Is the EITC as Good as an NIT?
Conditional Cash Transfers and Tax Incidence

by

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Abstract

The Earned Income Tax Credit (EITC) is intended to encourage work. But EITC-induced increases in labor supply may drive wages down, shifting the intended transfer toward employers. I simulate the economic incidence of the EITC under a range of plausible supply and demand elasticities. In all of the scenarios that I consider, a substantial portion of the intended transfer to low income single mothers is captured by employers through reduced wages. The transfer to employers is borne in part by low skill workers who are not themselves eligible for the EITC and are therefore made strictly worse off by its existence. I contrast the EITC with a traditional Negative Income Tax (NIT). The NIT discourages work, and so induces large transfers from employers of low skill labor to their workers. With my preferred parameters the EITC increases after-tax incomes by \$0.73 per dollar spent, while the NIT yields \$1.39.

1 Introduction

Most means-tested transfer programs impose high effective tax rates on earned income. In recent decades, however, there has been a trend toward the imposition of labor supply conditions for the receipt of benefits. In the United States, traditional welfare was replaced with Temporary Assistance to Needy Families (TANF), which comes with time limits and work requirements, and the Earned Income Tax Credit (EITC) was repeatedly expanded. By 2000, spending on the EITC was 70% larger than that on TANF (Hotz and Scholz, 2003).

The EITC is often seen as an implementation of a Negative Income Tax, or NIT, but its central feature distinguishes it. Where non-workers receive the largest payments under the NIT, only families with earned income can receive the EITC. This feature ensures that the EITC encourages rather than discourages labor force participation among eligible individuals.[1]

Saez (2002b) argues that the optimal income transfer program will resemble the EITC if labor supply decisions are made primarily on the extensive (participation) margin, whereas intensive (hours) responses lead to an optimal tax that more closely resembles the NIT. Given mounting evidence that labor market participation is far more elastic with respect to the wage than are hours among participants, Saez's analysis supports the view (also advanced by Triest, 1994; Liebman, 2002; Eissa et al., 2008; and Blundell and Shephard, 2008) that the shape of the EITC schedule is a desirable one.

But Saez's analysis, like nearly all optimal tax analyses and discussions of the EITC, presumes that the incidence of taxes is entirely on workers. As Fullerton and Metcalf (2002) note, "this assumption has never been tested" (p. 29).[2] A basic result in the economics of taxation is that the economic incidence of taxes depends on the elasticities of supply and demand for the good being taxed and not on their statutory incidence. If demand is less than perfectly elastic, supply-side taxes are partially passed through to the demand side via changes in the equilibrium price. Effects on prices are are of the opposite sign as those on supply, so any program that increases labor supply will lead to reduced pre-tax wages. This implies that employers of low-skill labor capture a portion of the intended EITC transfer. Moreover, because EITC recipients (primarily single mothers)

[1] This is clearly true only for unmarried recipients. I discuss the incentives faced by secondary earners as well as the intensive margin incentives below.

[2] Anderson and Meyer (1997, 2000); Bingley and Lanot (2002); Gruber (1994, 1997), and Kubik (2004) estimate tax incidence, generally finding that workers bear much but not all of the burden. Lise et al.'s (2004) examination of the Canadian Self Sufficiency Project (SSP) is the only evaluation of an income transfer program of which I am aware that considers general equilibrium effects. These effects reverse the conclusion of a partial equilibrium cost-benefit analysis.

compete in the same labor markets as others who are ineligible for the credit, wage declines extend to many workers who do not receive offsetting EITC payments. These unintended transfers limit the EITC's value as a tool for income redistribution. Recognizing the endogeneity of wages thus reduces the attractiveness of work-encouraging transfers like the EITC. But the practical importance of incidence effects is unclear.

In this paper, I show that incidence effects are extremely important to the evaluation of the EITC. With plausible labor supply and demand elasticities, the unintended consequences of the EITC operating through the wage are large relative to the direct, intended transfers. Neglecting these wage effects leads to quite misleading assessments of the impact of a hypothetical EITC expansion on labor supply, incomes, and welfare.

I begin by extending the standard partial equilibrium tax incidence model to take account of important complexities in the labor market: Tax schedules are non-linear and heterogeneous across workers; the good being supplied is differentiated and imperfectly substitutable; and supply choices combine discrete (participate or not?) and continuous (how many hours to work?) decisions. I show that targeted work subsidies produce unintended transfers to employers, coming not just from targeted workers but also from ineligible workers in the same labor markets. The transfer to employers is largest when the subsidy induces large increases in labor supply and when demand is inelastic; it is paid primarily by targeted workers only when targeted and ineligible workers are poor substitutes in production.

I derive formulas for tax incidence that depend on the labor supply elasticity measures that are commonly obtained in empirical work: the elasticity of labor force participation with respect to the average tax rate on workers' earnings and the (uncompensated) elasticity of hours worked, conditional on participation, with respect to the marginal tax rate. Although both average and marginal tax rates vary substantially across even similarly-skilled workers, I show that incidence calculations can proceed based on aggregate data with only the mean rates within appropriately-defined cells.

To evaluate the importance of incidence considerations, I contrast two alternative income transfer policies: a small EITC expansion and a comparably-sized NIT, both targeted at families with children. Using data from the 1993 March Current Population Survey, I simulate the impact on the female labor market of adding each program to the actual 1992 tax schedule. I examine the effects of each program on labor supply, earnings, and net transfers, both for all women and for women disaggregated by EITC eligibility (i.e., the presence of children), marital status, and skill.

I treat elasticities and other parameters as known.[3] While I consider a range of

[3]A companion paper (Rothstein, 2008) uses an actual EITC expansion to estimate the elasticities of

plausible values, I focus on cases in which labor supply is more elastic at the extensive margin than at the intensive margin. In this case, with fixed wages the EITC causes net increases in low-skilled women's labor supply, while the NIT reduces supply. Thus, Saez (2002b) concludes that the optimal schedule resembles the EITC.

The evaluation of the two programs is quite different when incidence is taken into account, as the EITC produces large unintended transfers that offset many of its benefits. With my preferred parameters, a dollar of EITC spending produces net transfers to women with children of only \$0.83. Another \$0.36 is transferred to employers of low-skill labor, with the excess \$0.18 coming from (ineligible) childless women. The passthrough from single mothers, the primary group targeted by the EITC, is even larger: Fully 55% of the marginal EITC dollar given to this group is transferred to employers through reduced wages, and single childless women lose almost exactly as much as single mothers gain.

One might evaluate the EITC by its impact on recipients' after-tax incomes rather than on their welfare.[4] The EITC is more attractive by this measure: The net-of-tax incomes of women with children rise by \$1.07 for each dollar spent on the program. However, this is much smaller than the \$1.39 that one would have computed with fixed wages. Moreover, it is accompanied by a decline of \$0.34 in the net-of-tax incomes of women without children, who respond to falling wages by reducing labor supply.

The contrast with the NIT is dramatic. The NIT imposes positive tax rates on earnings, leading to net reductions in labor supply among eligible women and thereby to increased wages. A dollar transferred to families with earned income through the NIT produces a total transfer of \$2.77 and an increase in after-tax income of \$2.49, both far in excess of the budgetary cost of \$1.79. Transfers flow from employers to their workers, and even ineligible workers' welfares and incomes rise.

There are several limitations to my analysis. First, I ignore the taxes that would be needed to finance the proposed EITC and NIT programs. These would presumably be levied on higher-income taxpayers, though their incidence too is unclear. Second, I examine only the first-order effects of tax policy on wages, not second- and third-order effects on other prices. The analysis is thus not fully general equilibrium. Third, I neglect many of the complexities introduced by nonlinear income tax schedules. I implicitly assume that small tax changes will not lead workers to jump from one segment of the tax schedule to another. This is unrealistic, but is necessary to obtain simple expressions for incidence effects and is unlikely to substantially affect the results. Finally, I do not

labor supply and demand that are needed for incidence calculations. The results of that paper inform the choice of elasticity values here.

[4]In the words of Besley and Coate (1995), "[t]here is little evidence that the poor's leisure is valued by policy makers." See also Besley and Coate (1992) and Moffitt (2006).

extend the analysis to derive the implications for the optimal tax schedule. At a minimum, however, my simulation results suggest caution in deriving policy conclusions from models with fixed wages. Allowing for plausible labor demand elasticities leads to substantial changes in the distribution of outcomes.

The paper proceeds as follows. In Section 2, I develop the theoretical framework. The EITC program is described in Section 3. I also review there the evidence on the EITC's labor supply effects. Section 4 describes the data and tax simulation. Section 5 introduces the EITC and NIT policy alternatives. Section 6 describes the details of the simulation. Section 7 presents results. Section 8 concludes.

2 A Model of Tax Incidence

In this section, I develop a model of partial equilibrium tax incidence that is suitable to the complexities of the labor market. I begin with a simple textbook presentation, then gradually extend it to allow for heterogeneity across workers, non-proportional taxes, and distinct participation and hours choices.

2.1 The Textbook Model

I begin with constant-elasticity supply and demand functions for a homogenous good, with taxes levied on the supplier:

$$(1) \qquad L^S(w) = \alpha \left(w\left(1-\tau\right)\right)^{\sigma} \text{ and } L^D(w) = \beta w^{-\rho}.$$

Here, w is the price faced by the demander, $w(1-\tau)$ is the net-of-tax price received by the supplier, and σ and ρ are the price elasticities of supply and demand, respectively. The equilibrium pre-tax price and quantity are

$$(2) \qquad w = \alpha^{\frac{-1}{\sigma+\rho}} \beta^{\frac{1}{\sigma+\rho}} \left(1-\tau\right)^{\frac{-\sigma}{\sigma+\rho}} \text{ and } L = \alpha^{\frac{\rho}{\sigma+\rho}} \beta^{\frac{\sigma}{\sigma+\rho}} \left(1-\tau\right)^{\frac{\sigma\rho}{\sigma+\rho}}.$$

Thus, the demand side (in the market for labor, employers) bears a share $\frac{\sigma}{\sigma+\rho}$ of taxes–$d\ln w = \frac{-\sigma}{\sigma+\rho} d\ln\left(1-\tau\right) \approx \frac{\sigma}{\sigma+\rho} d\tau$–and the supply side bears the remaining $\frac{\rho}{\sigma+\rho}$ share. The demand-side share represents a transfer to suppliers. The net transfer from the supply side is thus $Lwd\tau \left(1 - \frac{\sigma}{\sigma+\rho}\right) = Lwd\tau \left(\frac{\rho}{\sigma+\rho}\right)$. It is smaller than the statutory tax whenever supply is at all elastic ($\sigma > 0$) and demand is less than perfectly elastic ($\rho < \infty$); it is smallest when supply is highly elastic and demand highly inelastic.

2.2 Incidence with heterogeneous workers

Workers of different skills are not perfectly substitutable in production, and even workers of the same skill may face different tax rates. The textbook model can be extended to allow for distinct labor markets and for tax rates that differ both across and within markets. For the moment, I maintain the assumption that taxes are proportional to earnings and that labor supply is characterized by a single parameter, σ. The supply of individual i working in market s is

$$L_{is} = \alpha_i \left(w_s \left(1 - \tau_{is}\right)\right)^{\sigma}. \tag{3}$$

This expression allows tax rates to vary freely across individuals, but assumes that the pre-tax wage is constant across workers in the same market. The total labor supplied to market s is $L_s = \sum_i L_{is}$, with differential

$$d \ln L_s \equiv \frac{dL_s}{L_s} = \frac{1}{L_s} \sum_i dL_{is} = \frac{1}{L_s} \sum_i L_{is} d \ln L_{is}. \tag{4}$$

Using (3) and again approximating $d \ln \left(1 - \tau_{is}\right) \approx -d\tau_{is}$, this yields

$$d \ln L_s \approx \sigma \left(d \ln w_s - L_s^{-1} \sum_i L_{is} d\tau_{is}\right) = \sigma \left(d \ln w_s - d\tau_s\right), \tag{5}$$

where $d\tau_s \equiv L_s^{-1} \sum_i L_{is} d\tau_{is}$. Thus, aggregate labor supplied to market s depends on the wage in that market and on the weighted mean tax rate in the market, using individuals' baseline labor supplies as weights.

Next, I need to model the determination of wages. I assume that workers within each market are perfect substitutes and that total effective labor supply is a Constant Elasticity of Substitution (CES) aggregate of supply in each market:

$$L = \left(\sum_s \beta_s L_s^{\frac{\rho - 1}{\rho}}\right)^{\frac{\rho}{\rho - 1}}. \tag{6}$$

Here, ρ is the elasticity of substitution between different types of labor. Cost minimization implies a set of labor demand functions of the form:

$$L_s = \psi \beta_s^{\rho} w_s^{-\rho}, \tag{7}$$

where $\psi = \psi(w_1, w_2, \ldots, w_S)$ is a parameter reflecting the aggregate demand for labor.

Note that w_t enters the expression for L_s, $s \neq t$, only through ψ. Because I focus on partial equilibrium incidence and not on changes in the price level, I neglect effects of taxes operating through ψ.

Differentiating the inverse demand implied by (7) yields

$$d \ln w_s = d \ln \beta_s + \rho^{-1} d \ln \psi - \rho^{-1} d \ln L_s. \tag{8}$$

Combining (5) and (8), we obtain the quasi-reduced form

$$d \ln w_s \approx \frac{1}{\sigma + \rho} d \ln \psi + \frac{\rho}{\sigma + \rho} d \ln \beta_s + \frac{\sigma}{\sigma + \rho} d\tau_s \tag{9a}$$

$$d \ln L_s \approx \frac{\sigma}{\sigma + \rho} d \ln \psi + \frac{\rho\sigma}{\sigma + \rho} d \ln \beta_s - \frac{\rho\sigma}{\sigma + \rho} d\tau_s. \tag{9b}$$

As the mean tax rate in the labor market rises, supply falls and wages increase. Just as in the textbook model, the employer's share of the change in average taxes is $\frac{\sigma}{\sigma+\rho}$.

2.3 Implications for Subgroup Analyses

It can also be of interest to examine the distribution of impacts across defined subgroups within market s. Let $d\tau_{sg} \equiv \left(\sum_{i \in g} L_{isg}\right)^{-1} \sum_{i \in g} L_{isg} d\tau_{isg}$ be the supply-weighted mean tax change for subgroup g in market s. The impact on subgroup g's net labor supply is:

$$d \ln L_{sg} \approx \frac{\sigma}{\sigma + \rho} d \ln \psi + \frac{\rho\sigma}{\sigma + \rho} d \ln \beta_s + \frac{\sigma^2}{\sigma + \rho} d\tau_s - \sigma d\tau_{sg}. \tag{10}$$

Thus, labor supply of subgroup g is declining in the mean tax rate in that subgroup but, conditional on this, increasing in the mean across the entire labor market.

Studies of the effects of tax reforms on labor supply frequently exploit contrasts between workers who plausibly participate in the same labor markets but are differently affected by a change in the tax regime (see, e.g., Eissa, 1995; Eissa and Hoynes, 2006b, 2004; Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001). These can identify the supply elasticity without accounting for wage effects. To see this, simply difference (10) between subgroups g_1 and g_2:

$$d \ln L_{sg_1} - d \ln L_{sg_2} = -\sigma \left(d\tau_{sg_1} - d\tau_{sg_2}\right).$$

Frequently, group g_2 is not directly affected by the tax change (i.e. $d\tau_{sg_2} = 0$). For example, in studies of the EITC's effect on labor supply, women without children – who are not eligible for the EITC – are often used as a "control" group. This terminology makes it seem as if the effect on the "treatment" group's labor supply is $\sigma d\tau_{sg_1}$. This would be correct if wages were fixed. But with general equilibrium effects this can be quite misleading. By (10), the net effect on group g_1's labor supply (neglecting changes in the price level) is

$$d\ln L_{sg_1} = \left(\frac{\sigma}{\sigma+\rho}\frac{L_{sg_1}}{L_s} - 1\right)\sigma d\tau_{sg_1}.$$

This can be quite different from the partial equilibrium labor supply effect if the taxed group is a large share of labor market s. Moreover, the "control" group g_2's supply changes as well, by $\frac{\sigma^2}{\sigma+\rho}\frac{L_{sg_1}}{L_s}d\tau_{sg_1}$. By (9a), if $d\tau_{sg_1} > 0$ (< 0) both groups will see declining (rising) wages.

Now imagine varying groups' shares of the labor market, ${}^{L_{sg_1}}/_{L_s}$, holding $d\tau_s = \left({}^{L_{sg_1}}/_{L_s}\right) d\tau_{sg_1}$ constant. That is, we compare a large tax cut targeted to a small group with a smaller cut spread across a larger group. The effects on employers and on group g_2's labor supply will be the same in either case, but the distribution of transfers will not. If group g_1 comprises the full labor market (i.e., $L_{sg_1} = L_s$), the full transfer to/from employers comes from this group, whose wages fall by $\frac{\sigma}{\sigma+\rho}d\tau_{sg_1}$. As the targeted group's share of the skill-s labor market falls, however, group g_2 bears an increasing share of the transfer to employers.

2.4 Nonlinear tax schedules

Finally, I extend the model to a nonlinear tax schedule. Let the tax paid by individual i, be an arbitrary function of individual earnings $y_i \equiv L_i w_i$, non-labor income R_i (assumed to be exogenous), and demographic characteristics X_i: $T_i = T\left(y_i,\, R_i,\, X_i\right)$. The individual's labor supply decision will depend on the marginal tax rate on earnings, $MTR_i \equiv {}^{\partial T}/_{\partial y_i}$, and, potentially, on other aspects of the tax schedule. For example, a discrete choice between working zero hours, which provides after-tax income $R_i - T\left(0,\, R_i,\, X_i\right)$, and working $h > 0$ hours for after-tax income $R_i + hw_i - T\left(hw_i,\, R_i,\, X_i\right))$ presumably depends on the average tax rate over the 0 to h range, $ATR_i \equiv \left(hw_i\right)^{-1}\left[T\left(hw_i,\, R_i,\, X_i\right) - T\left(0,\, R_i,\, X_i\right)\right]$.

It is straightforward to extend the incidence model to the nonlinear tax case so long as $d\ln L_{sg}$ is linear in $d\ln w_s$ and a set of tax parameters $\{d\tau_{sg1},\, \ldots,\, d\tau_{sgk}\}$. Assume

$$d\ln L_{sg} = \sigma_w d\ln w_s - \sigma_1 d\tau_{sg1} - \cdots - \sigma_k d\tau_{sgk} \tag{11}$$

and labor demand is as in (7). By (8), the impact of a tax shock on wages is proportional to the partial effect of the shock on labor supply, holding wages constant:

(12) $$d\ln w_s = \frac{1}{\sigma_w + \rho} d\ln\psi + \frac{1}{\sigma_w + \rho} d\ln\beta_s + \frac{\sigma_1}{\sigma_w + \rho} d\tau_{s1} + \cdots + \frac{\sigma_k}{\sigma_w + \rho} d\tau_{sk}.$$

As before, the tax rates in (11) and (12) are the hours-weighted averages across workers in market s.

Empirical researchers often estimate the effects of tax changes on labor force participation and on average hours among participants. The current framework can be used to incorporate these extensive and intensive responses. I neglect income effects here; the system is extended to include them in the appendix. Let p_{sg} be the participation rate of group g in market s and let h_{sg} represent average hours among participants. Total labor supply in the group is therefore $L_{sg} = N_{sg} p_{sg} h_{sg}$, where N_{sg} is the number of individuals in the group. Let σ_e and σ_i be the extensive- and intensive-margin elasticities, respectively. Letting $dMTR_{sg}$ and $dATR_{sg}$ be the change in mean marginal and average tax rates in the subgroup (as before, weighted by hours worked), this means that $d\ln h_{sg} = \sigma_i \left(d\ln w_s - dMTR_{sg}\right)$ and

$$\begin{aligned} d\ln p_{sg} &= \sigma_e d\ln\left(h_{sg} w_s \left(1 - ATR_{sg}\right)\right) \\ &\approx \sigma_e \left(1 + \sigma_i\right) d\ln w_s - \sigma_e \sigma_i dMTR_{sg} - \sigma_e dATR_{sg}. \end{aligned}$$

The overall change in labor supply in response to a tax change is thus

(13)
$$d\ln L_{sg} = d\ln p_{sg} + d\ln h_{sg} = \left(\sigma_i + \sigma_e + \sigma_i\sigma_e\right) d\ln w_s - \sigma_i \left(1 + \sigma_e\right) dMTR_{sg} - \sigma_e dATR_{sg}$$

and the reduced-form effect of the tax change on wages is

(14) $$d\ln w_s = \frac{1}{\sigma_i + \sigma_e + \sigma_i\sigma_e + \rho} \left[d\ln\psi + \left(\sigma_i + \sigma_i\sigma_e\right) dMTR_s + \sigma_e dATR_s\right].$$

Several aspects of these equations are of note. First, note that the product of the intensive- and extensive-margin elasticities appears in several places. This reflects the fact that any change in hourly after-tax wages leads to an intensive-margin response, and that this in turn changes the incentive to participate. Second, all of the tax rates are hours-weighted averages among workers in the cell; the implicit assumption is that the change in ATRs and MTRs faced by working women in an $s - g$ cell captures the change in the labor supply incentives faced by non-workers. This is questionable at best, but may be a tolerable approximation. Third, if $\sigma_e = 0$, (13) and (14) reduce to the simpler expressions in Section 2.2, using only σ_i and the marginal tax rate. Similarly, if $\sigma_i = 0$, we obtain the same expressions from Section 2.2, this time using σ_e and the average tax rate. Fourth, the same simplification does not arise when only one of the tax rates is changed but both elasticities are non-zero: A change in either tax rate influences both extensive- and intensive-margin labor supply decisions via its effect on wages. Finally, wage effects of tax changes are proportional to their impacts on labor supply. As discussed below, the EITC has opposite effects on MTRs and ATRs for many women. The net impact on the wage will depend on the sum of extensive- or intensive-margin labor supply responses.

2.5 Continuous skill distributions

The above model assumes that each worker participates in one of S distinct labor markets, and that an increase in labor supply in one of these markets has the same proportional effect on wages in every other market. In analyses of labor supply responses that do not examine wage effects, it is conventional to define labor markets by observed education and experience. This is less attractive for demand analyses: In the CES production function used here, a shock to the labor supply of young high school dropouts must have the same proportional effects on the wages of young high school graduates as on those of older college graduates.

An alternative is to treat skill as a continuous variable. Teulings (1995, 2005) develops a model of job assignments when "close" skill types are more substitutable than are those further apart in the distribution. In his model, the relevant labor supply that determines the wages of a worker with skill s (in, e.g., the inverse version of (7)) is the local average around s, with more weight on skill levels closer to s. Moreover, in any cross section there is a one-to-one mapping from wages to skills. Thus, we can continue to use the above reduced-form equations for taxes and labor supply by simply re-defining the market-level tax shock that is relevant to worker i as the local average of the change in tax rates among workers with wages close to w_i:

$$d\tau_{s(i)} \equiv \frac{\sum_j L_j K\left(\omega^{-1} d\left(w_i,\, w_j\right)\right) d\tau_j}{\sum_j L_j K\left(\omega^{-1} d\left(w_i,\, w_j\right)\right)}.$$

Here, $d\left(w_0,\, w_1\right)$ representes the distance from w_0 to w_1 in some suitable metric, $K\left(\right)$ is a kernel function, and ω is a bandwidth. As before, this local average is weighted by labor supply.

My main estimates use the conventional education-experience categorization. I also present estimates from the continuous skill model – with $d\left(w_i,\, w_j\right) \equiv \left|\ln w_i - \ln w_j\right|$, the

Table 1: The EITC Schedule

If y is between	the credit is	the marginal tax rate is
0 and C/τ_1	$\tau_1 y$	$-\tau_1$
C/τ_1 and p	C	0
p and $p + C/\tau_2$	$C - \tau_2 (y - p)$	τ_2
$p + C/\tau_2$	0	0

Epanechnikov kernel, and a bandwidth of 0.1 – as a specification check. Rothstein (2008) explores this model more fully.

3 An Overview of the EITC

The EITC is a refundable tax credit that depends on a family's total earnings according to a four-segment schedule.[5] Four parameters define the credit: A phase-in rate τ_1, a maximum credit C, an income level p at which the credit begins to phase out, and a phase-out rate τ_2. Table 1 describes the credit and marginal tax rate for a family with earned income y, depending on the range in which y falls.[6]

All four parameters vary across family types and over time. In 1992, families without children were ineligible, and families with more than one child were slightly more generously treated (higher C, τ_1, and τ_2) than families with just one. Importantly, the schedule did not (until 2002) vary with the number of adults or the number of workers in the household. Figure 1 displays the 1992 EITC schedule. Eissa and Hoynes (2008) review the EITC's dramatic expansion from its introduction in 1975 to the present. This has generally come through increases in the four parameters (though not always in proportion) rather than through changes in the fundamental structure of the program.

Liebman (1998) and Hotz and Scholz (2003) discuss the EITC's labor supply incentives. In the phase-in range, marginal tax rates (MTRs) are negative and substitution effects should lead to increased labor supply, but income effects may partially offset this. In the plateau region, MTRs are zero and income effects are negative. In the phase-out, substitution and income effects reinforce each other, both leading to reductions in labor supply. Thus, traditional labor supply models with continuous hours choices suggest a net negative labor supply effect.

But the annual hours distribution is extremely concentrated: 74% of women who work

[5] EITC take-up rates are estimated at 80% or more (Scholz, 1994; Kopczuk and Pop-Eleches, 2007).

[6] If Adjusted Gross Income (AGI) – typically just the sum of earnings and non-labor income – is above p, the credit can be less than is shown in Table 1 and Figure 1, and if AGI is above $p + C/\tau_2$ the family receives no EITC.

at all in a year work at least 48 weeks, and 52% work between 38 and 42 hours per week.[7] If the participation decision is discrete, average tax rates (ATRs) on a woman's potential earnings may be more important than MTRs. The EITC produces negative ATRs for all primary earners with potential earnings below $p + C/\tau_2$, so should have induced increased participation from single parents. Among secondary earners, by contrast, nearly all of the incentives are toward reduced labor supply on both the extensive and intensive margins (Eissa and Hoynes, 2004). [8]

The empirical literature on labor supply is huge. Hausman (1985), Pencavel (1986), Blundell and MaCurdy (1999), and Moffitt (2002) provide reviews. Three frequent findings are that men's labor supply is quite unresponsive to changes in the wage or in non-labor income; that women's labor supply is more elastic; and that low-skill workers' supply is more elastic than that of high-skill workers. As the EITC targets low-wage women, we can expect the relevant elasticities to be fairly high.

A series of recent studies use expansions of the EITC to identify supply elasticities. These are reviewed by Eissa and Hoynes (2006a, 2008) and Hotz and Scholz (2003). Studies of single women uniformly find that the EITC unambiguously expands single mothers' labor market participation, consistent with a large extensive margin elasticity (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001). Also consistent with this, Eissa and Hoynes (2004) find that the EITC reduces participation among married women. Hotz and Scholz (2003) summarize the evidence as indicating an elasticity of women's labor force participation with respect to net-of-tax income between 0.69 and 1.16.

Another clear result is that effects on hours worked conditional on participation are comparatively small. Eissa and Hoynes (2006b) find intensive-margin wage elasticities for low skill married women of 0.07 and 0.44, depending on the specification. These are if anything larger than those obtained by others (e.g., Eissa and Liebman, 1996 and Meyer and Rosenbaum, 2001). In a review, Meyer (2007) notes that the "lack of an 'hours effect' [of the EITC] is one of the more puzzling, yet robust findings in the literature." Saez (2002a) finds no evidence of bunching around the EITC kink points, again consistent with a small intensive-margin elasticity.

Combining the two margins, it is clear that the net effect of the EITC is to increase single mothers' total labor supply (Keane and Moffitt, 1998) and to reduce that of married

[7] Among single mothers who did not attend college, a group quite likely to receive the EITC, 68% work full year and 56% full time. The source is the 1994 March Current Population Survey sample decribed below.

[8] If the husband's earnings are above C/τ_1, the wife will face a non-negative MTR from her very first dollar of earnings. She also faces a positive ATR whenever the husband's earnings are below $p + C/\tau_2$ but her potential earnings would place the family's total income above p.

women with children (Eissa and Hoynes, 2004).[9] Effects on the latter group tend to be smaller than those on the former, suggesting that the net effect on total labor supply should be positive. But few studies examine the two groups in tandem.

Only a few studies have examined the wage impacts of the EITC. The between-group contrast cannot identify these effects if mothers with and without children participate in the same labor markets. Thus, only weaker identification strategies are available. Rothstein (2008) compares the wage trends for workers with different initial wages, who plausibly participated in distinct labor markets, surrounding a large EITC expansion. Allowing for a trend in the production function parameters (i.e., for skill biased technical change), he finds wage responses consistent with a demand elasticity of -0.3. Leigh (2007) contrasts workers in different states, under the assumption that labor markets are geographic, and also estimates $\rho = 0.3$.[10] Azmat (2006) studies the wage impacts of an analogue to the EITC in the UK, but focuses on the effect on the wages of recipients relative to those of non-recipients in the same labor markets. In the competitive model outlined above, this effect is necessarily zero.

4 Data

I use data from the 1993 Annual Demographic Supplement to the Current Population Survey (CPS) – the March survey – to simulate EITC eligibility and to calibrate the impacts of the counterfactual policy changes discussed below. The 1993 data contain information about labor market participation and annual earnings and wages from 1992. This just predates the large EITC expansion that began in the 1993 tax year.

I form tax filing units consisting of the family head and his or her spouse if present. Following the EITC rules, the family's credit is based on the number of resident children under 18 or under 24 and enrolled in school.[11] I compute hourly wages as the ratio of annual earnings to annual hours. I exclude families where the woman's hourly wage is above \$100 (in nominal dollars) or below \$2, or where she has negative self employment income.

Using the CPS sample, I simulate the EITC for which each family would have been

[9] The appendix discusses evidence regarding income effects.

[10] Leigh computes this as the ratio of reduced-form effects of the EITC on labor supply (of eligible and ineligible workers combined) and wages. Leigh also interprets his results as indicating that all (or more than all) of the EITC is shifted onto employers, however. This would imply inelastic demand ($\rho = 0$) and no reduced form effect on net labor supply of eligible women.

[11] In complex households, this only approximates the tax units used for EITC eligibility. For example, I assign a child in a multigenerational household to her mother, when in fact she might be claimed on her grandmother's return.

eligible in 1992 given its observed earnings.[12] I use this to compute the marginal tax rate (MTR) that each working woman faces and the average tax rate (ATR) on her earnings. The latter is computed as the difference between the (negative of) the EITC credit due to the family with and without her earnings, as a share of those earnings. Both MTRs and ATRs incorporate only the federal EITC; I neglect payroll and income taxes as well as state-level EITCs and other transfer programs.

Table 2 presents an empirical analysis of the distribution of women with children across EITC segments. I divide women by marital status and, for married women, by whether they worked at all during the year. About 30% of single mothers do not work. Among those that do, slightly more are in the phase-out (positive MTR) region than in the phase-in (negative MTR). In the subset without high school diplomas (Column 4) , the non-participation share is much higher, and a larger share are in the phase-in than in the phase-out region. Among married couples, the majority have incomes too high to receive the EITC. Those who are eligible are much more likely to be in the phase-out than in the phase-in range, even when I limit attention to families where the women does not have a high school diploma.[13] The final rows of the Table shows the fraction of working women for whom the EITC induces a positive or negative ATR. All single women who are eligible for the EITC face negative ATRs, but far more working married women face positive than negative ATRs.

Figure 2 shows mean EITC marginal and average tax rates (hereafter, MTRs and ATRs) among working women with children at each hourly wage, separately by marital status.[14] The average low-wage single mother faces a large, negative ATR. MTRs are negative at the lowest wages and positive at wages between about \$6 and \$11. For married women, average ATRs and MTRs are both positive but small throughout the bottom of the wage distribution.

The model in Section 2 indicates that the EITC's impact depends on the density of EITC-affected women in the labor markets in which they participate. Figure 3 shows the fraction of working women at each hourly wage who are eligible for a positive EITC, separately for single and married women. Throughout the bottom of the wage distribution,

[12] The EITC also depends on the family's Adjusted Gross Income (AGI). I use Taxsim (Feenberg and Coutts, 1993) to compute this, given the relevant variables that are available in the CPS. All further calculations use my own EITC calculator.

[13] The distribution across segments is quite different for married couples with and without female earnings. When I calculate taxes without female earnings, however, the two groups' distributions across EITC segments are quite similar.

[14] These are computed by locally linear regressions of tax rates on the log hourly wage, separately for married and single mothers. The regressions are weighted by annual hours worked; women with zero annual hours are excluded. I use an Epanechnikov kernel and a bandwidth of 0.05.

the majority of single women are receive the EITC. The share of married women receiving the credit is lower and drops off quickly at wages above about \$5. Note, however, that many married women who do not receive the EITC nevertheless face positive ATRs, as the family *would* be eligible for a credit if they did not work.

5 Counterfactual policies

I contrast two counterfactual policy reforms, each treated as additions to the 1992 tax schedule. The first is a small proportional expansion of the EITC: A family whose credit was c under the 1992 schedule would instead receive $c\,(1+\epsilon)$.[15]

I contrast this EITC expansion with a comparably-sized Negative Income Tax (NIT). An NIT has only two parameters: A baseline credit C^{NIT} and a rate τ^{NIT} at which it is taxed away. A family with earned income $y < {}^{C^{NIT}}\!/_{\tau^{NIT}}$ receives a credit of $C^{NIT} - y\tau^{NIT}$ and faces marginal tax rate τ^{NIT}; a family with income above this point gets nothing. Importantly, families with zero labor income receive the full credit C^{NIT} but are ineligible for the EITC. An NIT produces positive MTRs and increases in virtual income for all recipients. It also produces positive ATRs for all working single women, whether or not they actually receive the NIT, and for any married woman whose husband earns less than ${}^{C^{NIT}}\!/_{\tau^{NIT}}$. The NIT thus unambiguously reduces labor supply.

To make the two policies as comparable as possible, I limit my hypothetical NIT to families with children. I set the ratio of C^{NIT} for families with one child and with two or more children to be the same as that for C under the 1992 EITC, and set τ^{NIT} so that the NIT phases out entirely at the same income level as the EITC (i.e., so that ${}^{C^{NIT}}\!/_{\tau^{NIT}} = p + {}^{C}\!/_{\tau_2})$.

This still leaves the matter of setting the scale of the two policies. I report estimates for an infinitesimal EITC expansion that would add \$1 to its total cost (computed over the sample described in Section 4, excluding single fathers). All of the incidence formulas in Section 2 are linear in the tax rate, so the extension to larger policies is straightforward. In my simulations, over 40% of NIT spending goes to families with zero labor income, so an NIT that spent the same amount as the EITC would have much smaller impacts on the labor market. To permit a closer comparison, I calibrate C^{NIT} so that the total expenditures to families with positive earned income (using observed labor supply and wages) is \$1. An additional \$0.79 goes to families without earned income.

[15] This hypothetical expansion differs slightly from the large expansion that in fact took place between 1992 and 1996, which reduced the kink points somewhat, was proportionately more generous to two-child families than to one-child families, and added a small credit for families without children.

Figure 4 shows the tax schedules in the two proposed policies. Figure 5 shows the change in mean tax rates that single and married mothers at each hourly wage would face under each policy, assuming that labor supply and wages were unchanged. In each case, I consider the proposed policies in isolation, and ignore the effects of other taxes (including the actual 1992 EITC). Figure 5 shows that the EITC expansion would reduce MTRs and ATRs for low-skill single women, raise MTRs for single women at slightly higher wages, and raise MTRs and ATRs slightly for married women. The NIT alternative would increase MTRs and ATRs for all low-skill women, more so for those who are unmarried.

6 Calibration Methods

The equations in Section 2 provide simple expressions for the changes in the relevant outcomes – participation rates, average hours among participants, and hourly wages – as functions of changes in tax rates. My simulation of the impact of the two proposed tax policies thus proceeds in three steps:

1. Specify the relevant labor markets.
2. Estimate changes in mean average and marginal tax rates within each market (and for relevant subgroups), given observed distributions of labor supply and wages.
3. Compute labor market responses, given specified elasticities of supply and demand.

I discuss each step in turn.

6.1 Specification of labor markets

In the model above, workers are separated into distinct labor markets. Hamermesh (1993) discusses the aggregation of workers into discrete groups for analyses of labor demand. He notes that the appropriate partition should yield cells within which workers are highly substitutable. Most of the studies of the demand for heterogeneous labor that Hamermesh (1993) reviews disaggregate workers by age, race, sex, or occupation. For the current purposes, there is little harm in over-dividing. If workers in two cells are perfectly substitutable, demand for workers in each cell will be highly elastic with respect to the wages in that cell, holding other wages constant. The employer share of the tax burden would be determined by the (less) elastic demand for workers in a super-cell that aggregates the two perfect substitutes.

Because the EITC primarily affects women, I focus exclusively on the labor market for women. I assume throughout that men and women participate in a distinct labor market. In my primary analyses, I subdivide the female labor market by the intersection of four education categories (less than high school, a high school diploma but no college, some college but no degree, and college graduates), five-year age intervals, and marital status. The first two are conventional skill proxies (see, e.g., Borjas, 2003). The last is motivated by Rothstein's (2008) finding of substantial divergence between the wages of similarly-skilled single and married women in the mid 1990s.

In sensitivity analyses, I consider several alternative categorizations. First, I consider markets that are segmented by geography. I define geographic markets by state and, within state, by whether the individual lives in a metropolitan area or not. I assume that each geographic market is further divided by whether workers have some college (or more) or not. Second, I use observed hourly wages as proxies for skill and assume that workers compete only with other workers with similar hourly wages. This analysis uses the continuous skill distribution discussed in Section 2.5. Finally, for each labor market proxy, I explore separating or pooling the markets for single and married women.

6.2 Simulated tax rate changes

For each family in the CPS sample described above, I simulate eligibility for both of the proposed tax credits. I use observed labor supply and wages for these simulations. In computing tax rates, I treat married women as secondary earners. The average tax rate that is relevant for their participation decisions is thus the difference between the family's after-tax income given observed labor supply and what the family would have were the individual's hours set to zero but non-labor income and husband's earnings unchanged. I then average across women in the same market to obtain mean marginal and average tax rates. As discussed in Section 2, these averages are weighted by annual hours of work.

I treat all intensive margin responses as occurring along linear budget constraints that coincide with the segment of the tax schedule on which the individual is observed. Hausman (1985) emphasizes that some individuals will jump from one segment to another in response to a tax change. An example would be someone who would reduce her hours, lowering her total earnings from just above $22,370 to just below it, in order to qualify for the proposed EITC or NIT. My strategy treats her MTR as zero, when in fact it would be positive at her new labor supply. Three defenses can be offered for my approach.[16] First,

[16]The alternative would be to fully model the individual labor supply choice under the counterfactual tax regimes. This would require assumptions about the full distribution of utility function parameters. However, the utility specifications that have been used in the structural labor supply literature have a

the evidence suggests that behavioral responses to nonlinearities in the tax schedule are relatively small. Saez (2002a), for example, finds no evidence of bunching around convex kinks in the tax schedule. Second, I analyze the incidence of a marginal change in the tax schedule. Any behavioral responses are likely to produce only second-order effects on tax rates. Finally, the consequences for my analysis of mis-measuring any individual's tax rate are minor. The key rates are the means within relatively large cells, and these are likely to be reasonably accurately proxied by my no-behavioral-response simulations.

6.3 Calibration of labor market responses

Given labor market definitions and estimates of the change in mean tax rates in each labor market and subgroup, it is straightforward to apply equations (14) and (13) to obtain the changes in labor market participation, hours conditional on participation, and wages that the two proposed transfer programs would produce. I also assume that changes in participation rates will not lead to changes in the mean wage of workers in the cell through composition effects (i.e. selection), and that any composition effects on mean hours are captured by the intensive margin elasticity. Finally, I assume that non-labor income, family structure, and male earnings are invariant to the tax changes under consideration.

My baseline estimates assume that the elasticity of women's participation with respect to average wages is 0.75, that the elasticity of hours with respect to marginal wages conditional on working is zero, and that the own-price elasticity of demand for labor within each market is -0.3. Income effects are assumed to be zero, though I present specification checks that allow for them.

The supply elasticities roughly correspond to consensus estimates in the literature reviewed in Section 3. But the demand elasticity merits further discussion, as it is central to the present analysis and much less is known about it. My parameter choice corresponds to Hamermesh's (1993; 1995) "best guess" at the elasticity of demand for homogeneous labor; he suggests a plausible range of -0.15 and -0.75. Although one might expect the demand for workers of particular types to be more elastic, the estimates that Hamermesh reviews do not show clear evidence of this. Moreover, Hamermesh's guess corresponds closely to the estimates discussed in Section 3 that exploit EITC expansions.

By contrast, more recent estimates indicate a much wider range of possible values. Generally, studies that exploit exogenous shifts in wages tend to find small quantity re-

difficult time explaining the common reduced-form result that extensive margin supply responses are much larger than those on the intensive margin (Meyer, 2002). Absent better understanding of this issue, it seems best to stick to the reduced form parameters without committing to a particular behavioral model.

sponses, consistent with inelastic demand, while those that exploit shocks to labor supply (typically from immigration) find small wage responses that indicate more elastic demand. Thus, for example, the small-to-zero employment effects of minimum wage increases found by Card and Krueger (1995) would suggest quite inelastic demand for low skill labor (i.e. ρ close to zero). And in a study of worker's compensation insurance, Gruber and Krueger (1991) estimate a demand elasticity of -0.5. By contrast, the immigration literature is divided between estimates that immigration has essentially no effect on native wages (e.g., Card, 1990), indicating $\rho = \infty$, and those that indicate small effects that are consistent with own-wage labor demand elasticities around 2.5 (Borjas, 2003; Borjas and Katz, 2007). Card (2009) summarizes the immigration-based evidence as indicating that the elasticity of substitution between high school graduates and college educated workers is between 1.5 and 2.5 and that high school dropouts are perfect substitutes for workers with high school diplomas.

I have conducted extensive sensitivity analyses that vary the elasticity parameters. In the results below, I present simulations that use extensive supply elasticities of 1, 0.75, and 0.5; intensive elasticities of 0, 0.25, and 0.5; and demand elasticities of $-\infty$, -1, -0.3, and 0. Table 3 reports the reduced-form effects of one percentage point across-the-board increases in ATRs and MTRs on labor supply and wages for each parameter combination, using equations (14) and (13). The baseline values are highlighted for emphasis.

7 Results

I begin by analyzing the case of perfectly elastic demand ($\rho = \infty$). This extreme case helps make clear the direct labor supply effects of the two proposed tax policies, as there are no indirect effects when the labor market can absorb arbitrary supply shocks without changes in wages. Table 4 presents the simulated labor supply effects, using extensive margin supply elasticity $\sigma_e = 0.75$ and intensive margin elasticity $\sigma_i = 0$.[17] Panel A describes the proposed EITC expansion, while Panel B describes the NIT. All effects are characterized in terms of the total amount of additional (or reduced) earnings due to the addition of the small hypothetical programs. Recall that each is calibrated so that the total tax transfer to families with positive earnings is $1.

The first two rows of each panel describe these tax transfers. By construction, all EITC spending goes to families with positive earnings. In my simulation, 54 cents of every dollar goes to single mothers, and 46 cents to married couples. The proposed NIT

[17] Note that the definition of labor markets is irrelevant with $\rho = \infty$, as there are no spillover effects from taxed to untaxed workers in any case.

would give a slightly larger share of funds to single mothers. Much of the spending on the NIT, however, goes to families without earned income. This amounts to \$0.79 for every \$1 to families with labor income. Nearly three quarters of the funds given to non-workers goes to female-headed households.

The next row presents the effects on the labor market. By construction, the only responses in this simulation are on the supply side at the extensive margin. My simulation indicates that each dollar spent on the EITC leads to an extra \$0.61 in earnings from new unmarried participants and to \$0.22 less in earnings from a net reduction in married women's participation, for a net increase in earnings of \$0.39. The NIT, by contrast, causes reductions in participation of both single and married mothers. Earnings fall by a total of \$1.11. There are no spillovers to women without children under either policy.

The final row of each panel shows the change in after-tax income under each of the proposed policies, combining the direct transfer with the change in earnings due to increased or reduced labor market participation.[18] The labor market effects of the EITC magnify the direct transfer to single mothers, so incomes rise by \$1.16. Incomes of two-adult families rise by only \$0.23, as about half of the \$0.45 in tax payments is offset by reduced earnings. Total after-tax incomes rise by \$1.39. Under the NIT, the change in total after-tax incomes is only \$0.68, as much of the \$1.79 that is spent on the program is offset by reduced earnings.

Table 4 clearly shows the EITC to be a more cost-effective means of raising low-skilled women's incomes. This echoes the conclusions of many studies of the EITC. However, this result turns out to be entirely dependent on the assumption that labor demand is perfectly elastic and wages therefore exogenous. Table 5 presents my preferred simulations, using the same supply parameters and somewhat inelastic demand ($\rho = 0.3$). Where Table 4 indicated that an EITC expansion would increase total earnings by \$0.39 and those of single mothers by \$0.61, both operating entirely through labor supply responses, Table 5 indicates that total earnings would *fall* by \$0.27. This reflects a small net increase in labor supply (+\$0.09) and a substantial (-\$0.36) reduction coming from decreased wages.

Columns 2-5 describe the distribution of effects across single mothers, single women without children, married mothers, and married women without children. Single mothers' labor supply rises by \$0.35, a bit more than half as much as it did in the no-wage-response model. Married mothers' supply falls by \$0.10. Recall that I model single and married women as participating in distinct labor markets. Thus, wages fall in the single women

[18] With large policy shifts, there would be an interaction effect as changes in labor supply behavior lead to altered credit eligibility. Because I focus on extremely small policies and I neglect their effects on eligibility for other programs (including the actual 1992 EITC), the interactions are too small to show up in the Table and the actual tax transfer equals, within rounding error, the intended transfer.

markets and rise in the markets for married women's labor. In each case, these wage impacts are shared between mothers (who are eligible for the EITC or NIT) and ineligible non-mothers. The wage impacts then lead to follow-on changes in labor supply among non-mothers, partially offsetting the effects on mothers' supply. Thus, while the labor supply of single mothers rises substantially relative to that of non-mothers, the absolute increase in single mothers' supply is fairly small.

The final rows of Panel A describe the total effects on after-tax incomes and transfers. For each dollar spent on the EITC, total after-tax incomes rise by only \$0.73. This reflects increases for single and married mothers that are slightly larger than the direct tax transfers, and substantial declines for women without children. \$0.64 of the \$0.73 represents net changes in transfers. Beyond the direct tax transfers, there are large transfers from single women to their employers and smaller transfers from employers to married women. Both are divided between women with and without children; the net transfer for unmarried women is -\$0.18.

Panel B repeats the exercise for the NIT. The picture looks entirely different. As in Table 4, we see that \$1 in spending on families with positive earnings is accompanied by \$0.79 for non-working families. This spending leads to small reductions in labor supply (reducing earnings by \$0.29) and large increases in wages (adding \$0.98 to total earnings). Thus, the net effect is to increase after-tax income by \$2.49, and the net transfer to workers is even larger, \$2.77. Even childless women receive positive transfers and see increases in their wages and after-tax incomes.

The negative net effect of the EITC on wages in Table 5 is driven by the large increase in single women's labor supply that the EITC induces with fixed wages (as seen in Table 4). This occurs because the EITC produces negative ATRs for all low wage single mothers. As I assume that the extensive margin is reasonably elastic but that labor supply on the intensive margin – where many single mothers face positive tax rates – is completely inelastic, the net effect is necessarily positive. Although these supply parameters correspond with what studies of the EITC's labor supply effects have found, it is nevertheless worth exploring the possibility of an intensive margin response.

Table 6 presents the simulation for an intensive-margin supply elasticity of 0.25. Compared with Table 5, the labor supply response to the EITC among single mothers is dampened – an increase of \$0.22 as compared with \$0.35, despite a wage decline that is only half as large. This reflects a participation response that is nearly identical to that seen in Table 5, combined with an offsetting but smaller hours response. The net effect is to leave single mothers' earnings almost unchanged. However, single childless women's earnings fall substantially: The wage effect remains non-trivial, and this has effects on both extensive and intensive margin supply decisions. When we combine married and single women, total earnings fall by \$0.07. This is driven primarily by wage responses, with essentially zero net supply effect. After-tax incomes rise by \$0.93, more than in Table 5 but still less than the fiscal cost.

Allowing for intensive-margin supply responses has much less of an effect on the evaluation of the NIT (Panel B of Table 6). Here, ATRs and MTRs move in the same direction, and the labor market effects continue to produce a large multiplier for government spending.

7.1 Alternative Parameters and Definitions

Table 7 explores a variety of alternative elasticity parameters. To conserve space, for each (σ_e, σ_i, ρ) combination I report only the net total transfer to all workers (Colums 1-4) and to single mothers (Columns 5-8). The parameter combinations corresponding to Table 5 are highlighted for reference. Columns 1 and 5 show the case of perfectly elastic demand. In this case, the economic transfer necessarily equals the statutory transfer. Comparing these columns to the others indicates that with any of the other demand elasticities a substantial portion of the intended EITC transfer to single mothers is captured by employers. The first nine rows of each panel vary the wage elasticities of labor supply, maintaining the assumption that income effects are zero. The last two rows fix the wage elasticities at 0.75 (extensive) and 0.25 (intensive) and allow for income effects. The method for doing so and the choice of parameter values are discussed in the appendix.

The magnitude of the transfer to employers is fairly insensitive to the particular demand parameter, but is more sensitive to the supply elasticities. When the intensive-margin supply elasticity is 0.5 (or when income effects are large), the decline in labor supply among married mothers creates a large transfer from employers to married women that more than offsets the transfer from single women to their employers. Even when $\sigma_i = 0.25$, the net transfer to employers is reasonably small. However, the columns that focus on single mothers show a less positive story. Under all of the parameter combinations that I consider, employers capture at least 7% and sometimes as much as 80% of the intended transfer to single mothers.

Panel B of the Table shows corresponding simulations of the NIT. Under all 33 parameter combinations that do not involve perfectly elastic demand, there are large net transfers from employers to both single and married women, magnifying the direct effects of the tax credits. The size of these transfers is somewhat sensitive to the demand elasticity but quite insensitive to the choice of supply parameters.

Table 8 explores alternative partitions of the female workforce into labor markets, using my baseline parameters ($\sigma_e = 0.75$, $\sigma_i = 0$, $\rho = 0.3$, no income effects). I report the net total transfer and the change in after-tax income, both for all women and for single mothers. The first row of each panel repeats the estimates from the baseline simulation in Table 5. The second row considers the case where labor markets are defined by geography interacted with education (using a binary college-or-not classification). This has only small effects on the estimates, for the EITC producing better outcomes for single women and worse outcomes for married women. The third row returns to skill-based labor markets, using the continuous skill distribution discussed in Section 2.5. This makes the EITC look somewhat more attractive, primarily due to changes in married women's outcomes.

In my baseline model and in the first rows of Table 8, I assume that single and married women participate in distinct labor markets. This assumption is not theoretically motivated. In the second set of estimates in each Panel of Table 8, I assume that married and single women compete for the same jobs. This has essentially no effect on the outcomes for all women, but dramatically improves the impact of the EITC on single mothers. Recall that the labor supply effects of the EITC are of opposite sign for married and single women. Thus, the merging of the two labor markets dampens the net change in labor supply and therefore the downward change in single women's wages. The NIT results are less sensitive to the assumption about labor market definitions, in part because the labor supply of single and married women responds in the same direction.

Taking the results in Tables 7 and 8 together, I conclude that the labor market impacts of the two proposed policies are moderately sensitive to reasonable variations in the labor supply parameters and much less dependent on the particular labor market definition used. They are quite insensitive to the demand elasticity within plausible ranges. The general conclusion of the earlier analysis, that the superiority of the EITC over the NIT is not robust to loosening the implicit assumption of perfectly elastic labor demand, does not appear to depend on the particular modeling choices made there.

7.2 Distributional impacts

Of course, neither the EITC nor the NIT is intended to transfer money to mothers as a class; both are intended as income support policies for low-wage families with children. Thus, part of the evaluation of the policies must depend on their distributional effects within demographic groups. Table 9 explores the distributional impact of the two proposed programs using the baseline elasticity parameters.

In Panel A, the estimates use my baseline marital status-education-age market definitions and show impacts across the four education categories. For each cell, I show the intended tax transfer under each policy and the actual transfer (including wage effects) as a share of this, separately for married and single women. The total transfer under the EITC, as seen earlier, is about two thirds of what was intended, and single women receive less than half of the intended transfer. Statutory transfers under each policy are heavily tilted toward women with below-average education. Under the EITC, "leakage" through reduced wages is largest for the middle education cells, while in the highest and lowest education groups a larger share of the tax transfer sticks with the intended recipients. By contrast, under the NIT all four education groups receive a follow-on transfer from employers that magnifies the tax credit. The ratio of this follow-on transfer to the original credit is strictly increasing in education.

In Panel B, I return to the continuous skill definition, based on the hourly wage. This makes it possible to examine the effects of the two policies on each decile of the wage distribution. Both policies are targeted at the lower end of the distribution, with about 70% of the credits paid to working women (90% for working single women) going to those in the bottom half of the wage distribution. Under the EITC, only about two thirds of the intended transfers to low-wage women stick there, while the small tax transfers to the highest deciles (mostly going to single women with low annual hours) are accompanied by relatively large wage increases. A similar pattern appears for the NIT: Though even the lowest deciles obtain larger transfers than were intended, the magnifying effect of these follow-on transfers is much larger in the higher-wage categories. Under each policy, the upper-decile wage effects are concentrated among married women. Even relatively high-wage married women may face positive ATRs (see Figure 4), and the resulting reduction in their labor supply leads to wage increases in this submarket.

8 Discussion

Analyses of tax and transfer policy, both theoretical and empirical, have tended to ignore the potential effects of these policies on wage rates. The implicit assumption has been that the entire economic incidence of taxes is on workers. Although some empirical analyses (e.g., Gruber, 1997; Anderson and Meyer, 2000) find evidence of this, others (Anderson and Meyer, 1997; Kubik, 2004; Leigh, 2007) suggest that employers are likely to bear a portion of the tax burden as well.

The neglect of incidence considerations is defensible in some contexts. But when tax policy is used explicitly as a tool to manage labor supply incentives, as with the EITC, the issue can no longer be ignored. This paper has shown that under reasonable demand elasticities substantial portions of the funds expended on the EITC are shifted to employers, with negative consequences both for EITC recipients and for ineligible workers in the same labor markets. Although the exact magnitudes of these effects are sensitive to parameter values, their presence and qualitative importance is quite robust.

Many discussions of tax policy have concluded that the EITC resembles the optimal tax schedule or that it is a cost-effective mechanism for raising the incomes of low-skill workers with children. All of these are based on fixed-wage analyses in which the results generally turn on the substantial positive effects of the the EITC on labor supply. Allowing wages to adjust substantially weakens the case for the EITC. With reasonable parameter values the net effect of the program on the earnings of single mothers is negligible, as declines in wages offset increases in hours. Feasible alternative policies, including the NIT, are much more effective.

There are several limitations to the analysis undertaken here. In addition to those mentioned earlier, three are worth highlighting as potential directions for future work. First, I have assumed that labor supply elasticities are constant across female workers of different types. It would be straightforward to extend the formulas in Section 2 to allow for heterogeneity in labor supply behavior. Eissa and Hoynes (2004) estimate a wage elasticity of participation for married women that is much smaller than those typically obtained for single women. With uniform elasticities, the EITC's negative effect on married women's labor supply partially offsets its positive effect on that of single mothers. If in fact married women are less responsive than are single women, this offsetting effect is overstated, and the EITC's net wage effects are even more negative than those presented above.

Second, I have ignored the interaction between my proposed EITC and NIT policies and other preexisting distortions to the low-skill labor market. These would affect the welfare results: By treating my proposed policies as the only taxes I have been able to ignore deadweight losses as second-order, where in fact the EITC might yield first-order reductions in deadweight loss produced by other work-discouraging programs. Interactions between the EITC and other programs might also have first-order effects on the government budget. But my results on after-tax incomes would not be affected by the inclusion of other programs in the simulation.

Finally, it would be interesting to examine the impact of incidence effects on the design of optimal transfers. The results here indicate that labor-supply-increasing schedules are less desirable than one might otherwise expect. A plausible consequence is that the optimal tax should have higher (less negative) tax rates at low incomes. This would be a fruitful topic for future research.

A Appendix: Incidence with Income Effects

The specifications in Section 2.4 assume that income effects are zero. In this appendix, I derive formulas for the incidence of tax increases when income effects are non-zero.

I begin by defining two behavioral elasticities corresponding to income effects on the extensive and intensive margin. Let r be non-labor income (including husband's earnings, which are treated as exogenous) less the taxes that would be owed on this income if the woman did not work. Let v be virtual income, the intercept of the linear segment of the budget constraint on which a family with a working woman lies. These are related by $v = r + wL\left(MTR - ATR\right)$, where $L = ph$ is the woman's labor supply, wL is her earnings, MTR is the marginal tax rate, and ATR is the average tax rate on the woman's earnings. Thus,

(15)
$$dv_{sg} = dr_{sg} + w_s h_{sg}\left(MTR_{sg} - ATR_{sg}\right)\left(d\ln w_s + d\ln h_{sg}\right) + w_s h_{sg}\left(dMTR_{sg} - dATR_{sg}\right).$$

A common definition of the income elasticity of labor supply is $\eta \equiv \frac{NY}{L} * \frac{\partial L}{\partial v}$, where$NY$ is net-of-tax total income (including earnings; $NY \equiv v + wL\left(1 - MTR\right) = r + wL\left(1 - ATR\right)$). Conventionally, the second fraction is the derivative of labor supply with respect to virtual income but the first uses net income instead. A natural extension of this to allow for distinct extensive and intensive margins is to define the participation elasticity as $\eta_e \equiv \frac{NY}{p} * \frac{\partial p}{\partial r}$ and the elasticity of hours conditional on participation as $\eta_i \equiv \frac{NY}{h} * \frac{\partial h}{\partial v}$. Note that although these are defined with respect to different income concepts, a \$1 increase in the family's exogenous income raises r and v by the same amount.

A drawback to these definitions is that non-labor and virtual income need not be positive. For example, single mothers in the phase-in segment of the EITC are likely to have quite low non-labor income (and for this group $v = r$). Small changes in tax parameters can therefore induce enormous changes in $\ln r$ and $\ln v$, if indeed these are well defined. As an alternative, I focus on quasi-elasticities:

$$\tilde{\eta}_e \equiv \frac{\partial \ln p}{\partial r} = \frac{1}{NY}\eta_e \text{ and } \tilde{\eta}_i \equiv \frac{\partial \ln h}{\partial v} = \frac{1}{NY}\eta_i \tag{16}$$

I assume that these quasi-elasticities are constant across the population and compute them from the chosen elasticities by using the mean of NY among working women in my sample.

Given these definitions, we can write equations for the change in hours and participation at the $(s,\, g)$ level as :

$$d\ln h_{sg} = \sigma_i d\ln w_s - \sigma_i dMTR_{sg} + \tilde{\eta}_i dv_{sg} \tag{17}$$

and

$$d\ln p_{sg} = \sigma_e d\ln w_s + \sigma_e d\ln h_{sg} - \sigma_e dATR_{sg} + \tilde{\eta}_e dr_{sg}. \tag{18}$$

Substituting (16) into (17) and solving for $d\ln h_{sg}$, we can relate the change in hours to the change in wages and the various tax parameters. We can then use this to obtain a similar expression for total labor supply:

$$(19)\quad d\ln L_{sg} = d\ln p_{sg} + d\ln h_{sg} = \psi^{w}_{sg} d\ln w_s + \psi^{r}_{sg} dr_{sg} + \psi^{MTR}_{sg} dMTR_{sg} + \psi^{ATR}_{sg} dATR_{sg}.$$

I do not spell out the definitions of the ψ coefficients. They are algebraically complex, but their derivation from (16), (17), and (18) is straightforward.

In terms of these coefficients, the change in supply at the level of the $s$market is

$$(20)\qquad d\ln L_s = L_s^{-1} \sum_g L_{sg} \left(\psi^{w}_{sg} d\ln w_s + \psi^{r}_{sg} dr_{sg} + \psi^{MTR}_{sg} dMTR_{sg} + \psi^{ATR}_{sg} dATR_{sg} \right).$$

In the case with no income effects, the ψ coefficients do not themselves vary across individuals or groups, so they can be factored out of the summation. With income effects, this no longer the case: The ψ coefficients depend on, for example, $w_s h_{sg} (MTR_{sg} - ATR_{sg})$ through the effect of this on virtual income. Thus, I define $\psi^{w}_{s} \equiv L_s^{-1} \sum_g L_{sg} \psi^{w}_{sg}$ and $d\tau \equiv L_s^{-1} \sum_g L_{sg} \left(\psi^{r}_{sg} dr_{sg} + \psi^{MTR}_{sg} dMTR_{sg} + \psi^{ATR}_{sg} dATR_{sg} \right)$, the averages of the relevant composite expressions across g groups, weighted by hours supplied. (20) then becomes

$$(21)\qquad d\ln L_s = \psi^{w}_{s} d\ln w_s + d\tau.$$

The demand equation (suppressing nuisance parameters) is $d\ln L_s = \rho d\ln w_s$. Combining this with (21), we obtain the reduced-form expression for the change in wages:

$$(22)\qquad d\ln w_s = \left(\rho - \psi^{w}_{s}\right)^{-1} d\tau.$$

This can then be substituted in to (17), (18), and (19) to obtain reduced-form expressions for the change in labor supply.

The only remaining issue is the choice of elasticity parameters. In two papers on the effects of the EITC on the labor supply of married couples, Eissa and Hoynes (2004, 2006b) report separate estimates of the income effects on participation and hours conditional on participation. Eissa and Hoynes (2004) estimate a probit regression of labor force participation on the net-of-tax wage ($40w(1 - ATR)$) and net-of-tax non-labor income (r, in \$1,000s). The r marginal effect is -0.001 (SE 0.0003), and Eissa and Hoynes report an elasticity of -0.039. Eissa and Hoynes (2006b) regress hours among the employed on the log of the net-of-tax wage ($w(1 - MTR)$) and virtual income (in \$1,000s). In one specification, they get a virtual income cofficient of -3.0 (SE 0.74); in another, they get -25.3 (14.8). These correspond to income elasticities of -0.04 and -0.36.[19] Given the similarity of the Eissa and Hoynes estimates on the extensive and intensive margins, it is quite plausible that the two income elasticities are the same. I present estimates for two values: $\eta_i = \eta_e = -0.04$, corresponding to the lower set of estimates, and $\eta_i = \eta_e = -0.36$, corresponding to the larger estimate of the hours response.

Other estimates in the literature are generally consistent with this range, with a bit more support for the smaller (in magnitude) value. Imbens et al. (2001) use a sample of lottery winners to identify the effect of unearned income on labor supply. Their various

[19] In personal communication, Hilary Hoynes reports that these use the above definition of the income elasticity, $\eta \equiv \frac{NY}{h}\frac{\partial h}{\partial v}$.

estimates of the elasticity of participation with respect to unearned income range between -0.18 and +0.02. Imbens et al. do not report estimates of the elasticity of hours conditional on participation, but do report that the unconditional hours elasticity is about 50% larger than the participation elasticity. Killingsworth and Heckman (1986) survey the literature on female labor supply and summarize estimates of the "total income" elasticity of labor supply, $w{}^{\partial L}/_{\partial r} = {}^{wL}/_{NY}\eta$, from studies that typically treat non-participation as an econometric problem but not as a distinct decision margin. In my sample, the ratio of the mean of wh to the mean of NY, both calculated over families with working women, is about 0.5. A substantial majority of the estimates that Killingsworth and Heckman report are between 0 and -0.18, consistent with the above range.

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Figure 1. 1992 EITC schedule

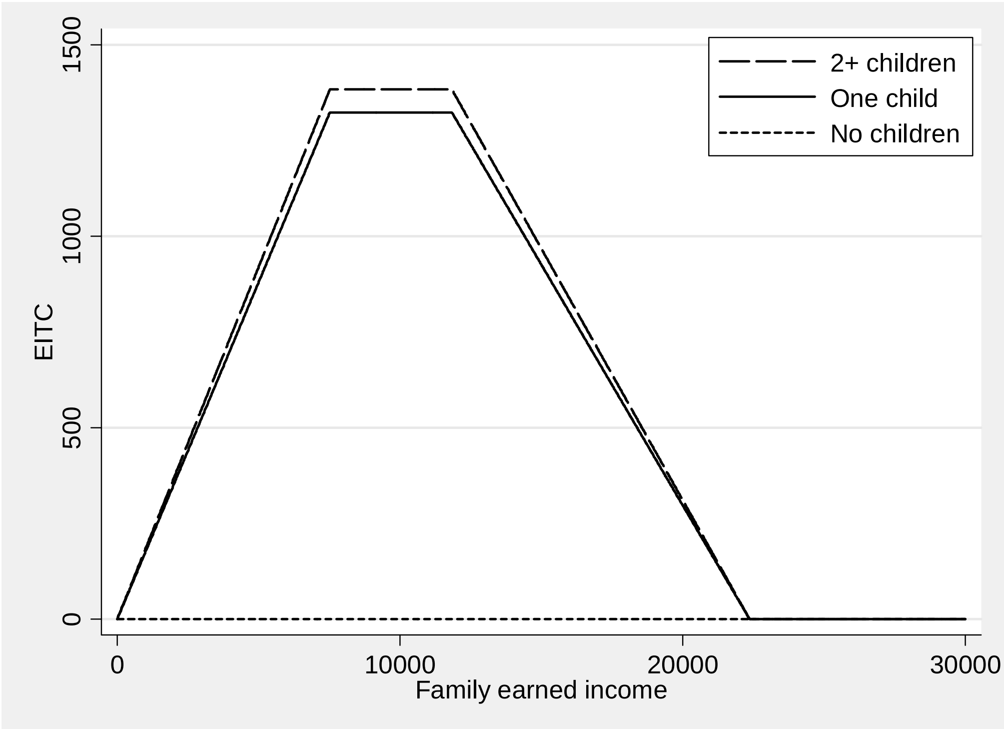
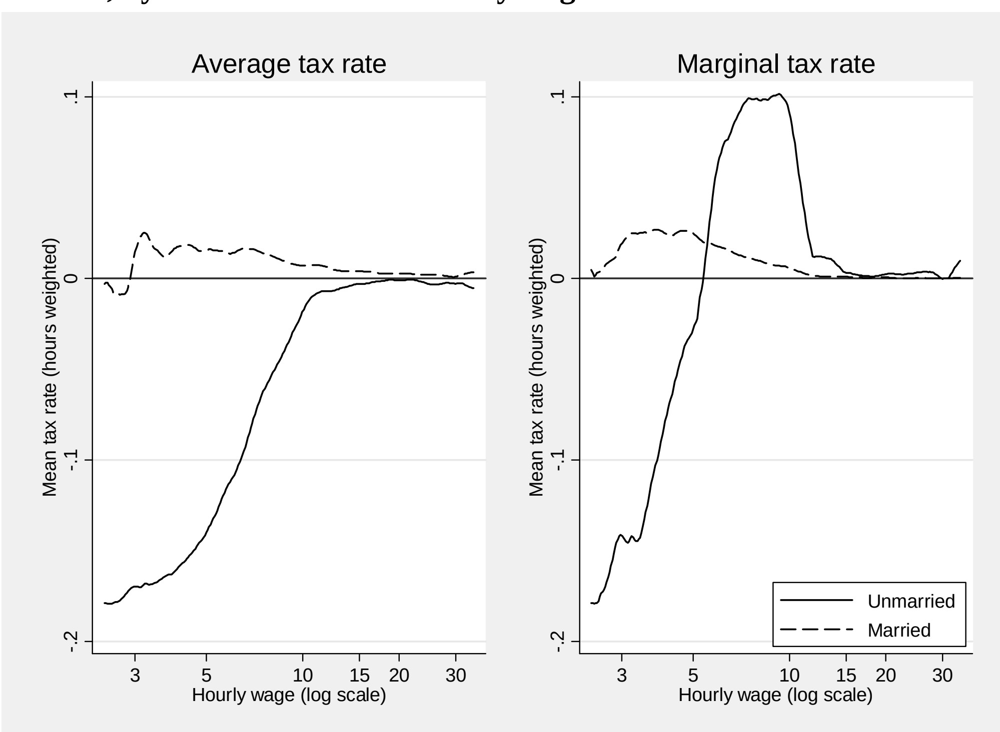
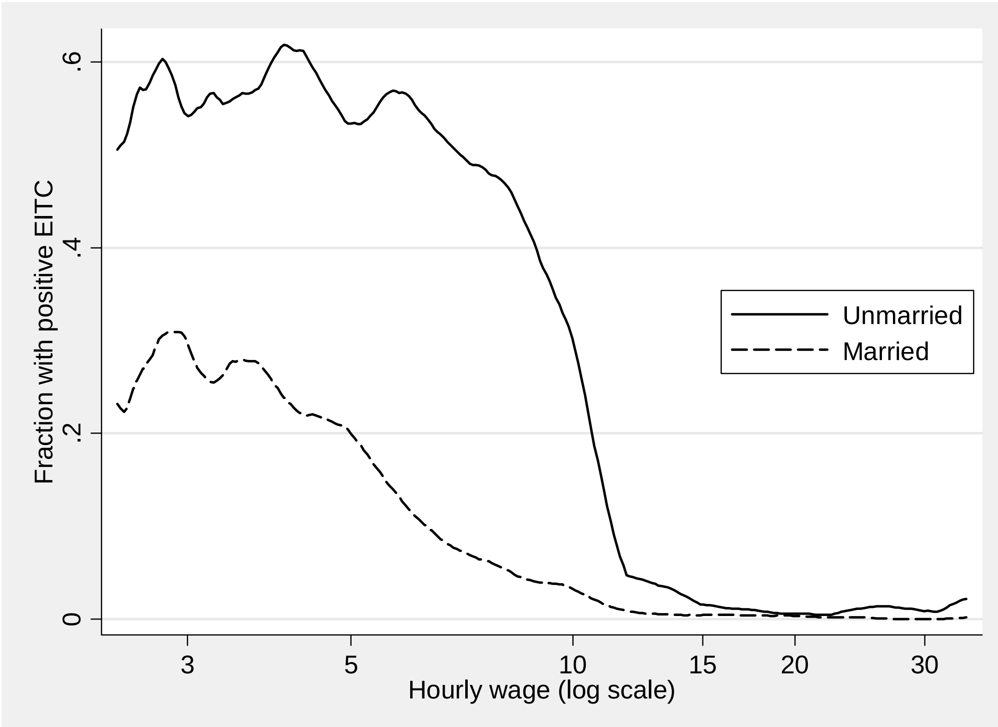


Figure 2. Mean EITC-associated average and marginal tax rates for women with children, by marital status and hourly wage



Notes: Series are estimated via local linear regressions using an Epanechnikov kernel and bandwidth = 0.05 log points.

Figure 3. Fraction of women eligible for EITC, by marital status and hourly wage



Notes: Series are estimated via local linear regressions using an Epanechnikov kernel and bandwidth = 0.05 log points.

Figure 4. Tax schedules associated with proposed EITC expansion and NIT alternative

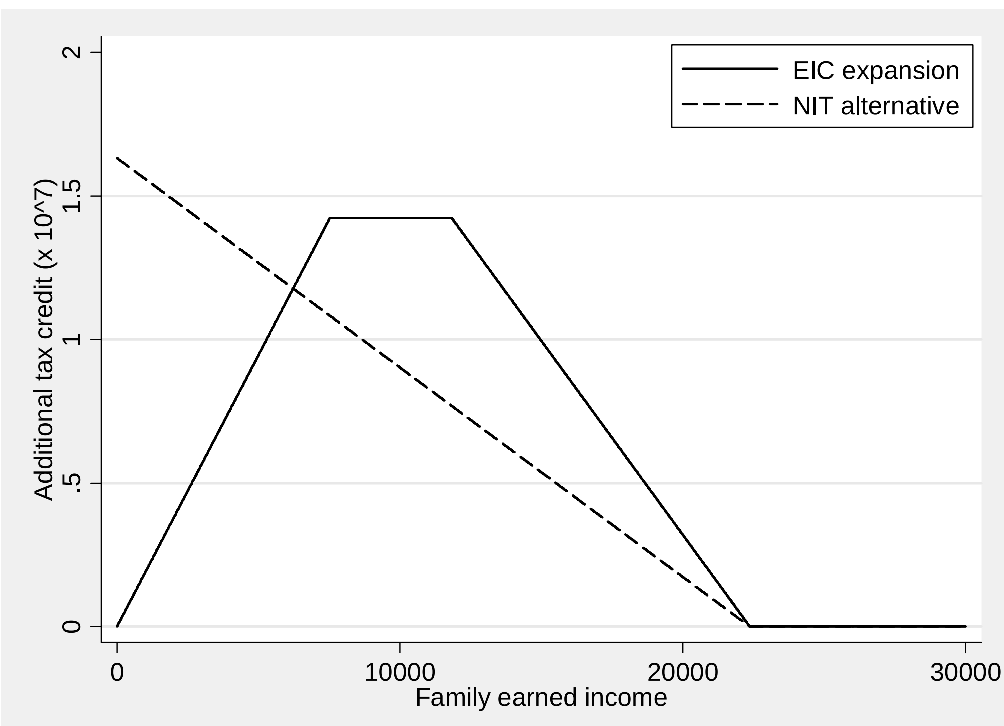
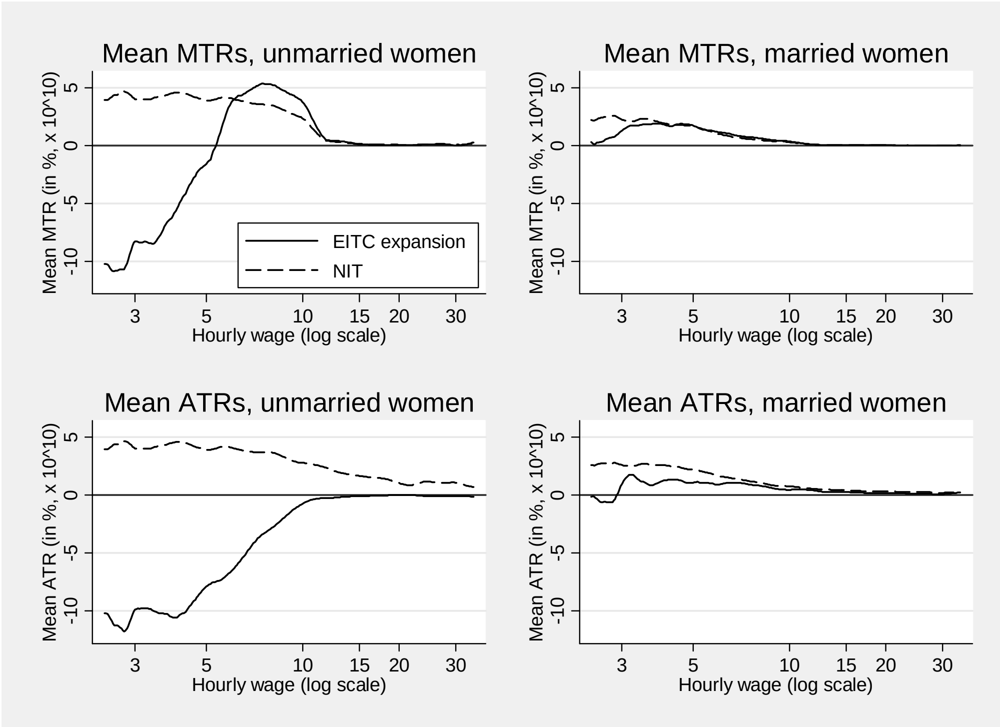


Figure 5. Mean marginal and average tax rates associated with proposed policies, by marital status and hourly wage



Notes: Series are estimated via local linear regressions using an Epanechnikov kernel and bandwidth = 0.05 log points.

Table 2. Distribution of families with working women across EITC segments in 1992

	All education levels			Less than a high school diploma		
	Single mothers	Married w/ kids		Single mothers	Married w/ kids	
		Wife works	Wife doesn't work		Wife works	Wife doesn't work
	(1)	(2)	(3)	(4)	(5)	(6)
N	7,005	13,139	5,221	1,760	1,261	1,355
% in each EITC segment, observed earnings						
Zero earnings	30%	0%	11%	60%	0%	24%
Phase-in	19%	2%	7%	19%	8%	13%
Plateau	10%	2%	5%	8%	8%	11%
Phase-out	23%	10%	18%	11%	25%	26%
Earnings too high	18%	86%	59%	2%	60%	27%
Families with positive female earnings						
% with ATR > 0	0%	26%		0%	44%	
% with ATR < 0	75%	7%		94%	19%	

Notes: See text for sample description. Only families with children are included in tabulations. "ATR" = "Average Tax Rate," calculated on a working woman's earnings.

Table 3. Effects of uniform tax increases on labor supply and wages, by elasticities of supply (σ) and demand (ρ)

	ρ = ∞		ρ = 1		ρ = 0.3		ρ = 0	
	Change in LS	Change in w	Change in LS	Change in w	Change in LS	Change in w	Change in LS	Change in w
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Across-the-board 1pp increase in ATRs								
Relatively inelastic extensive margin (σ_x = 0.5)								
σ_i=0	-0.50%	--	-0.33%	+0.33%	-0.19%	+0.63%	--	+1.00%
σ_i=0.25	-0.50%	--	-0.27%	+0.27%	-0.13%	+0.43%	--	+0.57%
σ_i=0.5	-0.50%	--	-0.22%	+0.22%	-0.10%	+0.32%	--	+0.40%
Central estimate of extensive margin elasticity (σ_x=0.75)								
σ_i=0	-0.75%	--	-0.43%	+0.43%	-0.21%	+0.71%	--	+1.00%
σ_i=0.25	-0.75%	--	-0.34%	+0.34%	-0.15%	+0.50%	--	+0.63%
σ_i=0.5	-0.75%	--	-0.29%	+0.29%	-0.12%	+0.39%	--	+0.46%
Unit elastic extensive margin (σ_x = 1)								
σ_i=0	-1.00%	--	-0.50%	+0.50%	-0.23%	+0.77%	--	+1.00%
σ_i=0.25	-1.00%	--	-0.40%	+0.40%	-0.17%	+0.56%	--	+0.67%
σ_i=0.5	-1.00%	--	-0.33%	+0.33%	-0.13%	+0.43%	--	+0.50%
Panel B: Across-the-board 1pp increase in MTRs								
Relatively inelastic extensive margin (σ_x = 0.5)								
σ_i=0	--	--	--	--	--	--	--	--
σ_i=0.25	-0.38%	--	-0.20%	+0.20%	-0.10%	+0.32%	--	+0.43%
σ_i=0.5	-0.75%	--	-0.33%	+0.33%	-0.15%	+0.48%	--	+0.60%
Central estimate of extensive margin elasticity (σ_x=0.75)								
σ_i=0	--	--	--	--	--	--	--	--
σ_i=0.25	-0.44%	--	-0.20%	+0.20%	-0.09%	+0.29%	--	+0.37%
σ_i=0.5	-0.88%	--	-0.33%	+0.33%	-0.14%	+0.45%	--	+0.54%
Unit elastic extensive margin (σ_x = 1)								
σ_i=0	--	--	--	--	--	--	--	--
σ_i=0.25	-0.50%	--	-0.20%	+0.20%	-0.08%	+0.28%	--	+0.33%
σ_i=0.5	-1.00%	--	-0.33%	+0.33%	-0.13%	+0.43%	--	+0.50%

Notes: Table shows the effect of a 1 percentage point in the ATR (panel A) or MTR (panel B) on all workers' earnings, using equations (13) and (14) in the text. σ_x and σ_i are the elasticity of supply on the extensive and intensive margins, respectively.

Table 4. Impacts of EITC and NIT Expansions without Incidence Effects (Perfectly Elastic Demand)

	All women	Single women w/ kids	Single women no kids	Married women w/ kids	Married women no kids
	(1)	(2)	(3)	(4)	(5)
Panel A: EITC expansion					
Intended tax transfer	$ 1.00	$ 0.55	$ -	$ 0.45	$ -
To families with earned income	$ 1.00	$ 0.55	$ -	$ 0.45	$ -
Change in labor supply (in $ of earnings)	$ 0.39	$ 0.61	$ -	$ (0.22)	$ -
Change in after-tax income	$ 1.39	$ 1.16	$ -	$ 0.23	$ -
Panel B: NIT expansion					
Intended tax transfer	$ 1.79	$ 1.20	$ -	$ 0.59	$ -
To families with earned income	$ 1.00	$ 0.59	$ -	$ 0.41	$ -
Change in labor supply (in $ of earnings)	$ (1.11)	$ (0.68)	$ -	$ (0.43)	$ -
Change in after-tax income	$ 0.68	$ 0.52	$ -	$ 0.16	$ -

Notes: Simulations are of an EITC or NIT expansion targeted at families with children and intended to transfer $1 to families with positive earnings (in the absence of labor supply or wage effects). Elasticities are σ_x=0.75, σ_i=0, $\rho=\infty$. Parentheses indicate negative numbers.

Table 5. Impacts of EITC and NIT Expansions with Incidence Effects (Demand Elasticity = -0.3)

	All women	Single women		Married women	
		w/ kids	no kids	w/ kids	no kids
	(1)	(2)	(3)	(4)	(5)
Panel A: EITC expansion					
Intended tax transfer	\$ 1.00	\$ 0.55	\$ -	\$ 0.45	\$ -
To families with earned income	\$ 1.00	\$ 0.55	\$ -	\$ 0.45	\$ -
Labor market effects					
Change in labor supply (in \$ of earnings)	\$ 0.09	\$ 0.35	\$ (0.20)	\$ (0.10)	\$ 0.04
Change in wages (in \$ of earnings)	\$ (0.36)	\$ (0.31)	\$ (0.23)	\$ 0.14	\$ 0.05
Change in total earnings	\$ (0.27)	\$ 0.03	\$ (0.43)	\$ 0.04	\$ 0.09
Net effects					
Change in after-tax income	\$ 0.73	\$ 0.58	\$ (0.43)	\$ 0.49	\$ 0.09
Net total transfer	\$ 0.64	\$ 0.24	\$ (0.23)	\$ 0.59	\$ 0.05
Panel B: NIT expansion					
Intended tax transfer	\$ 1.79	\$ 1.20	\$ -	\$ 0.59	\$ -
To families with earned income	\$ 1.00	\$ 0.59	\$ -	\$ 0.41	\$ -
Labor market effects					
Change in labor supply (in \$ of earnings)	\$ (0.29)	\$ (0.42)	\$ 0.25	\$ (0.21)	\$ 0.10
Change in wages (in \$ of earnings)	\$ 0.98	\$ 0.32	\$ 0.30	\$ 0.26	\$ 0.11
Change in total earnings	\$ 0.70	\$ (0.10)	\$ 0.54	\$ 0.04	\$ 0.21
Net effects					
Change in after-tax income	\$ 2.49	\$ 1.10	\$ 0.54	\$ 0.63	\$ 0.21
Net total transfer	\$ 2.77	\$ 1.52	\$ 0.30	\$ 0.84	\$ 0.11

Notes: Simulations are of an EITC or NIT expansion targeted at families with children and intended to transfer \$1 to families with positive earnings (in the absence of labor supply or wage effects). Elasticities are σ_x=0.75, σ_i=0, ρ=0.3. Parentheses indicate negative numbers.

Table 6. Incidence Effects with Hours Responses (Intensive Margin Supply Elasticity = 0.25)

	All women	Single women		Married women	
		w/ kids	no kids	w/ kids	no kids
	(1)	(2)	(3)	(4)	(5)
Panel A: EITC expansion					
Intended tax transfer - total	$ 1.00	$ 0.55	$ -	$ 0.45	$ -
To families with earned income	$ 1.00	$ 0.55	$ -	$ 0.45	$ -
Labor market effects					
Change in labor supply	$ 0.01	$ 0.22	$ (0.14)	$ (0.14)	$ 0.07
Change in labor force participation	$ 0.19	$ 0.36	$ (0.11)	$ (0.11)	$ 0.06
Change in hours | participation	$ (0.18)	$ (0.14)	$ (0.03)	$ (0.02)	$ 0.02
Change in wages	$ (0.07)	$ (0.17)	$ (0.11)	$ 0.15	$ 0.06
Change in total earnings	$ (0.07)	$ 0.05	$ (0.25)	$ 0.01	$ 0.13
Net effects					
Change in after-tax income	$ 0.93	$ 0.60	$ (0.25)	$ 0.46	$ 0.13
Net total transfer	$ 0.93	$ 0.38	$ (0.11)	$ 0.60	$ 0.06
Panel B: NIT expansion					
Intended tax transfer - total	$ 1.79	$ 1.20	$ -	$ 0.59	$ -
To families with earned income	$ 1.00	$ 0.59	$ -	$ 0.41	$ -
Labor market effects					
Change in labor supply	$ (0.26)	$ (0.54)	$ 0.38	$ (0.24)	$ 0.14
Change in labor force participation	$ (0.29)	$ (0.47)	$ 0.30	$ (0.23)	$ 0.11
Change in hours | participation	$ 0.03	$ (0.07)	$ 0.08	$ (0.01)	$ 0.03
Change in wages	$ 0.95	$ 0.32	$ 0.29	$ 0.23	$ 0.10
Change in total earnings	$ 0.69	$ (0.22)	$ 0.67	$ (0.01)	$ 0.24
Net effects					
Change in after-tax income	$ 2.48	$ 0.98	$ 0.67	$ 0.58	$ 0.24
Net total transfer	$ 2.74	$ 1.52	$ 0.29	$ 0.82	$ 0.10

Notes: Simulations are of an EITC or NIT expansion targeted at families with children and intended to transfer $1 to families with positive earnings (in the absence of labor supply or wage effects). Elasticities are σ_x=0.75, σ_i=0.25, ρ=0.3. Parentheses indicate negative numbers.

Table 7. Sensitivity of total transfers to elasticity parameters

	Net total transfer, all women				Net total transfer, single mothers			
	ρ = ∞	ρ = 1	ρ = 0.3	ρ = 0	ρ = ∞	ρ = 1	ρ = 0.3	ρ = 0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: EITC								
Relatively inelastic extensive margin (σ_x = 0.5)								
σ_i=0	$ 1.00	0.83	0.69	0.50	$ 0.55	0.40	0.27	0.11
σ_i=0.25	$ 1.00	0.99	0.98	0.97	$ 0.55	0.47	0.42	0.37
σ_i=0.5	$ 1.00	1.09	1.13	1.16	$ 0.55	0.51	0.49	0.48
Central estimate of extensive margin elasticity (σ_x=0.75)								
σ_i=0	$ 1.00	0.79	0.64	0.50	$ 0.55	0.36	0.24	0.11
σ_i=0.25	$ 1.00	0.95	0.93	0.91	$ 0.55	0.43	0.38	0.34
σ_i=0.5	$ 1.00	1.06	1.08	1.10	$ 0.55	0.48	0.46	0.44
Unit elastic extensive margin (σ_x = 1)								
σ_i=0	$ 1.00	0.75	0.62	0.50	$ 0.55	0.33	0.21	0.11
σ_i=0.25	$ 1.00	0.92	0.89	0.87	$ 0.55	0.41	0.35	0.31
σ_i=0.5	$ 1.00	1.04	1.05	1.05	$ 0.55	0.46	0.43	0.42
With income effects (using σ_x = 0.75 and σ_i = 0.25)								
$\eta_e = \eta_i = -0.04$	$ 1.00	0.97	0.96	0.95	$ 0.55	0.44	0.39	0.35
$\eta_e = \eta_i = -0.36$	$ 1.00	1.17	1.25	1.31	$ 0.55	0.51	0.49	0.48
Panel B: NIT								
Relatively inelastic extensive margin (σ_x = 0.5)								
σ_i=0	$ 1.79	2.25	2.65	3.16	$ 1.20	1.35	1.48	1.65
σ_i=0.25	$ 1.79	2.33	2.65	2.95	$ 1.20	1.39	1.50	1.60
σ_i=0.5	$ 1.79	2.39	2.66	2.87	$ 1.20	1.41	1.51	1.58
Central estimate of extensive margin elasticity (σ_x=0.75)								
σ_i=0	$ 1.79	2.38	2.77	3.16	$ 1.20	1.39	1.52	1.65
σ_i=0.25	$ 1.79	2.44	2.74	2.98	$ 1.20	1.42	1.52	1.61
σ_i=0.5	$ 1.79	2.47	2.72	2.90	$ 1.20	1.44	1.53	1.59
Unit elastic extensive margin (σ_x = 1)								
σ_i=0	$ 1.79	2.48	2.85	3.16	$ 1.20	1.42	1.54	1.65
σ_i=0.25	$ 1.79	2.51	2.80	3.00	$ 1.20	1.45	1.54	1.61
σ_i=0.5	$ 1.79	2.54	2.77	2.92	$ 1.20	1.46	1.54	1.59
With income effects (using σ_x = 0.75 and σ_i = 0.25)								
$\eta_e = \eta_i = -0.04$	$ 1.79	2.47	2.79	3.04	$ 1.20	1.43	1.54	1.63
$\eta_e = \eta_i = -0.36$	$ 1.79	2.71	3.15	3.50	$ 1.20	1.53	1.68	1.81

Note: Highlighted cells correspond to elasticity parameters used in Table 5.

Table 8. Sensitivity of effects to labor market definitions

	Net total transfer		Change in after-tax income	
	All women	Single mothers	All women	Single mothers
	(1)	(2)	(3)	(4)
Panel A. EITC				
Markets segmented by marital status				
Education-experience	$ 0.64	0.24	0.73	0.58
Geography-education	$ 0.60	0.29	0.68	0.73
Wage (continuous)	$ 0.78	0.34	0.84	0.59
Markets not segmented				
Education-experience	$ 0.64	0.46	0.73	0.99
Geography-education	$ 0.57	0.48	0.63	1.08
Wage (continuous)	$ 0.78	0.50	0.84	0.88
Panel B. NIT				
Markets segmented by marital status				
Education-experience	$ 2.77	1.52	2.49	1.10
Geography-education	$ 2.81	1.46	2.54	0.99
Wage (continuous)	$ 2.73	1.46	2.45	1.02
Markets not segmented				
Education-experience	$ 2.77	1.39	2.48	0.87
Geography-education	$ 2.83	1.35	2.57	0.79
Wage (continuous)	$ 2.73	1.35	2.45	0.83

Notes: Each row corresponds to a distinct definition of the relevant labor market. Each simulation uses baseline elasticity parameters: σ_x=0.75, σ_i=0, ρ=0.3.

Table 9. Distribution of net transfers with baseline parameters

	EITC				NIT			
	All women		Single mothers		All women		Single mothers	
	Intended	Actual (as % of intended)	Intended	Actual	Intended	Actual	Intended	Actual
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Baseline market definitions								
Full population	$ 1.000	64%	$ 0.550	43%	$ 1.790	155%	$ 1.201	126%
By education								
Less than high school	$ 0.244	76%	$ 0.090	48%	$ 0.633	116%	$ 0.407	108%
High school	$ 0.431	64%	$ 0.240	40%	$ 0.671	157%	$ 0.443	131%
Some college	$ 0.260	51%	$ 0.180	40%	$ 0.392	181%	$ 0.292	139%
College graduate	$ 0.065	74%	$ 0.041	60%	$ 0.095	290%	$ 0.060	159%
Panel B: Continuous skill distribution								
Full population	$ 1.000	78%	$ 0.550	62%	$ 1.790	152%	$ 1.201	122%
By education								
Less than high school	$ 0.244	80%	$ 0.090	64%	$ 0.633	113%	$ 0.407	106%
High school	$ 0.431	78%	$ 0.240	61%	$ 0.671	150%	$ 0.443	123%
Some college	$ 0.260	75%	$ 0.180	62%	$ 0.392	170%	$ 0.292	131%
College graduate	$ 0.065	80%	$ 0.041	60%	$ 0.095	357%	$ 0.060	168%
By hourly wage decile								
Non-workers	$ 0.207	100%	$ -	-	$ 0.983	100%	$ 0.615	100%
1st decile (bottom)	$ 0.171	67%	$ 0.091	58%	$ 0.244	122%	$ 0.170	110%
2nd decile	$ 0.167	63%	$ 0.110	60%	$ 0.176	144%	$ 0.125	118%
3rd decile	$ 0.151	64%	$ 0.110	60%	$ 0.132	168%	$ 0.097	129%
4th decile	$ 0.138	61%	$ 0.112	62%	$ 0.105	215%	$ 0.082	149%
5th decile	$ 0.074	68%	$ 0.063	65%	$ 0.060	257%	$ 0.049	166%
6th decile	$ 0.045	86%	$ 0.034	68%	$ 0.041	364%	$ 0.030	194%
7th decile	$ 0.016	151%	$ 0.011	58%	$ 0.016	786%	$ 0.011	368%
8th decile	$ 0.013	186%	$ 0.009	76%	$ 0.013	847%	$ 0.008	377%
9th decile	$ 0.009	219%	$ 0.005	78%	$ 0.011	990%	$ 0.007	411%
10th decile (top)	$ 0.009	195%	$ 0.005	77%	$ 0.011	894%	$ 0.006	359%

Notes: Simulations use baseline elasticity parameters: σ_x=0.75, σ_i=0, ρ=0.3.