worked conditional on working and total hours worked by married couples using two empirical approaches. We first compare the change in labor supply of affected married couples (with kids) before and after the OBRA93 expansion of the EITC to unaffected married couples (without kids). Our main estimates are based on a sample of married couples with less than 12 years of schooling because they are the group most likely to be eligible for the EITC. We then exploit the variation in EITC changes by family size and find married women with two or more children responded to the large increase in the maximum credit by reducing their participation rate by more than 3.5 percentage points and working about 80 hours less per year. Also, we test our results for bias due to differential labor supply trends by couples with children and find the results to be robust.

Our second approach uses variation in after-tax wages and income to estimate reduced form labor supply models. Our results suggest that the EITC expansions over the past decade *increased* the likelihood of married men's labor participation only slightly but *reduced* the likelihood of married women's labor force participation by up to a full percentage points. Eligible women whose husband's earnings are beyond the phase-in region are more than 2 percentage points (5 percent) less likely to participate in the labor because of

the credit.

Further, we find evidence that taxpayers already in the labor force respond to the disincentives in the flat and phase-out regions by reducing their annual hours worked. In couples with family earnings in the phase-out region, married women are predicted to work as much as 172 fewer hours per year. Overall, the evidence suggests that family labor supply fell after the expansion of the EITC.

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Appendix A-Simulations

Labor Force Participation

Within each one of these groups, we simulate the predicted change in labor force participation using the parameter estimates in Table 6 and the changes in average net wages and net income from expanding the EITC. Then using mean wages within these groups, along with mean annual hours worked for workers, we translate the simulated changes in participation into changes in annual earnings. These are provided separately for the husband and wife. These simulated changes in earnings can be used for making welfare calculations.

Using information on actual family earnings and adjusted gross income, we calculate the EITC the family is eligible for in the current year. We then calculate their EITC using the 1996 tax schedule, assuming that all other taxes, as well as family labor supply, remains unchanged. The difference between the credit based on the 1996 EITC and the credit based on current year tax law is the *gross change in the family EITC*. The *net change in the family EITC* is equal to the gross change in the transfer after netting out the changes in earnings for the husband and wife.

(incomplete)

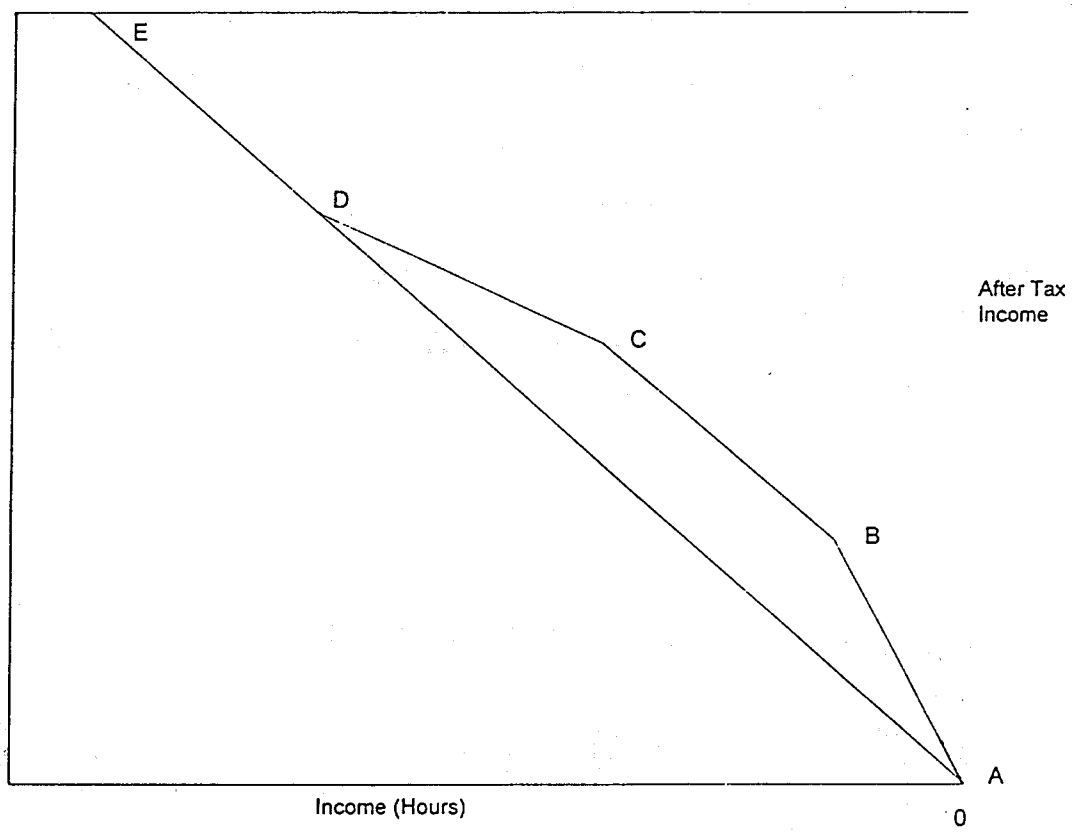


Figure 1

EITC Budget Constraint

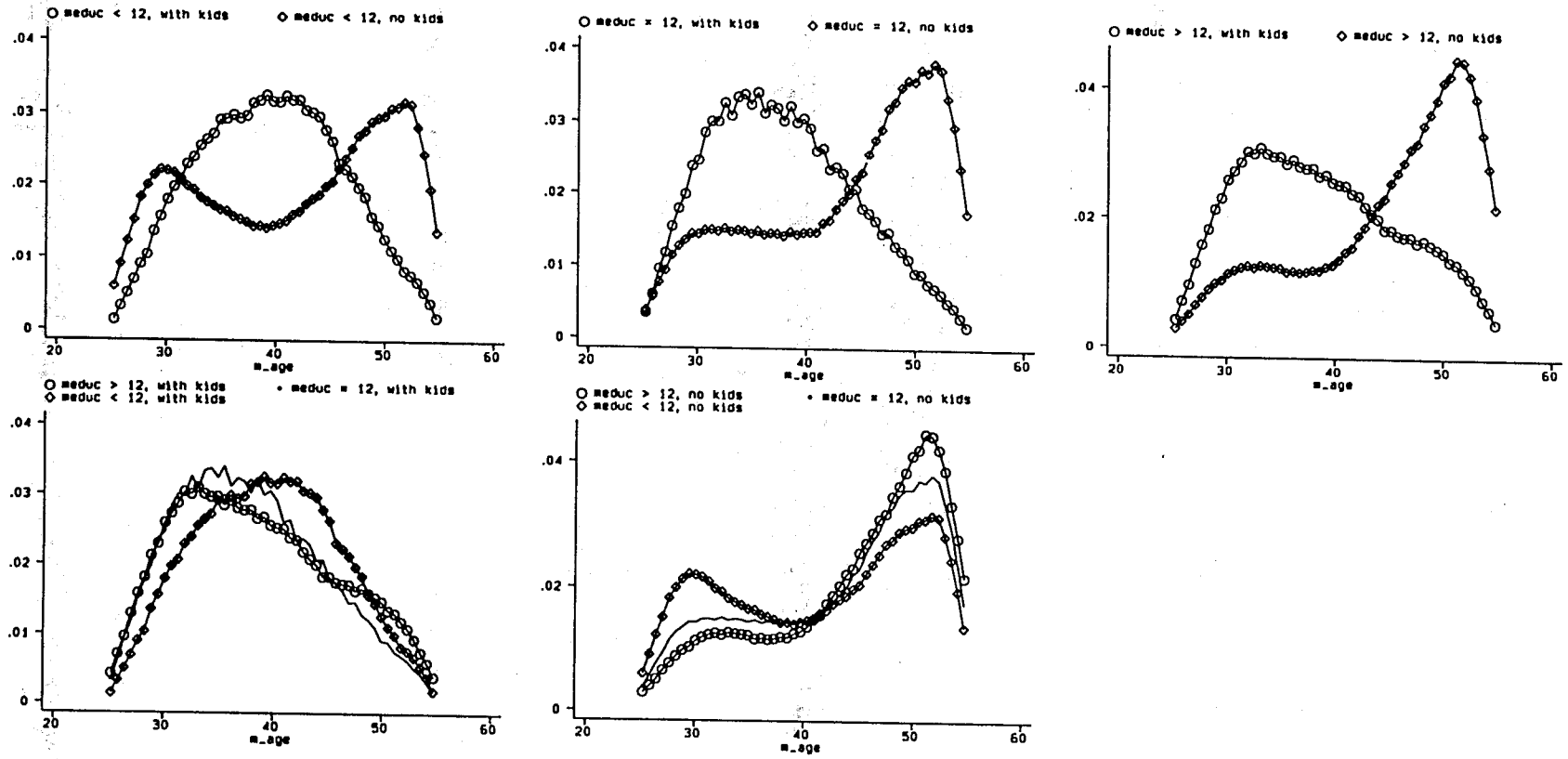


Figure 2a: Male Age

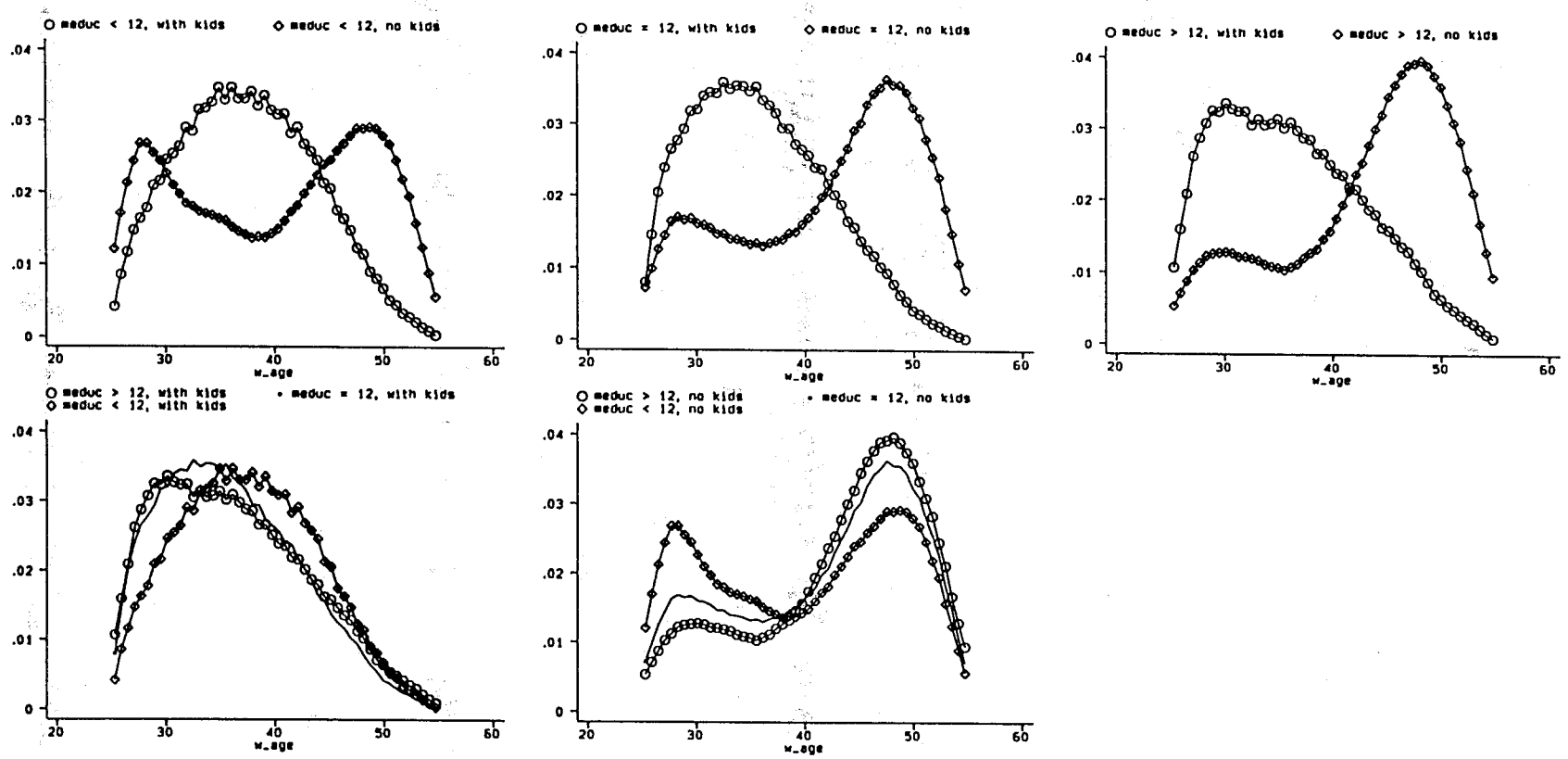
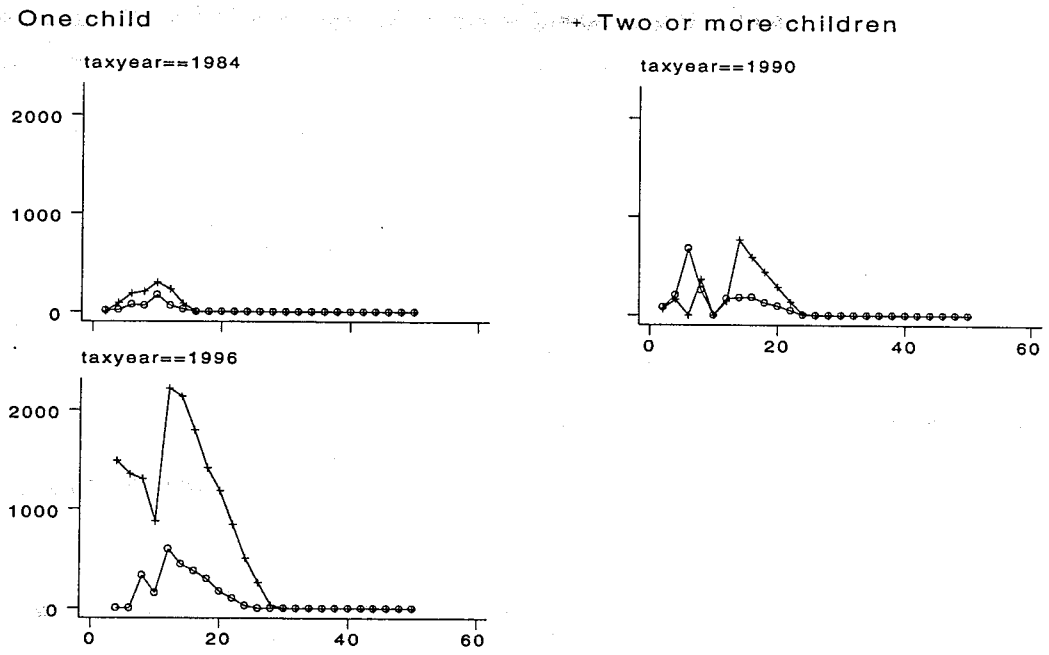


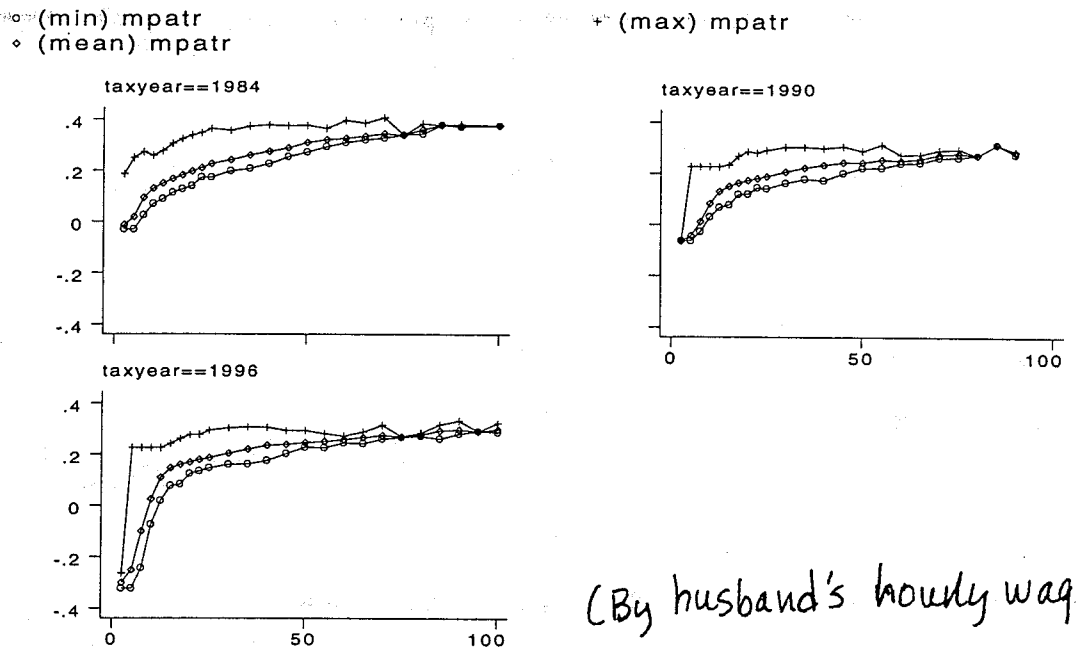
Figure 2b: Female Age



1995$

EITC benefit, by family earnings ($1000)

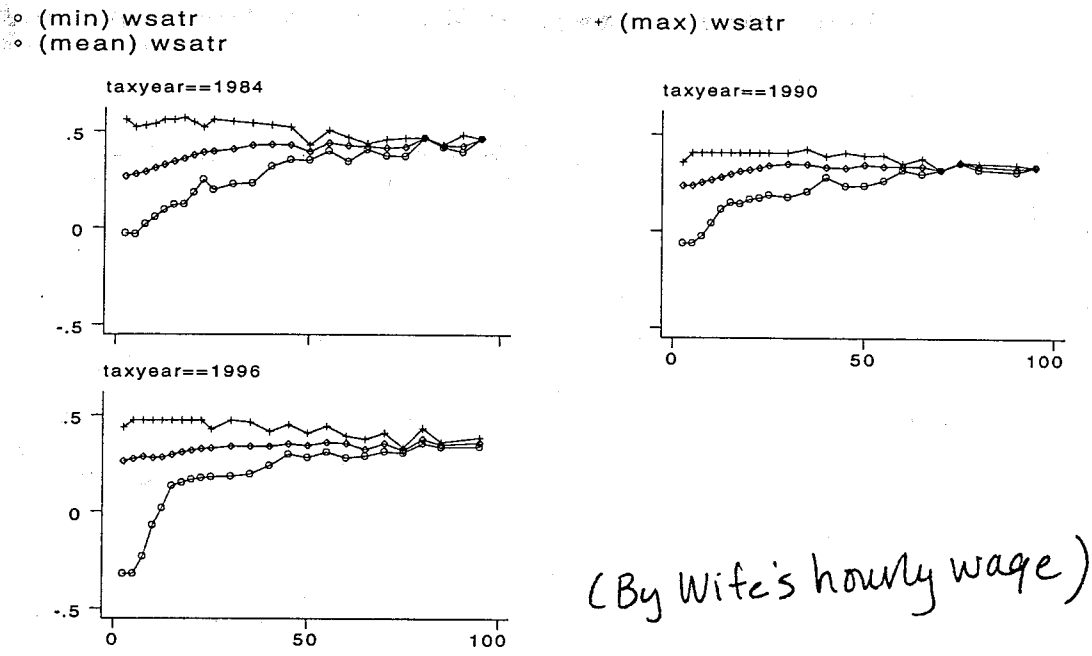
Figure 3



(By husband's hourly wage)

Husband's average tax rates, 40 hrs/wk, actual wages

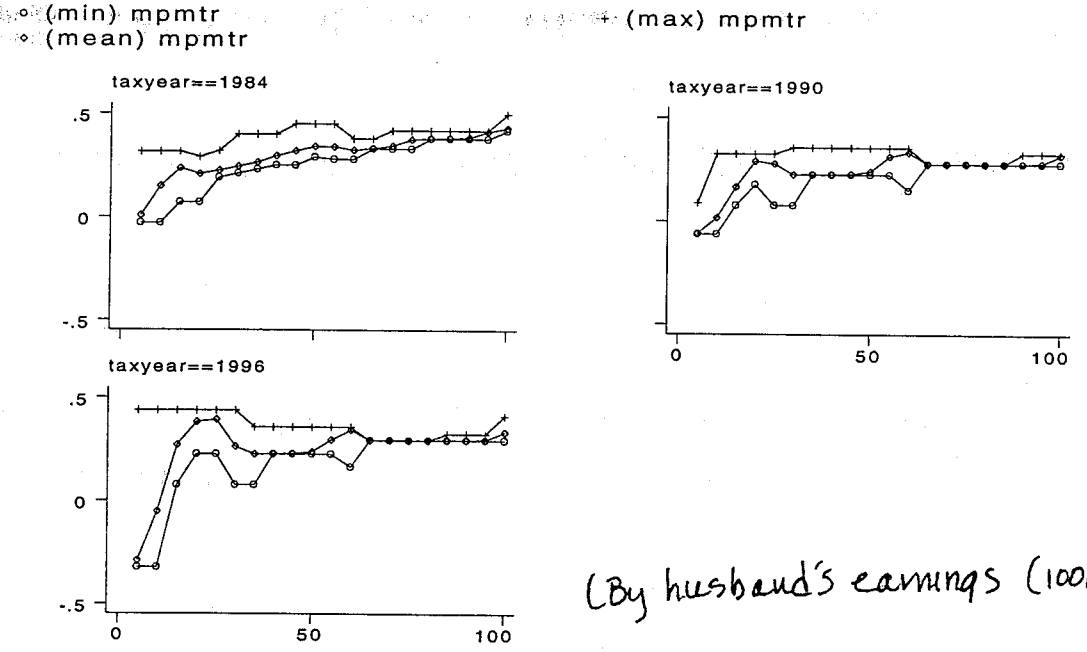
Figure 4a



(By Wife's hourly wage)

Wife's average tax rates, 40 hrs/wk, actual wages

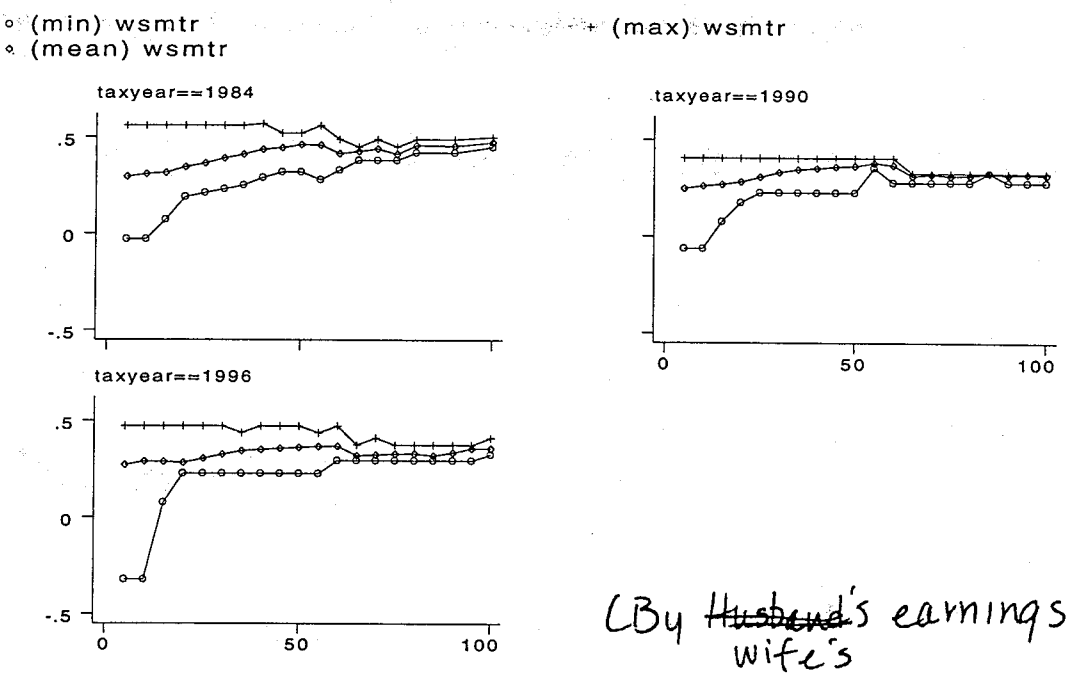
Figure 46



(By husband's earnings (1000s))

Husband's marginal tax rates, actual hours

Figure 5a



(By ~~Husband's~~ wife's earnings (1000s))

Wife's marginal tax rates, actual hours

Figure 5b

Table 1
Earned Income Tax Credit Parameters
1975-1996

Year	Phase-In Rate	Phase-In Range	Maximum Credit	Phase-Out Rate	Phase-Out Range
1975-1978	10.0%	$0-$4,000	$400	10.0%	$4,000-$8,000
1979-1984	10.0%	$0-$5,000	$500	12.5%	$6,000-$10,000
1985-1986	11.0%	$0-$5,000	$550	12.22%	$6,500-$11,000
TRA86					
1987	14.0%	$0-$6,080	$851	10.0%	$6,920-$15,432
1988	14.0%	$0-$6,240	$874	10.0%	$9,840-$18,576
1989	14.0%	$0-$6,500	$910	10.0%	$10,240-$19,340
1990	14.0%	$0-$6,810	$953	10.0%	$10,730-$20,264
OBRA90					
1991[a]	16.7%[1]	$0-$7,140	$1,192	11.93%	$11,250-$21,250
	17.3%[2]		$1,235	12.36%	
1992[a]	17.6%[1]	$0-$7,520	$1,324	12.57%	$11,840-$22,370
	18.4%[2]		$1,384	13.14%	
1993[a]	18.5%[1]	$0-$7,750	$1,434	13.21%	$12,200-$23,050
	19.5%[2]		$1,511	13.93%	
OBRA93					
1994	26.3%[1]	$0-$7,750	$2,038	15.98%	$11,000-$23,755
	30.0%[2]	$0-$8,425	$2,528	17.68%	$11,000-$25,296
	7.65%[3]	$0-$4,000	$306	7.65%	$5,000-$9,000
1995	34.0%[1]	$0-$6,160	$2,094	15.98%	$11,290-$24,396
	36.0%[2]	$0-$8,640	$3,110	20.22%	$11,290-$26,673
	7.65%[3]	$0-$4,100	$314	7.65%	$5,130-$9,230
1996	34.0%[1]	$0-$6,330	$2,152	15.98%	$11,650-$25,078
	40.0%[2]	$0-$8,890	$3,556	21.06%	$11,650-$28,495
	7.65%[3]	$0-$4,220	$323	7.65%	$5,280-$9,500

[1] Families with one qualifying child.
[2] Families with two or more qualifying children.
[3] Taxpayers with no qualifying children.
[a] Basic credit only. Does not include supplemental young child credit or health insurance credit.
Source: The Green Book and authors' calculations from OBRA93.

Table 2
Summary Statistics
Sample: Wife's Education <12

	Married Couples			
	All	*No Children*	*1 Child*	*2 or More Children*
State unemp rate	6.6 (1.7)	6.5 (1.7)	6.5 (1.7)	6.7 (1.7)
# children	1.81 (1.51)	0	1	2.9 (1.1)
# preschool children	0.44 (0.74)	0	0.21 (0.41)	0.72 (0.87)
Husband:				
non-white	0.13	0.14	0.11	0.13
age	40.4 (7.8)	45.4 (7.4)	41.6 (7.7)	37.8 (6.7)
education	9.7 (3.2)	10.2 (2.9)	10.1 (3.1)	9.4 (3.4)
annual hours	1922 (718)	1937 (739)	1976 (675)	1895 (725)
labor force participation	0.959	0.955	0.969	0.957
unearned income	1669 (3767)	2046 (4452)	1658 (3897)	1513 (3364)
average net wage(40 hours)	--	--	10.68 (5.14)	10.08 (4.90)
net non-labor income (1000s)	--	--	1535 (3600)	1518(3335)
gross hourly wage[a/]	12.09 (7.06)	13.08 (7.6)	12.6 (7.2)	11.44 (6.72)
ln(net wage)[a/]	--	--	2.11 (0.50)	2.05 (0.48)
virtual income (1000s) [a/]	--	--	4334 (3858)	4343 (3540)
Wife:				
non-white	0.13	0.15	0.12	0.13
age	38.0 (7.6)	43.8 (7.2)	39.2 (7.5)	35.1 (6.1)
education	8.5 (2.5)	8.9 (2.2)	8.8 (2.2)	8.2 (2.6)
annual hours	873 (932)	1040 (968)	993 (940)	756 (896)
labor force participation	0.577	0.644	0.633	0.526
unearned income	24,928 (16310)	27,312 (17925)	26,726 (17028)	23,206 (15047)
average net wage(40 hours)	--	--	5.52 (3.21)	5.50 (3.63)
net non-labor income (1000s)	--	--	23233 (12236)	21279 (11091)
gross hourly wage[a/]	7.56 (5.06)	7.87 (4.8)	7.63 (4.9)	7.37 (5.2)
ln(net wage)[a/]	--	--	1.58 (0.46)	1.57 (0.48)
virtual income (1000s) [a/]	--	--	23081 (12484)	20801 (11411)
Observations	22,863	5,493	4,868	12,502

[a/] Wage is defined for workers only.

Source: Authors' tabulations of March CPS for years 1985-1997. Sample includes married couples where the wife has less than a high school education. See text for sample selection. Standard errors are in parentheses. All dollar amounts are in 1994 dollars.

Table 3
Labor Force Participation Rates and Annual Hours Worked
Unconditional Means by Presence of Children and Pre/Post OBRA1993
Low Education Sample

	Before Expansion (1989-1993)	After Expansion (1994-1996)	Change	Relative (to No Kids) change
Labor Force Participation				
Panel A: Married Men				
2+ kids (N=7276)	0.955 (0.003)	0.958 (0.004)	+0.003 (0.005)	**+0.016 (0.010)**
1 kid (N=2669)	0.967 (0.004)	0.961 (0.007)	-0.006 (0.008)	**+0.007 (0.012)**
no kids (N=2999)	0.957 (0.005)	0.944 (0.008)	-0.013 (0.009)	
Panel B: Married Women				
2+ kids	0.533 (0.007)	0.507 (0.010)	-0.026 (0.012)	**-0.043 (0.022)**
1 kid	0.644 (0.011)	0.643 (0.017)	-0.001 (0.020)	**-0.018 (0.012)**
no kids	0.656 (0.010)	0.673 (0.015)	+0.017 (0.018)	
Annual Hours Worked				
Panel C: Married Men				
2+ kids	1869.4 (10.6)	1924.1 (14.7)	+54.7 (18.1)	**+74.5 (34.8)**
1 kid	1957.5 (16.0)	2031.8 (24.0)	+74.4 (28.8)	**+94.2 (41.4)**
no kids	1941.3 (16.4)	1921.6 (24.7)	-19.8 (29.7)	
Panel D: Married Women				
2+ kids	776.8 (12.9)	761.5 (18.4)	-15.3 (22.5)	**-60.2 (44.6)**
1 kid	1012.2 (21.7)	1062.0 (33.6)	+49.7 (39.9)	**+4.8 (55.5)**
no kids	1082.7 (21.7)	1127.7 (31.9)	+45.0 (38.5)	

Source: Authors' tabulations of March CPS for years 1990-1997. Sample includes married couples where the wife has less than 12 years of education. See text for sample selection.

Table 4
Difference-in-Difference Estimates of Annual Hours Worked and Labor Force Participation Rates
Children vs. No Children

Variable	*Sample: Wife with Less than 12 Years of Education*				
	Married Men			Married Women	
	(1) LFP Probit (dp/dx)	(2) LFP Probit (dp/dx)	(3) Annual Hours OLS	(4) LFP Probit (dp/dx)	(5) Annual Hours OLS
constant	0.159 (0.006)	-0.499 (0.222)	2335.5 (938.5)	-1.490 (0.637)	-594.27 (1137.5)
unearned inc/1000	--	-0.004 (0.000)	-0.05 (0.002)	-0.002 (0.000)	-3.3 (0.6))
# of children	--	-0.002 (0.001)	-13.8 (6.22)	-0.036 (0.005)	-73.2 (8.2)
# preschool children	--	-0.004 (0.022)	-31.1 (10.0)	-0.092 (0.008)	-156.5 (13.5)
non-white	--	-0.034 (0.004)	-208.8 (18.7)	0.019 (0.014)	81.1 (24.4)
age	--	-0.028 (0.017)	-34.8 (72.2)	0.112 (0.051)	93.3 (90.3)
age^2	--	0.001 (0.000)	1.2 (1.8)	-0.002 (0.001)	-1.3 (2.3)
age^3	--	-0.0001 (0.000)	-0.01 (0.02)	0.000 (0.000)	0.001 (0.02)
education	--	-0.003 (0.002)	-19.2 (7.6)	-0.005 (0.007)	-2.1 (13.4)
$education^2$	--	0.000 (0.000)	2.7 (0.4)	0.002 (0.001)	2.6 (1.0)
state unemp rate	--	-0.006 (0.002)	-23.7 (7.3)	-0.011 (0.005)	-23.8 (9.6)
kids (γ_0)	0.002 (0.005)	0.009 (0.005)	29.8 (22.2)	0.029 (0.017)	18.7 (29.3)
post93 (γ_1)	-0.014 (0.009)	-0.017 (0.008)	-79.6 (32.7)	-0.006 (0.024)	22.9 (42.9)
kids*post93 (γ_2)	+0.011 (0.009)	0.009 (0.007)	82.8 (30.8)	-0.034 (0.023)	-34.1(40.4)
Other Controls	time	time, state	time, state	time, state	time, state
Average EITC Effect	**+0.011 (0.008)**	**+0.009 (0.007)**	**82.8 (30.8)**	**-0.031 (0.022)**	**-34.1(40.4)**
Mean of Dep Var	0.96	0.96	1918	0.58	900
Log Likelihood / R^2	-2279	-1974	0.12	-8189	0.09
Observations	12,944				

Source: Authors' tabulations of March CPS for years 1990-1997. See text for sample selection. Parameter estimates for labor force participation are probability derivatives (dp/dx) from a Probit estimation where dummy variables are measured as the change in predicted probability from going from 0 to 1.

Table 5
Labor Force Participation and Annual Hours Worked, Wife <12 Years of Schooling
Sensitivity Tests

	Married Men		Married Women	
	(1) LFP (dp/dx)	(2) Annual Hours	(3) LFP (dp/dx)	(4) Annual Hours
Panel A: Cohort Dummies and Interactions				
Average EITC Effect	**0.014 (0.008)**	**79.6 (33.3)**	**-0.042 (0.024)**	**-56.3 (43.0)**
Log Likelihood / R^2	-1,965	0.12	-8,187	0.09
Observations	12,944	12,944	12,944	12,944
Panel B: Kids, 2+Kids				
Average EITC Effect (Any Kids)	**0.008 (0.010)**	**100.7 (40.5)**	**-0.016 (0.030)**	**3.1 (53.7)**
Marginal EITC Effect (Two+ children)	**0.007 (0.008)**	**-29.9 (33.8)**	**-0.036 (0.025)**	**-84.2 (44.4)**
Log Likelihood / R^2	-1,960	0.11	-8,184	0.09
Observations	12,944	12,944	12,944	12,944
Panel C: Linear Time Trend for Kids				
Average EITC Effect (Any Kids)	**0.012 (0.015)**	**142.7 (66.5)**	**0.031 (0.049)**	**13.4 (87.2)**
Marginal EITC Effect (Two+ children)	**0.008 (0.008)**	**-26.6 (33.8)**	**-0.037 (0.025)**	**-85.3 (44.4)**
Time Trend	-0.004 (0.003)	-1.16 (1.59)	-0.006 (0.008)	-10.6 (15.0)
Time Trend*Kids	-0.001 (0.003)	-10.0 (12.8)	-0.010 (0.010)	-2.9 (16.6)
Log Likelihood / R^2	-1,961	0.11	-8,184	0.09
Observations	12,944	12,944	12,944	12,944
Other Controls (all specifications)	demog, time, state			

Source: Authors' tabulations of March CPS for years 1990-1997. See text for sample selection. Parameter estimates for labor force participation are probability derivatives (dp/dx) from a Probit estimation where dummy variables are measured as the change in predicted probability from going from 0 to 1.

Table 6
Parameter Estimates for Labor Force Participation Equation
Sample: Married Couples with Children, 1984-1996

Sample: Wife Education<12 *Specification: Average Tax Rate Evaluated at full-time (40 hours)*				
Variable	Married Men		Married Women	
# of children	-0.003	(0.001)	-0.043	(0.004)
# preschool children	-0.006	(0.001)	-0.093	(0.006)
black	-0.021	(0.007)	0.084	(0.016)
other race	-0.046	(0.008)	0.020	(0.017)
age	0.001	(0.002)	0.046	(0.006)
age squared /100	-0.001	(0.002)	-0.067	(0.008)
state unemp rate	-0.004	(0.001)	-0.005	(0.004)
average net wage	**0.003**	**(0.0005)**	**0.029**	**(0.005)**
net unearned income (1000s)	**-0.005**	**(0.0003)**	**-0.001**	**(0.0004)**
Other controls	state, time			
Pseudo R2	0.17		0.06	
Mean of Dep Variable	0.960		0.556	
Observations	17,370			
Elasticity of Participation				
Wage Elasticity of Participation	0.033		0.288	
Income Elasticity of Participation	-0.008		-0.038	

Source: Authors' tabulations of 1985-1997 March CPS. Average net wage is the gross predicted hourly wage times one minus the average tax rate from entering the labor market at full-time hours. Parameter estimates for labor force participation are probability derivatives (dp/dx) from Probit estimation. Standard errors in parentheses.

Table 7a
Simulated LFP Responses and Welfare Calculations
OBRA93 Expansion

Grouping Variable #1: *Gross Husband's Predicted Hourly Wage*

		Wife				*Husband*					
Percentile	Percent of Sample	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	*Change in Family EITC* Gross	Net
1	10%	-0.78	-1.6%	6.65	-73	0.19	0.2%	8.04	31	*874*	*832.2*
2	10%	-0.79	-1.5%	6.82	-75	0.13	0.1%	8.63	23	*791*	*738.2*
3	10%	-0.66	-1.2%	6.79	-63	0.12	0.1%	9.26	22	*666*	*625.7*
4	10%	-0.43	-0.8%	7.07	-43	0.15	0.2%	10.34	31	*582*	*570.8*
5	10%	-0.66	-1.1%	6.93	-64	0.04	0.0%	10.55	9	*565*	*509.5*
6	10%	-0.59	-1.0%	7.01	-58	0.00	0.0%	11.48	0	*465*	*407.1*
7	10%	-0.52	-0.9%	7.16	-52	0.02	0.0%	11.58	5	*469*	*421.6*
8	10%	-0.39	-0.7%	7.76	-42	0.01	0.0%	12.29	2	*381*	*341.1*
9	10%	-0.32	-0.6%	8.46	-38	0.00	0.0%	13.76	0	*317*	*279.1*
10	10%	-0.18	-0.3%	8.8	-22	0.00	0.0%	16.02	0	*213*	*190.8*
Overall	100%	*-0.53*	*-1%*	*7.3*	*-53*	*0.07*	*0.1%*	*11*	*12*	*532*	*492*

Grouping Variable #2: *Location in EITC Schedule in 1996 (using N. family earnings)*

		Wife				*Husband*					
Location	Percent of Sample	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	*Change in Family EITC* Gross	Net
phase-in	9.5%	0.49	3.0%	4.91	34	0.16	0.29%	5.83	19	*790*	*843*
flat	5.9%	-0.97	-4.0%	5.56	-76	0.11	0.12%	5.9	13	*1722*	*1660*
phase-out	37.6%	-1.07	-2.6%	6.08	-91	0.08	0.08%	8.21	13	*948*	*870*
>phase-out	47.0%	-0.25	-0.4%	8.29	-29	0.03	0.03%	14.9	9	*0.0*	*-20*

Table 7b
Simulated LFP Responses and Welfare Calculations
TRA86,OBRA90 and OBRA93

Grouping Variable #1: *Gross Husband's Predicted Hourly Wage*

		Wife				Husband				Change in Family EITC	
Percentile	Percent of Sample	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Gross	Net
1	10%	-1.63	-3.48%	6.97	-159	0.23	0.24%	9.03	42	*1087*	*970*
2	10%	-1.54	-3.01%	6.9	-149	0.14	0.15%	10.27	29	*888*	*768*
3	10%	-1.31	-2.34%	7.46	-137	0.10	0.11%	10.44	21	*826*	*710*
4	10%	-1.17	-2.48%	7.49	-123	0.06	0.06%	11.05	13	*754*	*645*
5	10%	-0.97	-1.74%	8.31	-113	0.05	0.05%	11.95	12	*640*	*539*
6	10%	-0.83	-1.70%	7.01	-81	0.03	0.03%	12.95	8	*466*	*392*
7	10%	-0.68	-1.34%	8.89	-85	0.01	0.01%	13.26	3	*436*	*354*
8	10%	-0.49	-0.76%	7.58	-52	0.00	0.00%	15.27	0	*254*	*202*
9	10%	-0.29	-0.47%	7.32	-30	0.00	0.00%	15.55	0	*201*	*171*
10	10%	-0.24	-0.41%	8.53	-29	0.00	0.00%	18.51	0	*155*	*126*
Overall	*100%*	*-0.92*	*-1.8%*	*7.6*	*-96*	*0.06*	*0.07%*	*13*	*13*	*571*	*488*

Grouping Variable #2: *Location in EITC Schedule in 1996 (using N, family earnings)*

		Wife				Husband				Change in Family EITC	
Location	Percent of Sample	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Change in LFP	% Change in LFP	Mean wage	Change in Ann Earn.	Gross	Net
phase-in	7.15%	1.22	6.18%	4.14	71	0.22	0.34%	6.78	30	*726*	*827*
flat	2.95%	-2.27	-6.29%	5.5	-175	0.11	0.11%	5.98	13	*2363*	*2202*
phase-out	31.31%	-2.19	-4.51%	6.42	-197	0.08	0.08%	8.67	14	*1438*	*1255*
>phase-out	58.59%	-0.43	-0.59%	8.21	-49	0.03	0.03%	15.79	10	*0*	*-40*

Table 8
Parameter Estimates for Annual Hours of Work Equation

Sample: Married Couples with Children, 1984-1996
Wife<12 Years of Education

Married Men, Hours>0			
Variable	OLS	IV-1[a/]	IV-2[b/]
constant	2595.3 (73.29)	2085.9 (421.5)	2046.0 (284.3)
# of children	-22.12 (4.12)	-18.73 (4.76)	-18.51 (4.48)
# preschool children	-24.23 (6.93)	-19.95 (8.51)	-19.55 (7.64)
black	-123.23 (20.05)	-110.77 (26.75)	-109.43 (22.60)
other race	-73.22 (21.61)	-57.57 (26.04)	-56.28 (23.88)
cohort2	-6.12 (16.86)	-8.86 (18.24)	-8.79 (17.31)
cohort3	-4.15 (17.18)	3.50 (23.23)	4.53 (19.06)
cohort4	-61.83 (21.79)	-37.04 (33.51)	-34.81 (27.11)
state unemp rate	-27.04 (4.70)	-26.31 (4.89)	-26.30 (4.82)
ln(net wage)	**-145.1 (10.1)**	**119.9 (191.0)**	**138.86 (129.9)**
virtual income/1000	**+4.4 (1.39)**	**-12.8 (18.6)**	**-13.14 (3.40)**
Other Controls		time, state	
Mean of Dep Var		1,996	
Observations		16,681	
Elasticity of Hours Worked			
Uncomp Wage Elas	**-0.07**	**0.06**	**0.07**
Income Elas	**+0.01**	**-0.03**	**-0.03**
Test Statistics			
1st Stage F stat, ln(w)	--	23.8 (p=0)	8.8 (p=0)
1st Stage F stat, y	--	47.8 (p=0)	346 (p=0)
Exogeneity Test	--	14.5(p=.07)	109 (fail)

[a/] Instrument set 1 includes EITC tax parameters (phase-in rate, phaseout rate, kink points), kink point where federal taxes begin, and tax parameters interacted with education and birth cohort dummies.

[b/] Instrument set 2 includes the marginal tax rate the individual faces at 5,000 earnings increments from zero up to $100,000 (0, 5000, 10000,... 95000, 100000). The tax calculations account for the EITC, other federal taxes, and payroll taxes and condition on the person's level of unearned income.

Source: Authors' tabulations of 1985-1997 March CPS. Sample includes married couples with children. See text for details.

Table 9
Parameter Estimates for Annual Hours of Work Equation

Sample: Married Couples with Children, 1984-199
Wife<12 Years of Education

Married Women, Hours>0			
Variable	OLS	IV-1[a/]	IV-2[b/]
constant	1877.4 (184.2)	1286.3 (667.1)	1735.3 (234.0)
# of children	-46.96 (6.93)	-50.89 (10.10)	-46.19 (6.98)
# preschool children	-73.66 (11.91)	-119.55 (25.45)	-75.18 (12.14)
black	79.83 (26.57)	-5.92 (56.12)	78.57 (29.75)
other race	182.85 (31.60)	-131.19 (48.36)	183.36 (31.66)
cohort2	92.34 (43.58)	101.49 (53.13)	90.34 (43.69)
cohort3	24.15 (44.29)	20.16 (51.77)	23.62 (43.38)
cohort4	4.24 (43.36)	9.75 (55.23)	8.48 (43.63)
state unemp rate	-23.12 (7.45)	-28.25 (9.20)	-23.09 (7.46)
Mills Ratio	-188.02 (180.1)	-87.58 (216.9)	-187.04 (180.4)
ln(net wage)	**27.8 (15.7)**	**773.9 (394.7)**	**118.7 (99.8)**
virtual income/1000	**-3.2 (0.67)**	**-28.5 (14.4)**	**-2.91 (0.73)**
Other Dummies		time, state	
Mean of Dep Var		1,480	
Observations		9,653	
Elasticity of Hours Worked			
Uncomp Wage Elas	**0.02**	**0.52**	**0.08**
Income Elas	**-0.05**	**-0.41**	**-0.04**
Test Statistics			
1st Stage F stat, ln(w)	--	1.1 (p=.3)	12.4 (p=0)
1st Stage F stat, y	--	1.2 (p=.2)	3558 (p=0)
Exogeneity Test	--	8.0 (p=.5)	50.8 (fail)

[a/] Instrument set 1 includes EITC tax parameters (phase-in rate, phaseout rate, kink points), kink point where federal taxes begin, and tax parameters interacted with education and birth cohort dummies.

[b/] Instrument set 2 includes the marginal tax rate the individual faces at 5,000 earnings increments from zero up to $100,000 (0, 5000, 10000,... 95000, 100000). The tax calculations account for the EITC, other federal taxes, and payroll taxes and condition on the person's level of unearned income.

Source: Authors' tabulations of 1985-1997 March CPS. Sample includes married couples with children. See text for details.

Table 10a
Simulated Annual Hours Responses and Welfare Calculations
OBRA93 Expansion

Grouping Variable #1: *Gross Husband's Predicted Hourly Wage*

IV-1: EITC Tax Parameters

	Wife				*Husband*			
Percentile	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.
1	-40	-2.86%	5.82	-233	1	0.05%	3.84	4
2	-62	-4.43%	6.33	-392	-28	-1.39%	5.48	-153
3	-59	-4.21%	6.72	-396	-28	-1.39%	6.63	-186
4	-43	-3.07%	6.90	-297	-33	-1.63%	7.80	-257
5	-28	-2.00%	7.13	-200	-35	-1.73%	9.19	-322
6	-23	-1.64%	7.53	-173	-34	-1.68%	10.43	-355
7	-8	-0.57%	7.75	-62	-37	-1.83%	12.00	-444
8	-2	-0.14%	8.08	-16	-6	-0.30%	14.04	-84
9	-5	-0.36%	8.25	-41	-4	-0.20%	17.14	-69
10	-2	-0.14%	9.13	-18	-2	-0.10%	25.50	-51
husb no work	9	0.64%	6.77	61	-	-	-	-
Overall	*-26*	-1.86%	*7.36*	*-191*	*-26*	*-1.29%*	*11.20*	*-291*

IV-2: simulated marginal tax rate

	Wife			*Husband*		
Percentile	Change in Hours	% Change in Hours	Change in Ann Earn.	Change in Hours	% Change in Hours	Change in Ann Earn.
1	-10	-0.71%	-58	2	0.10%	8
2	-14	-1.00%	-89	-29	-1.44%	-159
3	-13	-0.93%	-87	-30	-1.49%	-199
4	-10	-0.71%	-69	-36	-1.78%	-281
5	-6	-0.43%	-43	-37	-1.83%	-340
6	-5	-0.36%	-38	-37	-1.83%	-386
7	-2	-0.14%	-16	-39	-1.93%	-468
8	-1	-0.07%	-8	-7	-0.35%	-98
9	-1	-0.07%	-8	-4	-0.20%	-69
10	-1	-0.07%	-9	-2	-0.10%	-51
husb no work	0	0.00%	0	-	-	-
Overall	*-6*	-0.43%	*-44*	*-26*	*-1.29%*	*-291*

Grouping Variable #2: *Location in EITC Schedule in 1996 (using N. family earnings)*

IV-1: EITC Tax Parameters

	Wife				*Husband*			
Percentile	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.
phase-in	105	7.50%	4.91	516	20	0.99%	5.83	117
flat	-9	-0.64%	5.56	-50	-9	-0.45%	5.90	-53
phase-out	-91	-6.50%	6.08	-553	-37	-1.83%	8.21	-304
>phase-out	0	0.00%	8.29	0	-14	-0.69%	14.90	-209

IV-2: simulated marginal tax rate

	Wife			*Husband*		
Percentile	Change in Hours	% Change in Hours	Change in Ann Earn.	Change in Hours	% Change in Hours	Change in Ann Earn.
phase-in	20	1.43%	98	23	1.14%	134
flat	-5	-0.36%	-28	-9	-0.45%	-53
phase-out	-20	-1.43%	-122	-40	-1.98%	-328
>phase-out	0	0.00%	0	-15	-0.74%	-224

Table 10b
Simulated Annual Hours Responses and Welfare Calculations
TRA86, OBRA90 and OBRA93

Grouping Variable #1: *Gross Husband's Predicted Hourly Wage*

IV-1: EITC Tax Parameters

	Wife				*Husband*			
Percentile	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.
1	-83	-5.93%	6.54	-543	-12	-0.59%	4.63	-56
2	-91	-6.50%	7.34	-668	-61	-3.02%	6.47	-395
3	-81	-5.79%	7.55	-612	-83	-4.11%	7.45	-618
4	-51	-3.64%	7.44	-379	-79	-3.91%	9.15	-723
5	-25	-1.79%	7.40	-185	-69	-3.42%	10.65	-735
6	-14	-1.00%	6.95	-97	-57	-2.82%	12.29	-701
7	-6	-0.43%	8.50	-51	-16	-0.79%	14.05	-225
8	-9	-0.64%	8.02	-72	-9	-0.45%	16.43	-148
9	-10	-0.71%	8.21	-82	-4	-0.20%	19.57	-78
10	0	0.00%	9.38	0	-2	-0.10%	27.60	-55
husb no work	-3	-0.21%	6.09	-18	--	--	--	--
Overall	-36	-2.57%	7.66	-276	-39	-1.93%	12.86	-502

IV-2: simulated marginal tax rate

	Wife			*Husband*		
Percentile	Change in Hours	% Change in Hours	Change in Ann Earn.	Change in Hours	% Change in Hours	Change in Ann Earn.
1	-20	-1.43%	-131	-11.0	-0.54%	-51
2	-21	-1.50%	-154	-64.0	-3.17%	-414
3	-18	-1.29%	-136	-89.0	-4.41%	-663
4	-11	-0.79%	-82	-85.0	-4.21%	-778
5	-6	-0.43%	-44	-74.0	-3.66%	-788
6	-3	-0.21%	-21	-61.0	-3.02%	-750
7	-1	-0.07%	-9	-17.0	-0.84%	-239
8	-2	-0.14%	-16	-10.0	-0.50%	-164
9	-2	-0.14%	-16	-4.0	-0.20%	-78
10	0	0.00%	0	-2.0	-0.10%	-55
husb no work	0	0.00%	0	--	--	--
Overall	-8	-0.57%	-61	-41.0	-2.03%	-527

Grouping Variable #2: *Location in EITC Schedule in 1996 (using N. family earnings)*

IV-1: EITC Tax Parameters

	Wife				*Husband*			
Percentile	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.	Change in Hours	% Change in Hours	Mean wage	Change in Ann Earn.
phase-in	173	12.36%	4.14	716	34	1.68%	6.78	231
flat	84	6.00%	5.50	462	1	0.05%	5.98	6
phase-out	-172	-12.29%	6.42	-1104	-81	-4.01%	8.67	-702
>phase-out	0	0.00%	8.21	0	-24	-1.19%	15.79	-379

IV-2: simulated marginal tax rate

	Wife			*Husband*		
Percentile	Change in Hours	% Change in Hours	Change in Ann Earn.	Change in Hours	% Change in Hours	Change in Ann Earn.
phase-in	32	2.29%	132	40	1.98%	271
flat	13	0.93%	72	4	0.20%	24
phase-out	-38	-2.71%	-244	-86	-4.26%	-746
>phase-out	0	0.00%	0	-26	-1.29%	-411

Appendix Table 1
Labor Force Participation Rates and Annual Hours Worked
Unconditional Means by Presence of Children and Pre/Post OBRA1993

	Pre-OBRA 1993	Post OBRA 1993	Change	Relative (to No Kids) change
Panel A: Male Labor Force Participation Rates				
Education=12				
2+ kids (N=20,844)	0.984 (0.001)	0.985 (0.002)	+0.001 (0.002)	**+0.005 (0.004)**
1 kid (N=10,922)	0.983 (0.002)	0.987 (0.002)	+0.004 (0.002)	**+0.008 (0.004)**
no kids (N=12,433)	0.975 (0.002)	0.971 (0.003)	-0.003 (0.003)	
Education>12				
2+ kids (N=28,224)	0.991 (0.001)	0.990 (0.001)	-0.001 (0.001)	**-0.000 (0.002)**
1 kid (N=14,737)	0.985 (0.001)	0.987 (0.002)	+0.002 (0.002)	**+0.003 (0.003)**
no kids (N=16,735)	0.985 (0.001)	0.984 (0.002)	-0.001 (0.002)	
Panel B: Female Labor Force Participation Rates				
Education=12				
2+ kids	0.708 (0.004)	0.735 (0.005)	0.027 (0.007)	**+0.024 (0.010)**
1 kid	0.798 (0.005)	0.807 (0.007)	0.010 (0.008)	**+0.007 (0.010)**
no kids	0.818 (0.004)	0.821 (0.006)	0.003 (0.007)	
Education>12				
2+ kids	0.764 (0.003)	0.785 (0.004)	+0.021 (0.005)	**+0.026 (0.007)**
1 kid	0.858 (0.004)	0.873 (0.004)	+0.015 (0.006)	**+0.020 (0.007)**
no kids	0.927 (0.003)	0.923 (0.003)	-0.005 (0.004)	
Panel C: Male Annual Hours Worked				
Education=12				
2+ kids	2131.3 (5.3)	2194.9 (7.7)	+63.6 (9.3)	**+29.5 (15.8)**
1 kid	2131.6 (7.2)	2168.0 (10.2)	+36.3 (12.5)	**+2.2 (17.8)**
no kids	2097.3 (7.0)	2131.4 (10.6)	+34.1 (12.7)	
Education>12				
2+ kids	2271.8 (4.5)	2303.7 (6.0)	+31.8 (7.5)	**-6.0 (12.7)**
1 kid	2209.3 (6.4)	2256.4 (8.6)	+47.1 (10.7)	**+9.3 (14.8)**
no kids	2186.0 (6.1)	2223.8 (8.2)	+37.8 (10.2)	
Panel D: Female Annual Hours Worked				
Education=12				
2+ kids	1058.9 (7.6)	1145.0 (11.4)	+86.1 (13.7)	**+75.7 (21.8)**
1 kid	1324.3 (10.3)	1399.0 (15.0)	+74.6 (18.2)	**+64.1 (24.9)**
no kids	1472.0 (9.6)	1482.5 (14.0)	+10.5 (17.0)	
Education>12				
2+ kids	1178.7 (7.0)	1243.9 (9.0)	+65.2 (11.4)	**+69.2 (16.9)**
1 kid	1490.2 (8.9)	1545.5 (11.7)	+55.4 (14.7)	**+59.4 (19.3)**
no kids	1797.0 (7.4)	1792.6 (10.0)	-4.0 (12.5)	

Source: Authors' tabulations of March CPS for years 1990-1997. Sample includes married couples. See text for sample selection. Pre-OBRA period is defined as years 1989-1993 and post-OBRA period is defined as 1994-1996.

Appendix Table 2
Difference-in-Difference Estimates of Annual Hours Worked and Labor Force Participation Rates
Children vs. No Children

	Husband's Labor Supply			Wife's Labor Supply	
	(1) LFP Probit (dp/dx)	(2) LFP Probit (dp/dx)	(3) Annual Hours OLS	(4) LFP Probit (dp/dx)	(5) Annual Hours OLS
			Panel B *Sample: Wife with 12 Years of Education*		
Average EITC Effect	**0.005 (0.002)**	**0.007 (0.002)**	**38.8 (13.9)**	**0.017 (0.009)**	**68.1 (19.6)**
Controls	time	demog, time, state	demog, time, state	demog, time, state	demog, time, state
Mean of Dep Var	0.98		2,137	0.77	1,260
Log Likelihood / R^2	-4070	-3631	0.07	-22363	0.11
Observations			44,199		
			Panel C *Sample: Wife with More then 12 Years of Education*		
Average EITC Effect	**0.0004 (0.002)**	**0.001 (0.001)**	**7.6 (11.4)**	**0.017 (0.007)**	**52.6 (15.6)**
Controls	time	demog, time, state	demog, time, state	demog, time, state	demog, time, state
Mean of Dep Var	0.99		2,261	0.83	1,427
Log Likelihood / R^2	-3912	-3906	0.05	-23264	0.17
Observations			59,696		

Source: Authors' tabulations of March CPS for years 1990-1997. Sample includes married couples. See text for sample selection. Pre-OBRA period is defined as years 1989-1993 and post-OBRA period is defined as 1994-1996. Parameter estimates for labor force participation are probability derivatives (dP/dX) from Probit estimation where dummy variables are measured as the change in predicted probability from going from 0 to 1.

Appendix Table 3
Parameter Estimates for Labor Force Participation Equation
Alternative Specifications

Sample: Married Couples with Children, 1984-1996

	Husband		Wife	
Panel A *Sample: Education of the Wife <=12* *Specification: Average Tax Rate Evaluated at full-time (40 hours)*				
average net wage	**0.003**	**(0.0002)**	**0.016**	**(0.003)**
net income at 0 hrs(1000s)	**-0.002**	**(0.0001)**	**-0.003**	**(0.0001)**
Other controls	demog, state, time		demog, state, time	
Pseudo R2	0.13		0.08	
Mean of Dep Variable	0.980		0.686	
Observations	74107		74107	
Panel B *Sample: Education of the Wife <12* *Specification: Average Tax Rate Evaluated at part-time (20 hours)*				
average net wage	**0.003**	**(0.0005)**	**0.014**	**(0.004)**
net income at 0 hrs(1000s)	**-0.005**	**(0.0003)**	**-0.001**	**(0.0004)**
Other controls	demog, state, time		demog, state, time	
Pseudo R2	0.17		0.06	
Mean of Dep Variable	0.960		0.556	
Observations	17370		17370	
Panel C *Sample: Education of the Wife <12* *Specification: Actual Wages for Workers*				
average net wage	**0.0004**	**(0.0001)**	**0.002**	**(0.001)**
net income at 0 hrs(1000s)	**-0.005**	**(0.0003)**	**-0.002**	**(0.0003)**
Other controls	demog, state, time		demog, state, time	
Pseudo R2	0.17		0.06	
Mean of Dep Variable	0.960		0.556	
Observations	17370		17370	

Source: Authors' tabulations of 1985-1997 March CPS. Average net wage is the gross hourly wage times one minus the average tax rate from entering the labor market at part-time or full-time work. Parameter estimates for labor force participation are probability derivatives (dp/dx) from a Probit estimation. Standard errors in parentheses.

Appendix Table 4
Parameter Estimates for Annual Hours of Work Equation, Sensitivity Tests

	OLS	IV-1[a/]	IV-2[b/]
Panel A *Sample: Wife with <=12 Years of Education* Husbands with Hours>0			
ln(net wage)	-71.6 (4.54)	202.7 (130.9)	397.8 (45.1)
virtual income/1000	+5.0 (0.55)	+29.2 (10.9)	-8.8 (1.2)
Other Dummies	time, state	time, state	time, state
Uncomp Wage Elas	-0.04	0.10	0.17
Income Elas	0.01	0.07	-0.02
Mean of Dep Var	2203	2203	2203
1st Stage F stat, ln(w)	--	7.7 (p=0)	63.5 (p=0)
1st Stage F stat, y	--	13.4 (p=0)	2132 (p=0)
Exogeneity Test	--	18.9(p=.02)	286 (fail)
Observations	72,591	72,591	72,591
Panel A *Sample: Wife with <=12 Years of Education* *Wives with Hours>0*			
ln(net wage)	166.3 (6.50)	1303.1 (522.9)	380.4 (53.5)
virtual income/1000	-4.6 (0.24)	+3.4 (8.6)	-5.4 (0.3)
Other Dummies	time, state	time, state	time, state
Uncomp Wage Elas	0.11	0.85	0.25
Income Elas	-0.09	0.06	-0.10
Mean of Dep Var	1528	1528	1528
1st Stage F stat, ln(w)	--	2.2 (p=0)	36.9 (p=0)
1st Stage F stat, y	--	3.9 (p=0)	1285 (p=0)
Exogeneity Test	--	25 (p=.01)	98 (fail)
Observations	50,835	50,835	50,835

[a/] Instrument set 1 includes EITC tax parameters (phase-in rate, phaseout rate, kink points), kink point where federal taxes begin, and tax parameters interacted with education and birth cohort dummies.

[b/] Instrument set 2 includes the marginal tax rate the individual faces at 5,000 earnings increments from zero up to $100,000 (0, 5000, 10000,... 95000, 100000). The tax calculations account for the EITC, other federal taxes, and payroll taxes and condition on the person's level of unearned income.

Source: Authors' tabulations of 1985-1997 March CPS. Sample includes married couples with children. See text for details.