

Appendix:

Is the EITC as Good as an NIT?

Conditional Cash Transfers and Tax Incidence

Jesse Rothstein
Princeton University and NBER

May 2009

A Appendix: Additional estimates

Appendix Figures 1 and 2 present estimates of the net transfer to workers, separately by marital status and the presence of children, under a 27 different elasticity parameter combinations. These extend the results from Figure 5 of the main text showing the total transfer pooled across all workers.

B 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 $v = r + wL(MTR - ATR)$, 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.

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; $NY \equiv v + wL(1 - MTR) = r + wL(1 - ATR)$). 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:

$$\tilde{\eta}_e \equiv \frac{\partial \ln p}{\partial r} = \frac{1}{NY} \eta_e \text{ and } \tilde{\eta}_i \equiv \frac{\partial \ln h}{\partial v} = \frac{1}{NY} \eta_i \quad (\text{B.1})$$

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.¹

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

$$d \ln h_{sg} = \sigma_i d \ln w_s - \sigma_i d MTR_{sg} + \tilde{\eta}_i d v_{sg} \quad (\text{B.2})$$

¹There is no particular reason to think that income elasticities (or quasi-elasticities) are structural parameters, and they more likely vary with non-labor income and earnings. As elsewhere in this paper, the estimates with income effects are best seen as approximations.

and

$$d \ln p_{sg} = \sigma_e d \ln w_s + \sigma_e d \ln h_{sg} - \sigma_e d ATR_{sg} + \tilde{\eta}_e dr_{sg}. \quad (\text{B.3})$$

Substituting (B.1) into (B.2) 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:

$$d \ln L_{sg} = d \ln p_{sg} + d \ln h_{sg} = \chi_{sg}^w d \ln w_s + \chi_{sg}^r dr_{sg} + \chi_{sg}^{MTR} dMTR_{sg} + \chi_{sg}^{ATR} dATR_{sg}. \quad (\text{B.4})$$

I do not spell out the definitions of the χ coefficients. They are algebraically complex, but their derivation from (B.1), (B.2), and (B.3) is straightforward.

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

$$d \ln L_s = L_s^{-1} \sum_g L_{sg} (\chi_{sg}^w d \ln w_s + \chi_{sg}^r dr_{sg} + \chi_{sg}^{MTR} dMTR_{sg} + \chi_{sg}^{ATR} dATR_{sg}). \quad (\text{B.5})$$

In the case with no income effects, the χ 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 χ coefficients depend on, for example, $w_s h_{sg} (MTR_{sg} - ATR_{sg})$ through the effect of this on virtual income. Thus, I define $\chi_s^w \equiv L_s^{-1} \sum_g L_{sg} \chi_{sg}^w$ and $d\tau \equiv L_s^{-1} \sum_g L_{sg} (\chi_{sg}^r dr_{sg} + \chi_{sg}^{MTR} dMTR_{sg} + \chi_{sg}^{ATR} dATR_{sg})$, the averages of the relevant composite expressions across g groups, weighted by hours supplied. (B.5) then becomes

$$d \ln L_s = \chi_s^w d \ln w_s + d\tau. \quad (\text{B.6})$$

The demand equation (suppressing nuisance parameters) is $d \ln L_s = \rho d \ln w_s$. Combining this with (B.6), we obtain the reduced-form expression for the change in wages:

$$d \ln w_s = (\rho - \chi_s^w)^{-1} d\tau. \quad (\text{B.7})$$

This can then be substituted in to (B.2), (B.3), and (B.4) 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, 2006) 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 (2006) 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 coefficient of -3.0 (SE 0.74); in another, they get -25.3 (14.8). These correspond to income elasticities of -0.04 and -0.36.² 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 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.

Appendix Table 1 presents estimates for the two sets of income elasticities as well as for the base case of no income effects. I restrict the wage elasticities to $\sigma_x = 0.75$ and $\sigma_i = 0.25$ in each specification. With the larger income elasticity parameter, the result that true transfers are smaller under the EITC than statutory transfers is reversed: Now, there is a net transfer from employers to workers, reflecting a net decline in labor supply. But the

²In personal communication, Hilary Hoynes reports that these use the above definition of the income elasticity, $\eta \equiv \frac{NY}{h} \frac{\partial h}{\partial v}$.

transfer from employers is even larger with the NIT, where labor supply is also reduced due to income effects. So the comparison between the two programs is unchanged.

References

Eissa, Nada and Hilary W. Hoynes, “Taxes and the Labor Market Participation of Married Couples: The Earned Income Tax Credit,” *Journal of Public Economics*, August 2004, 88 (9-10), 1931–1958.

— **and** —, “The Hours of Work Response of Married Couples: Taxes and the Earned Income Tax Credit,” in Jonas Agell and Peter Birch Sorensen, eds., *Tax Policy and Labor Market Performance*, Cambridge and London: MIT Press, 2006, pp. 187– 227.

Imbens, Guido W., Donald B. Rubin, and Bruce I. Sacerdote, “Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players,” *American Economic Review*, September 2001, 91 (4), 778–794.

Killingsworth, Mark R. and James J. Heckman, “Female Labor Supply: A Survey,” in Orley Ashenfelter and Richard Layard, eds., *Handbook of Labor Economics*, Vol. 1, Elsevier, 1986, pp. 103–204.