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## The Earned Income Tax Credit, Taxes, and Food Stamps: Their Effects on Minimum Wage Workers by State

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THE EARNED INCOME TAX CREDIT, TAXES, AND FOOD STAMPS:  
THEIR EFFECTS ON MINIMUM WAGE WORKERS BY STATE

A Thesis  
Submitted  
in Partial Fulfillment  
of the Requirements for the Designation  
University Honors

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The Earned Income Tax Credit, Taxes, and Food Stamps:  
Their Effects on Minimum Wage Workers by State

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Jessica Moon, Director, University Honors Program

## **Introduction**

The new direction I propose will make this solemn, simple commitment: by expanding the refundable Earned Income Tax Credit, we will make history; we will reward the work of millions of working poor Americans by realizing the principle that if you work 40 hours a week and you've got a child in the house, you will no longer be in poverty.

-William Jefferson Clinton

State of the Union Address, 1993 (Shapiro and Greenstein, 2003)

The federal government spends billions of dollars annually on programs to lift low income workers out of poverty, but the money is not necessarily efficiently spent. If the benefits provided by the government provide a work incentive, then to increase the income of a worker by \$1 requires more than \$1 in government funds. Some programs, however, do provide an incentive for people to work. Given the complexity of the federal bureaucracy, few people have tried to compute the income that minimum wage workers would expect to earn given a set of government benefits that they receive and a number of hours that they work. The studies that have analyzed the benefits that minimum wage workers would receive (generally marginal tax studies) do not address the nuances of state tax codes and state EITC benefits. It is important to study the benefits that workers would expect to receive while taking into account multiple programs, because many federal programs designed to help the poor provide different work incentives and affect the same group of workers. A precise computation of expected benefits will yield data that economists could use to estimate more accurately the labor supply responses to and the effectiveness of various government programs. Such computations could yield insight into previously unrecognized inefficiencies and work disincentives. Using government data from various state and federal agencies of 47 states and the District of Columbia, I compute benefits that a minimum wage workers would expect to earn given their earnings, federal payroll

taxes, state and federal income taxes, the state and federal Earned Income Tax Credit (EITC), and benefits from the Food Stamp Program.

Minimum wage workers require full time jobs to approach the poverty line, the income level over which a person is not considered to be in poverty, in most states. Ideally, the welfare system would reward people who work full time jobs. Full time workers have a higher probability of receiving health care and retirement benefits, raises, and marketable job skills. At the same time, parents who work too much may not have enough time or energy to aid in the development of their children. Ideally, the welfare system should provide incentives for single parents to work, nurture their children, and lift themselves out of poverty.

The computations yield some significant conclusions. The federal EITC effectively targets full time minimum wage workers with two or more children. Workers with fewer dependents either do not receive the maximum benefits or the EITC benefits provide them a work disincentive. In states with a minimum wage higher than the federal minimum wage, full time minimum wage workers earn too much; they do not receive the maximum federal EITC credit. The federal EITC, since it targets minimum wage workers at the federal minimum wage, does not effectively target full time minimum wage workers in states with a high minimum wage. If a higher state minimum wage implies a higher cost of living, then workers in states with a high state minimum wage are relatively worse off compared to workers in states that use the federal minimum wage. Marginal tax rates, a focus of several studies, never exceed 80% in any situation under the programs specified. Some background on the labor-leisure model is necessary to understand the computations and reach any conclusions.

### Some Previous Attempts at Modeling the Budget Constraints of Workers

Most studies that seek to determine the effects of various government programs on the labor supply or work incentives of workers calculate the expected benefits and taxes that workers would pay or receive based on their earnings. Shaviro (1999) computed the marginal tax rates of workers at various wage rates. His objective was not to determine the benefits or taxes that workers would receive at various earnings levels, but his methods required the much of the same methods and data that are needed for this study. He used estimated state tax data, which produced some error in his data. Wolfe (2002) computed the income of workers in Wisconsin and Pennsylvania under several different benefit program and tax combinations for the year 1999. Rather than fixing the wage at the minimum wage, she plotted income against earnings and determined the effective marginal tax rates on workers. Her data was precise, but the data did not extend across any more states. Her ultimate goal was to determine whether welfare reform in the 1990s increased the work incentives provided to low wage workers. Meyer and Rosenbaum (2001) compiled information from various years to determine the welfare and tax liability for workers if they worked at any one of ten wage rates for one of five amounts of annual hours worked that they specify. Their computations were the closest in terms of design to the concept of this study, but they did not compute the expected income of workers at nearly as many hours worked, and they did not take into account the minimum wage across the states. They sought to determine the effects of welfare on the labor supply of single mothers. There are other studies that compute the expected benefits and taxes, but no study that I found directly and precisely computed the budget constraints of workers across many states.

## **The Labor-Leisure Model**

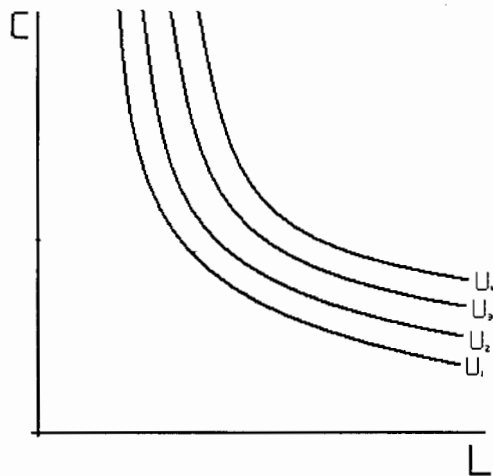
I begin with the basic labor-leisure model. The theory suggests that people derive utility (U) from:

1. The consumption goods (C) that they purchase with the labor and non-labor income and
2. Leisure time (L), where L includes non-work time but does not include necessary activities, such as sleep.

Mathematically,  $U=f(C,L)$ . The individual's goal is to select the combination of C and L that maximizes utility subject to constraints of the individual's income and time. The definitions of work and leisure imply a clear tradeoff between consumption goods, which is equal to income since I assume that people spend all of their income on consumption, and leisure. People have to choose between working an additional hour and receiving the wage in compensation for an hour of leisure lost and having an extra hour of leisure. Applying the theory for empirical studies, labor economists model leisure time as a function of a person's wage, non-labor income, and other characteristics.(age, education, etc.).

Any two amounts of consumption goods and leisure will yield a single specific amount of utility. On a graph that plots consumption goods and leisure, lines of equal utility exist called indifference curves.

Figure 1: Indifference Curves

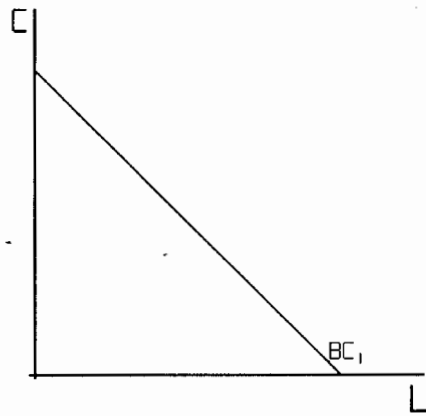


Since more leisure time and more consumption goods make people happier, utility is higher on an indifference curve towards the right. On Figure 1, the indifference curve  $U_4$  implies a higher level of utility than indifference curve  $U_1$ . Indifference curves are also downward-sloping, and they do not intersect. The slope of the indifference curve, called the marginal rate of substitution, is the change in income given a small increase in the number of hours of leisure while holding utility constant. Since utility is constant along an indifference curve, the slope of the indifference curve depends on how people relatively value income and free time. Utility depends on consumption and leisure in the model, so the rate at which utility changes relative to consumption and leisure time is equal to the sum of change in utility resulting from a change in consumption and a change in leisure time. The marginal rate of substitution is the rate at which a person will give up leisure time in exchange for income, holding all else constant.

In a perfect world where people can satisfy all of their needs and wants, no constraint on utility would exist, and people would increase their utility ad infinitum. In the real world, people seek to maximize their utility within the constraints of their budgets.



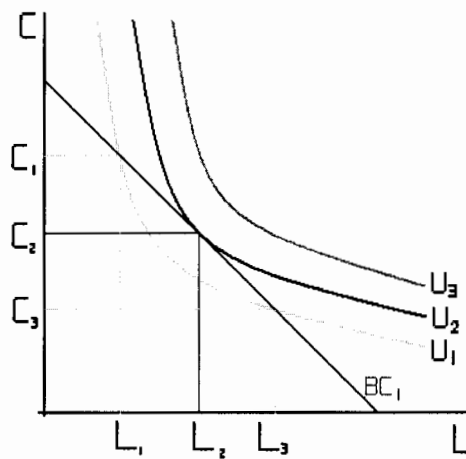
Figure 2: A Budget Constraint



The budget constraint represents the combinations of leisure and consumption goods that people can receive holding time constant. For every hour of leisure that people give up, they receive an hourly wage in compensation. Thus, the slope of the budget constraint is negative and equal, in absolute value, to the wage rate.

Given any budget constraint, a single indifference curve exists that represents the maximum utility of the worker.

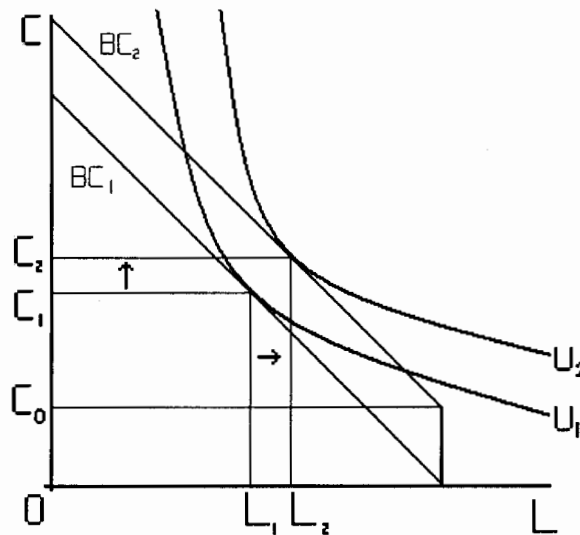
Figure 3: The Optimal Labor-Leisure Combination



On Figure 3, the optimal labor-leisure combination is  $(L_2, C_2)$ , and the resulting level of utility is  $U_2$ . The person cannot afford utility  $U_3$ , and the person can choose a level of utility higher than  $U_1$ . At the optimal labor-leisure point, the marginal rate of substitution equals the wage. Hence, people maximize their utility when the amount of money that a person would take to give up an hour of leisure is equal to the amount of money that they would receive to give up an hour of leisure. They are indifferent between working and not working any additional hours.

It is worth noting the effects of increases in the wage and unearned income. An increase in the unearned income of a worker, such as a lump sum welfare payment, yields a clear work disincentive, but it makes the worker better off.

Figure 4: The Effect of an Increase in Unearned Income



An increase in unearned income, from 0 to  $C_0$  on Figure 4, shifts the budget constraint to the right, from  $BC_1$  to  $BC_2$  in Figure 4. The person moves to a higher indifference curve, from  $U_1$  to  $U_2$  on Figure 4, because of the shift in the budget constraint. Equilibrium reestablishes when the slope of the indifference curve equals the wage. The amount of leisure hours increases, as from  $L_1$  to  $L_2$  on Figure 4, which implies that the worker's work hours decrease. Income also

increases, as from  $C_1$  to  $C_2$  on Figure 4. Since both leisure hours and income increase, the utility of the worker increases as well. The worker is better off, but a work disincentive results from the increase in income. The worker could increase utility by moving to  $U_2$  from  $U_1$ . This is called the income effect, which guarantees a work disincentive. The income effect occurs whenever the wage or non labor income increase. The demand for leisure increases due to an increase in income, and hours of work decrease as a result.

An increase in the worker's wage makes the worker better off, but the work incentive of a wage increase is ambiguous.

Figure 5: The Effect of a Wage Increase

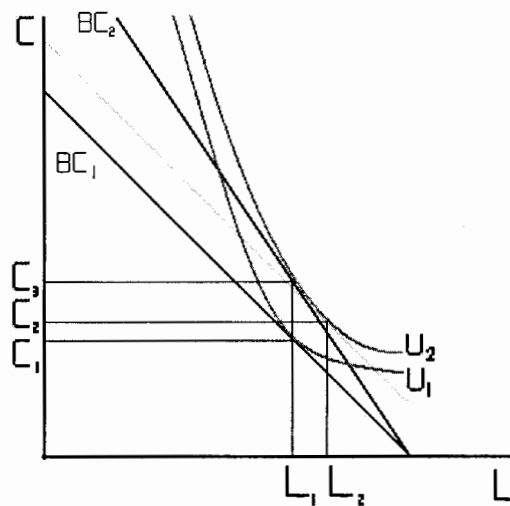


Figure 5 presents the effect of a wage increase. The budget constraint pivots outward from  $BC_1$  to  $BC_2$ . The old equilibrium point,  $(L_1, C_1)$ , is not optimal, so the indifference curve shifts out to the optimal point  $(L_1, C_3)$ . Clearly, the earnings of the worker increase from  $C_1$  to  $C_3$ , and utility increases. The choice of  $L_1$  as the optimal leisure point of both budget constraints is arbitrary. Two effects influence the work incentives of the worker. First, the income effect, analogous to the effect of an increase in income for a worker, is the point on  $U_2$  where the slope of the

indifference curve equals the old wage. On Figure 5, the point is at  $(L_2, C_2)$ . The income effect implies an increase in leisure hours and an increase in income. Second, the substitution effect results from the change in incentives caused by the wage increase. The wage increase makes work relatively more attractive, so workers are more willing to give up an hour of leisure for the wage. The budget constraint of the worker does not change, so the worker does not move to a higher indifference curve. On Figure 5, the substitution effect is from  $(L_2, C_2)$  to  $(L_1, C_3)$ . The size of the substitution effect may depend on the shape of the indifference curve. If the substitution effect exceeds the income effect, then a wage increase acts as a work incentive and vice versa. In Figure 5, the income effect equals the substitution effect. Workers are happier because of a wage increase regardless of the income and substitution effects.

### **The Minimum Wage**

#### The Theory

An increase in the minimum wage acts exactly as a wage increase in the labor-leisure model. Across all hours, the wage increases for workers who earn the minimum wage. The income effect provides a work disincentive, and the substitution effect provides a work incentive. Without knowledge of the relative sizes of the income and substitution effects, the effect of an increase in the minimum wage is indeterminate.

The one exception to the rule is for people who do not work. A clear incentive exists for people to work if they do not work initially. The income effect does not exist for people who do not work; the minimum wage only increases the income of people who work. Only the substitution effect exists for people who do not work, so an increase in the minimum wage provides them a work incentive.

One controversial aspect of the minimum wage is its effect on unemployment.

Theoretically, if the government sets the minimum wage above the equilibrium wage in a competitive industry, then more workers would want to work at the higher wage than there would exist jobs. A labor surplus would be the result, which translates into unemployment. If the minimum wage were set below the equilibrium wage in a competitive industry, then no effect on the labor market would result. Economists debate whether a change in the minimum wage significantly changes the unemployment rate, but for simplicity, I assume that people find a minimum wage job without problems.

#### The Minimum Wage Across the States

The federal minimum wage was set at \$5.15 an hour in 1997, which was an inflation-adjusted increase of 16.8% compared to the minimum wage in 1990 (Blank, 2000). Since 1997, the federal minimum wage has not changed. Eleven states and the District of Columbia had a state minimum wage above the federal minimum wage of \$5.15 an hour in 2003. Table 1 lists the states that had a minimum wage higher than the federal minimum wage.

Table 1: States With a Minimum Wage Higher Than \$5.15 in 2003

Alaska	7.15
California	6.75
Connecticut	6.90
Delaware	6.15
DC	6.15
Hawaii	6.25
Maine	6.25
Massachusetts	6.75
Oregon	6.90
Rhode Island	6.15
Vermont	6.25
Washington	7.01

Source: (NLIHC, 2003)

Two states had a minimum wage at or above \$7.00 an hour, and all eleven states and the District of Columbia had a minimum wage at or above \$6.00 an hour.

## **The Earned Income Tax Credit**

### The Theory

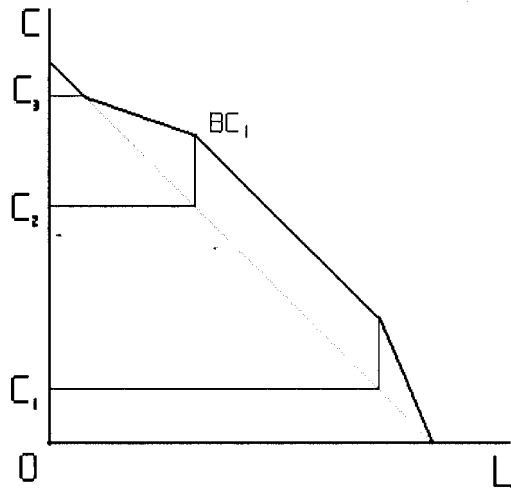
The EITC has three distinct effects on budget constraints that separates it from other welfare programs. First, the EITC phases in its benefits with a wage subsidy. Second, after the benefit level reaches the maximum level set by the government, the government maintains the maximum benefit as long as the worker's earnings remain below a level determined by the government. Third, the EITC targets low income workers, so the government recovers the benefits as a household becomes relatively better off. The government can recover the EITC benefits in two ways. First, the government could impose a benefit implicit tax on the benefits. The tax would be implicit, because the workers receive the EITC after filing their tax returns. Since people receive the EITC later than their wages, they do not immediately notice the reduction in EITC benefits. An implicit benefit tax recovers all of the benefits at once after the worker's earnings reach a level set by the government<sup>1</sup>. Second, the government could impose an implicit marginal tax on earnings, which produces a region of the budget constraint in which the credit phases out. The phase-out region of the EITC commences when the earnings of the worker exceeds a level set by the government. The government imposes an implicit tax on the worker until the EITC benefits drop to zero.

The phase-in, phase-out, and maximum credit regions of the EITC have different effects on the budget constraint.

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<sup>1</sup> The tax is implicit, because the workers receive the benefits when they file their taxes the following year. The tax on the benefits does not come directly out of their paychecks, so it may be difficult for people to notice that the tax exists.

Figure 6: The Effect of the Earned Income Tax Credit on the Budget Constraint



The phase-in region of the EITC, from an earnings level of 0 to  $C_1$  on Figure 6, is a wage subsidy. The effective wage increases in the phase-in region. The substitution effect from a wage increase acts as a work incentive, and the income effect acts as a work disincentive. Two conflicting forces on work incentives exist, so the work incentive for workers on the phase-in portion of the budget constraint is ambiguous. The EITC has the same effect as the minimum wage on people who do not work. If the wage subsidy on the phase-in region forces the effective wage above a person's marginal rate of substitution, then the person will enter the labor market.

Only the income effect exists over the portion of the budget constraint that includes the maximum EITC credit, which is represented on Figure 6 by the region of the budget constraint between  $C_1$  and  $C_2$ . Since the budget constraint shifts outward in a parallel way, a work disincentive exists over the maximum EITC region due to the income effect.

The substitution effect over the phase-out region of the EITC, from  $C_2$  to  $C_3$  on Graph 6, is negative, because the government imposes an implicit tax over the phase-out region. An additional tax is a wage decrease, and a wage decrease implies that the substitution effect

provides a work disincentive. The income effect also provides a work disincentive, so the phase-out region of the EITC provides a strong work disincentive.

### The Federal EITC

Taxpayers can claim the federal Earned Income Tax Credit if they meet certain criteria. Either the taxpayer must have a qualifying dependent child or the taxpayer must be between 25 and 65 years old. In either case, the taxpayer cannot claim the EITC if another taxpayer claims the original taxpayer as a dependent. If income from investments exceeds a certain threshold (\$2,700 in 2006) then the taxpayer cannot claim the EITC. Several other residency and technical rules apply (Internal Revenue Service, 2006b).

In 2003, the phase-in rate, phase-out rate, maximum credits, and the earnings level at which the credit phased out differed depending on how many dependents workers had. For single filers with no dependents, the credit phased in at a 7.65% rate until the credit reached \$382. The credit plateaued until earnings reached \$6,237, and the credit phased out at a 7.65% rate until no credit existed at and above an income level of \$11,230. For single filers with one dependent, the credit phased in at a 34% rate until the credit reached \$2,547. The credit plateaued until earnings reached \$13,727, and the credit phased out at a 15.98% rate until no credit existed at an income level of \$29,666. For single filers with two or more dependents, the credit phased in at a 40% rate until the credit reached \$4,204. The credit plateaued until earnings reached \$13,730, and the credit phased out at a 21.06% rate until the no credit existed at and above an income level of \$33,692 (Schuyler Center for Analysis and Advocacy, 2003). Some states have chosen to modify the federal credit.



## State EITC's and Similar Programs

The simplest state EITC programs provide a percentage subsidy to the federal EITC. Eight states, Indiana, Kansas, Massachusetts, New York, Oklahoma, Vermont, Illinois, and Ohio, and the District of Columbia have simple state EITC. The percentages range between 5% in Illinois, Oklahoma, and Ohio and 32% in Vermont. Colorado has a similar system, but the state EITC only exists if a state budget surplus exists (Manzi and Michael, 2006, 15-21; NCCP, 2004; Johnson et al, 2003). The eight states opted for the simplest, not the cheapest, state EITC option.

Four states, Iowa, Maine, Oregon, and Rhode Island, have a nonrefundable state EITC system. A nonrefundable tax credit may never exceed a taxpayer's tax liability, so if the credit exceeds the taxpayer's tax liability, then the government reduces the credit size to the size of the taxpayer's tax liability. The credit is still calculated as a percentage of the federal EITC. Taxpayers can collect the EITC up to the amount of the credit for their level of income or their state income tax liability, whichever is the least (NCCP, 2004; Johnson et al, 2003). A nonrefundable state EITC system does not benefit taxpayers as much as a refundable system, because the benefit is capped at the amount of the state income tax. A nonrefundable state EITC system, however, is cheaper than a refundable EITC, all else equal.

Four other states have exotic state EITC systems. Maryland has two state EITC systems, but a taxpayer may only choose one. One system provides a 50% nonrefundable benefit over the federal EITC system, and the other provides a refundable benefit set at 18% of the federal EITC (Johnson et al, 2003). Maryland's tax system provides a benefit to low income taxpayers and shelters low income taxpayers who would otherwise owe income taxes.

Wisconsin offers an EITC program that increases the benefit percentage as the number of dependents in the household increases. Single taxpayers without dependents are not eligible for

state EITC benefits in Wisconsin. Wisconsin offers a 4% state EITC to taxpayers with one dependent. The benefit increases to 14% for taxpayers with two children and 43% for taxpayers with three or more children (Johnson et al, 2003). The state EITC system in Wisconsin attempts to compensate for the lack of an additional benefit for a third dependent in the federal EITC.

Minnesota's state EITC system provides an extra benefit to full time, low wage workers with dependents. The state offers a standard EITC system up to a certain earnings level based on the number of dependents that a taxpayer claims. The system offers an additional, secondary benefit peak for workers with earnings above full-time minimum wage workers (Manzi and Michael, 2006). The secondary peak does, however, raise the phase-out percentage of the state EITC higher than that of a state EITC based on a simple percentage of the federal EITC. Minnesota's state EITC rewards full time low wage workers with dependents over part time minimum wage workers.

New Jersey created a state EITC system that could hurt full time low wage workers. The New Jersey state EITC provides taxpayers a 20% premium over the federal EITC up to an adjusted gross income of \$20,000. Beyond \$20,000, the taxpayer receives nothing. The New Jersey State EITC phases out in an implicit benefit tax (NCCP; Johnson et al, 2003). The effects of the New Jersey state EITC system will be examined in more detail in the results of the computations of the budget constraints.

New Mexico has a tax credit similar to a state EITC, but it is not a state EITC by a strict definition. The Low Income Comprehensive Tax Rebate grants taxpayers a tax credit based on the number of federal exemptions and other attributes. For single taxpayers, the maximum amount of the credit in 2003 was \$135, and the maximum credit for taxpayers with six or more state exemptions was \$450. The earnings that maximizes the tax credit differentiates it from any

other EITC program. For a person with any number of exemptions, the credit phases in quickly, and the credit peaks between earnings of \$500 and \$5,500. The credit is phased out in steps (rather than at a smooth rate) at or above an earnings level of \$22,000 (State of New Mexico Taxation and Revenue, 2003). New Mexico aimed its EITC-like system towards part time workers with low incomes rather than full time workers who earn low wages.

## **Food Stamps**

### The Theory

Food stamps provide a monthly grant to households with the lowest income, and the government reduces benefits in a similar manner as a tax on earnings to ensure that people with the greatest need receive the highest amount of benefits. A simple program would award an initial benefit and immediately impose the implicit tax on any earnings, but the current federal system gives households some deductions so that the implicit tax does not immediately take effect.

Since the Food Stamp Program offers an initial grant and imposes an implicit tax on earnings in excess of what the worker can deduct, it provides an effect similar to that of the EITC without a phase-in region. For households with little or no income, the Food Stamp Program provides a work disincentive similar to that of the EITC at its maximum benefit level. No substitution effect exists to counter the income effect. For workers with higher levels of income, the Food Stamp Program applies an implicit tax on earnings until the worker fails one of the income tests or benefits reach zero, whichever occurs first. Workers who face the phase-out region of the Food Stamp Program face a more substantial work disincentive. The income effect exists, because the budget constraint still shifts outward. The implicit tax imposed by the phase-out region of the Food Stamp Program leads to a decrease in the effective wage. A wage

decrease results in a negative substitution effect. The Food Stamp Program provides a work disincentive regardless of financial circumstances of the recipient.

### The Federal System

The federal government maintains the Food Stamp Program, but it gives the responsibility of enrolling applicants to the states. Federal rules, however, govern the benefits that the states can issue. Two income tests exist for food stamp recipients, which depend on the number of dependents for which a person cares. The gross income test compares the person's monthly income to a level set by the federal government. In 2003, single parents with two dependents could not earn over \$1,635 a month. The amounts were higher in Alaska and Hawaii. (USDA, 2002b). The net income test allows people to deduct a percentage of their income from their gross monthly income along with other specific deductions. In 2003, single people (not living in Alaska or Hawaii) with two dependents could not earn over \$1,255. Again, the amounts were higher in Alaska and Hawaii (USDA, 2002b). If people pass both income tests, then they receive a benefit calculated by subtracting 30% of their gross income (subtracting out deductions from gross income first), from a maximum monthly benefit (USDA, 2006).

### Taxes

#### Theory

An increase in the marginal tax rate lowers the effective wage. A wage decrease has an indeterminate effect on the labor supply decisions of a worker. The income effect encourages the worker to work more hours, and the substitution effect encourages the worker to work fewer hours. The worker does not benefit in any case; he will wind up on a lower indifference curve.

## Federal Taxes

Two different types of federal taxes affect low income workers. The government imposes payroll taxes on all workers to support Social Security and Medicare. No waivers or deductions exist for the Social Security and Medicare taxes; the government imposes the taxes on all wage earnings up to \$87,000<sup>2</sup>. The payroll tax taken directly out of the earnings of workers was 7.65% (Social Security Administration, 2003).

The federal government also imposes income taxes on workers. In the income range of minimum wage workers, only the 10% and 15% marginal tax brackets apply. For single filers in 2003 (single workers without dependents), the marginal tax rate on the first \$7,000 of taxable income was 10%. On the next \$21,400, the 15% marginal tax bracket applies (Internal Revenue Service, 2003a). Minimum wage workers will not earn over \$35,000 in a year, so the higher tax brackets are irrelevant. For head of household filers (single filers with children, simply), the marginal tax rate was 10% on the first \$10,000 of taxable income and 15% on the next \$28,050. Total tax owed is computed as the sum of the tax owed from each tax bracket.

The federal government does give deductions and exemptions that shift the burden of income taxes away from low income workers by lowering taxable income. Taxable income is found by subtracting deductions and exemptions from gross income. Thus, deductions and exemptions reduce the amount of the tax by reducing the amount of income that the government taxes. Workers can take a standard deduction or itemize their deductions. For simplicity, I assume that workers only take the standard deduction. For single filers, the standard deduction in 2003 was \$4,750, and for workers who file as head of household, the standard deduction was \$7,000 (Internal Revenue Service, 2003b). Exemptions differ from the deductions in that

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<sup>2</sup> The payroll tax ceiling exists only for the Social Security tax. The Medicare tax does not have an income ceiling. Considering that few minimum wage workers earn over \$30,000 a year, the payroll tax ceiling is largely irrelevant.

workers receive an exemption for themselves, their spouses, and each of their dependents. The size of each exemption does not depend on the filing status of the worker. In 2003, the size of each exemption was \$3,050 (Internal Revenue Service, 2003b). A single filer, for example, with two dependents would receive a  $\$3,050 \times 3 = \$9,150$  exemption.

### State Income Taxes

Forty-three states and the District of Columbia had a state income tax system in 2003 (Russell, 2003). The methods of taxation varied across the states. Several states chose a flat income tax system, while other states chose a tax system with progressive marginal tax rates. Twenty-six states and the District of Columbia use federal adjusted gross income as a tax base while the others use either federal taxable income or pooled all income from all sources, such as capital gains (Federation of Tax Administrators, 2005). Each state income tax system is unique.

### **An Analysis of Budget Constraints across the States**

#### Assumptions

In a model, simplifying assumptions make the analysis of a complex subject possible. The budget constraints are built with the labor-leisure model, so all of the assumptions of the labor-leisure model still apply. Given the complexity of the federal bureaucracy and the bureaucracy of each state, other simplifying assumptions are desperately needed.

The first additional assumption is that workers are not married. The filing status of a worker determines how much income that they will have exempt from state and federal income taxes. Two filing statuses exist for married couples; they can file jointly, or they can file separately. It is possible to adjust for the different rules, but the problem is modeling the earnings of both partners. Since single mothers are more likely to be in poverty than any other group, it is reasonable to assume that the workers are not married.

Second, workers are eligible to receive the benefits for which they apply. Federal programs disqualify recipients for a variety of reasons, including receiving too much investment income and owning a car that is too valuable. Workers may possess other attributes that result in the loss of benefits or tax breaks. Conversely, workers apply for and receive benefits for which they are not eligible. Scholz (1994) found that the participation rate for the EITC program was over 100% without adjusting for workers who claimed the credit but were not technically eligible. The size of the federal programs ensures that there exist people who cheat to receive benefits or receive benefits even though they are not technically eligible. It may seem like a trivial assumption, but it is nevertheless an important assumption.

Third, workers only apply for the EITC and food stamps. Many other federal programs exist that seek to aid low income families. For example, the Women, Infants, and Children Program gives aid to families with children who are malnourished or have other physical problems. This study is too general to include such a specialized program. Another program that could be included but is not is Temporary Assistance for Needy Families (TANF), which is the program most similar to what people consider to be welfare. Work requirements exist for TANF, and the amount of benefits received depends on when workers sign up for the program, so it is not a program that can be modeled well using the methods in this paper. While many people are eligible for TANF, not all of them apply for benefits. A study by Meyer and Rosenbaum (2001) found that people attach a significant stigma to welfare. People do not apply for welfare even though they are eligible, because there is a social cost of being on welfare. Implicitly, this assumption also forces workers not to pay for childcare, but the effect on the computations is negligible, because the only method that workers can recover childcare benefits under the specific programs considered is through the child and dependent care tax deduction.

Federal income taxes do not affect full time minimum wage parents, so the childcare problem has little effect on the model.

Fourth, workers work the same number of hours per month at the same wage throughout the year. The Food Stamp Program determines eligibility and benefits based on monthly income. If monthly income varies, then some families whose monthly income is near the cutoffs for the eligibility tests would lose their benefits depending on the time of year. When the income of a household varies and the peak income of the household eclipses one of the earnings tests, food stamp benefits will be less than the amount predicted in the model. For workers in the retail industry, for instance, the assumption is not necessarily realistic. The assumption is necessary to avoid creating several versions of the model in which income varies by season.

Fifth, any programs that tax or benefit people on the local or county level are ignored. Most Iowa counties, for example, impose a surcharge on the amount of income tax paid. The local governments use the revenue to support local schools (Iowa Department of Revenue and Finance, 2003). Some cities, such as New York City, also apply a local income tax. New York City also offers a nonrefundable household tax credit and a refundable local EITC (New York Department of Finance, 2006). New York City is not the only place that offers a local EITC. Montgomery County, Maryland offers a county EITC, and Denver Colorado offers a local EITC (Johnson et al., 2003). Since the computations analyze states and not local governments, it is impossible to take into account all of the local and county ordinances.

Sixth, all workers reside and work in the same state for the entire year. States provide different tax rules for people who reside in multiple states in a year to avoid penalizing people for moving to a different state. The labor-leisure model assumes that no savings occurs, so it is



likely that minimum wage workers cannot gather sufficient resources to move. To assume that all workers stay in the same state eliminates potential state tax conflicts.

Seventh, workers are indifferent between equal sized payments immediately and in the future. Individuals discount the value of payments in the future differently according to their preferences. To assume that workers do not discount the value of future payments would hamper the discussion of the EITC. EITC recipients receive their payments after they file their federal taxes in the following year, but they receive earnings and pay taxes (if withholding occurs) within a couple of weeks of working. Since individuals value payments in the future uniquely, it would be impossible to arrive at a single rate at which individuals discount the value of the EITC.

Finally, employers will not employ any single worker more than forty hours per week. In most jobs, an employee who works more than forty hours per week earns overtime. The effect of overtime is the same as a wage increase for work hours beyond forty hours per week. A worker may work more than forty hours in a week due to moonlighting, or working more than one full time job. The hourly wage rate was constant for the budget constraints under the labor-leisure model, so the final assumption merely extends the original labor-leisure model assumption to cover the most obvious case when the wage rate changes.

With assumptions in hand, the subjects of the model become clear. The model investigates the income of single people with or without dependents. Single people without any dependents are between 25 and 65 years old, because they receive the EITC. They do not come from an opulent background, because they have few assets and no returns from investments or significant help from family members. Many programs penalize owning significant assets and savings, so they do not have much, if any, savings. Since they earn the minimum wage, it is

likely that they have few skills that benefit them in the labor market. Single people in the model live relatively difficult lives near the subsistence level.

The single parents in the model benefit greatly from the welfare programs. They do not come from opulent backgrounds as evidenced by a lack of investment income and assets that would disqualify them from some federal programs. They have support from their families or have one or more jobs that allow them to balance their time so that they do not need to pay for childcare. Their children are probably of school age and healthy. Single parents in the model do not face any special hardships other than being a single parent with limited resources.

### Calculating the Budget Constraints

In each state, different taxation and welfare systems exist, but only seven factors determine the income of minimum wage workers in the computations at any number of hours worked. Earnings equal the minimum wage multiplied by the number of hours worked, regardless of any other factors. Payroll, federal, and state taxes are calculated from earnings, so one value for each tax exists for each value of earnings. Similarly, one value of benefits exists for each amount of earnings for food stamps, the federal EITC, and the state EITC. A formula for income follows:

$$(2) \text{ Income} = \text{Earnings} + (\text{Federal EITC} + \text{State EITC} + \text{Food Stamps}) - (\text{Payroll Taxes} + \text{Federal Income Taxes} + \text{State Income Taxes})$$

or simply:

$$(3) \text{ Income} = \text{Earnings} + \text{Government Benefits} - \text{Taxes}$$

A labor-leisure diagram requires an income calculation at any amount of leisure hours.

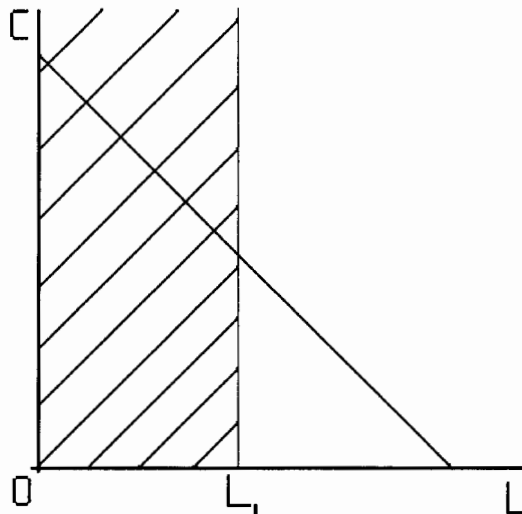
Earnings depend on the number of hours worked, and leisure hours are the unit of measure on a labor-leisure diagram. People may only work or not work, so the number of hours worked is simply the total number of hours in any given period minus the number of leisure

hours. On the labor-leisure diagrams, hours worked increases from right to left. The logical amount of time to use is a year, and there are  $24 \times 365 = 8760$  hours in a year (excluding leap years). To report that 1,820 hours of work in a year yields an income (after all benefits and taxes are included) of \$11,238 means little. If the number of hours in a year are divided by weeks, then the unit of measure becomes number of hours of work or leisure per week. To say that a worker who works 35 ( $=52 \times 35$ ) hours per week will earn \$11,238 is much more understandable. The units of measure reported on the labor-leisure diagrams will be hours per week, but income is calculated over the entire year.

All hours, for simplicity, are divided between labor and leisure on the diagrams.

Technically, leisure does not include hours reserved for nondiscretionary activities (sleep), but the diagrams that are presented show the budget constraints for workers who work less than 84 hours per week.

Figure 7: Effects of the Simplification of the Diagrams



The region that is crossed out on Figure 7 illustrates the region of the budget constraint not presented in the diagrams. Everything to the left of  $L_1$ , where work hours equals leisure hours at

84 hours per week, is not presented in the diagrams. A vast majority of workers works less than 84 hours per week, so presenting budget constraints with more than an 84 hour work week is unnecessary. People do not sleep more than 12 hours per day, so the concept of nondiscretionary time is irrelevant to the diagrams, the calculations, and the conclusions. Leisure, on the diagrams, is simply the remaining hours of each day not devoted to work. Hence,

$$(4) \text{ Leisure hours} = 168 - \text{Work hours}$$

Equation 4 assumes that the unit of time is hours per week.

### Data Sources

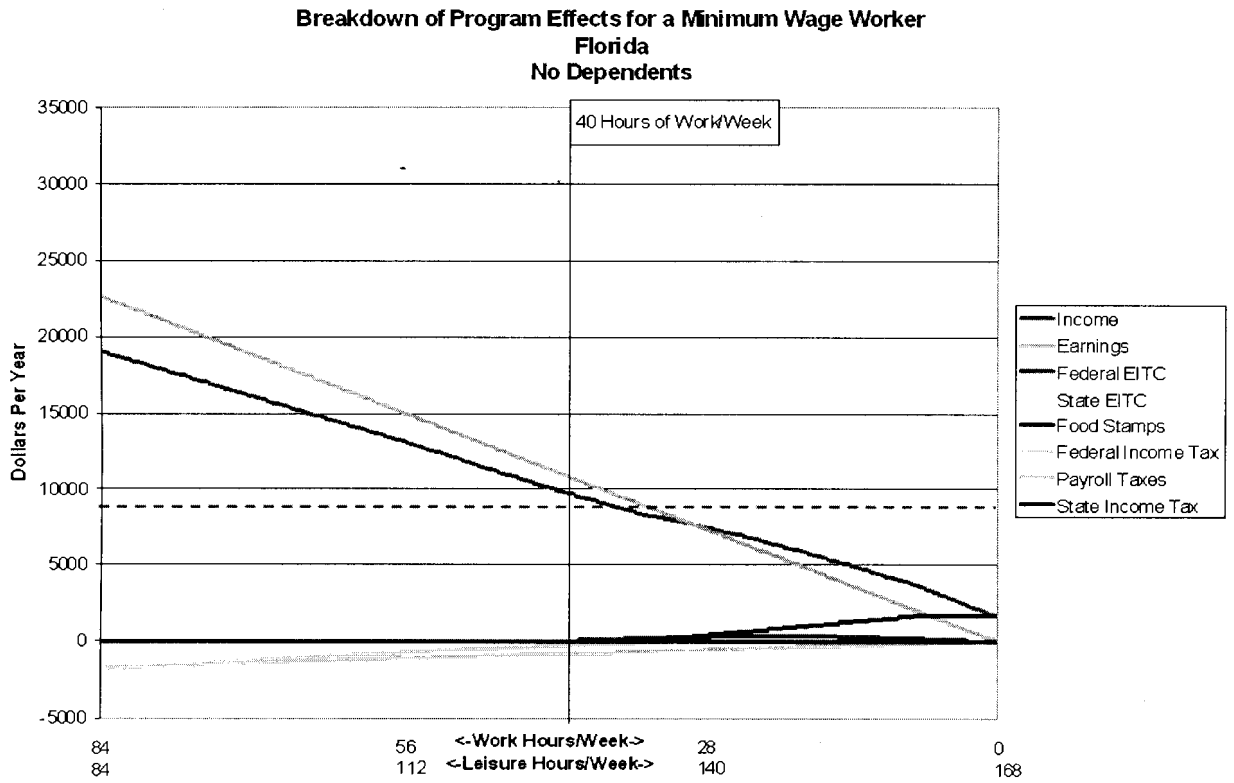
Considering that centralized information about government programs and initiatives, especially at the state level, is scarce, considerable effort went into collecting the data required to compute the various effects. The National Low Income Housing Coalition (2003) provided the necessary information about state minimum wages to compute the earnings of the workers across the states. Federal EITC information came from the Schuyler Center for Analysis and Advocacy (2003) and the Internal Revenue Service (2006a, 2006b). A combination of several state tax agencies, namely Iowa (2006), Minnesota (2003), New Jersey (2006), and New Mexico (2003), and Johnson et al (2003) provided vital information about the various state EITC programs. Data for the Food Stamp Program came exclusively from the United States Department of Agriculture (2002a, 2002b, 2006). Information about taxes came from a variety of sources as well. The Social Security Administration (2003) supplied the necessary payroll tax information. Federal income tax rates came from the Internal Revenue Service (2003a, 2003b). Russell (2005) and The Federation of Tax Administrators (2005) provided a useful compilation of state income tax information. No single source of data was sufficient to provide all of the information necessary for all programs across all states.

### Can Minimum Wage Workers Earn an Income Above the Poverty Line?

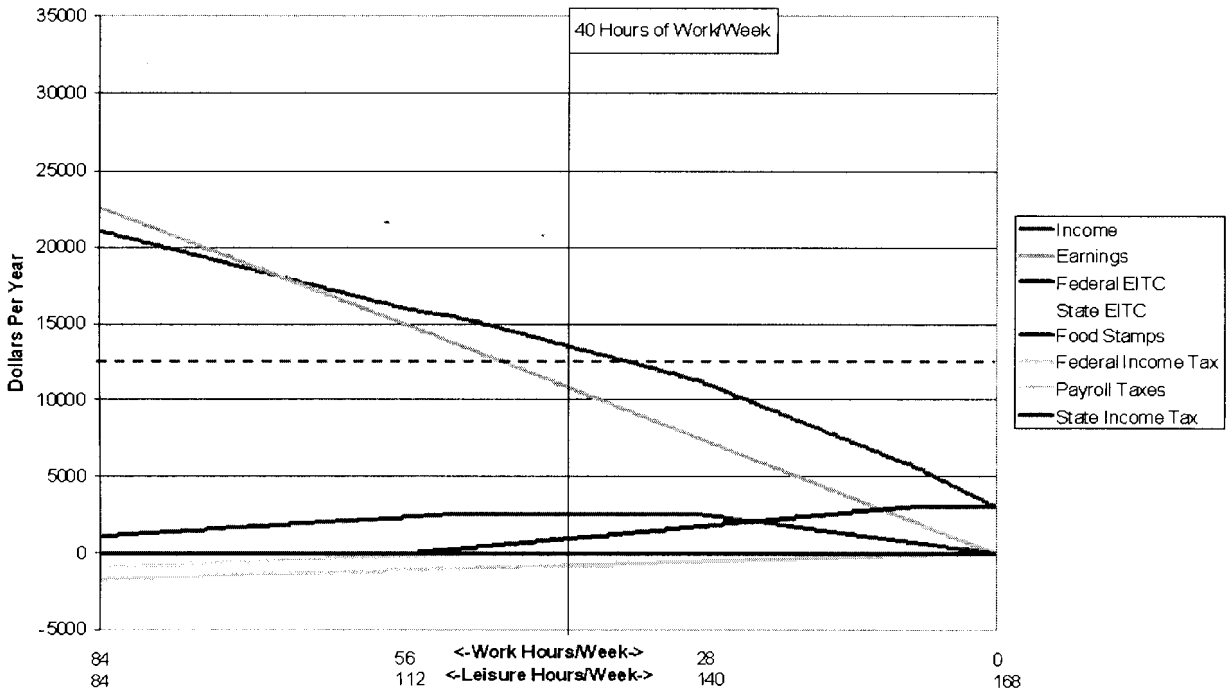
When President Clinton said that he wanted full time single parents to avoid living in poverty, he was not specific about what poverty is. Exactly how much money is necessary to avoid living in poverty is a tough question to answer, but the federal government uses the poverty line as a crude measurement for poverty. People whose income is less than the poverty line are considered to be in poverty. It is certainly not a perfect measure, because it does not take into account variations in the cost of living across states (United States Department of Health and Human Services, 2005). If a full-time minimum wage worker cannot earn above the poverty line, then it is difficult to find that the welfare system has achieved its goals.

Florida provides the ideal test for the effectiveness of the federal programs. No state income tax, no state EITC, and no state minimum wage was in effect in Florida in 2003, so the income of Florida workers is the same as workers only affected by federal programs. On the following graphs, the simple test fails if the income line does not increase above the poverty line, represented by dashed lines, to the right of the line that denotes when the worker works forty hours per week.

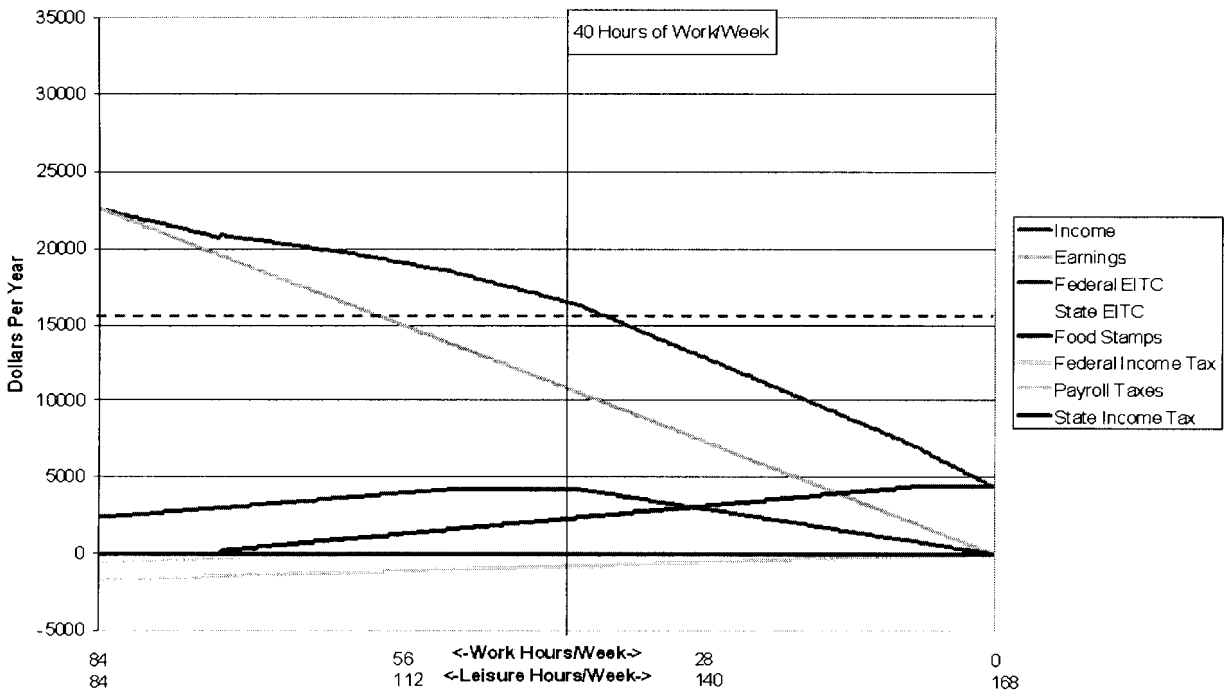
Figures 8-11: Breakdown of Program Effects for Minimum Wage Workers in Florida by the Number of Dependents that They Have



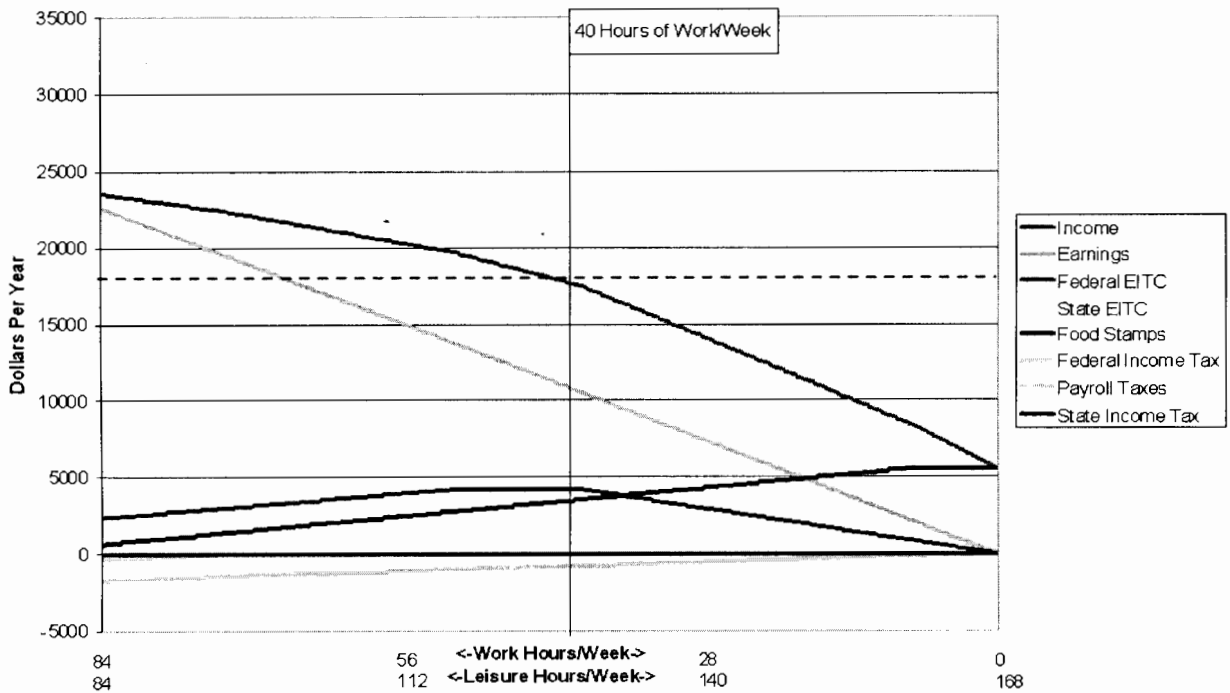
**Breakdown of Program Effects for a Minimum Wage Worker  
Florida  
1 Dependent**



**Breakdown of Program Effects for a Minimum Wage Worker  
Florida  
2 Dependents**



**Breakdown of Program Effects for a Minimum Wage Worker  
Florida  
3 Dependents**



The only situation in which single workers cannot earn enough money to eclipse the poverty line with a forty-hour work week is when they have three dependents. Only food stamp benefits increase when the number of dependents increases above two, so the welfare programs are insufficient to increase the incomes of workers with more than two dependents above the poverty line. They would need to apply for an additional welfare benefits or work a second job to earn above the poverty line. Regardless, full time minimum wage workers do not earn much above the poverty line under the circumstances.

### Is the Federal EITC Well-Targeted?

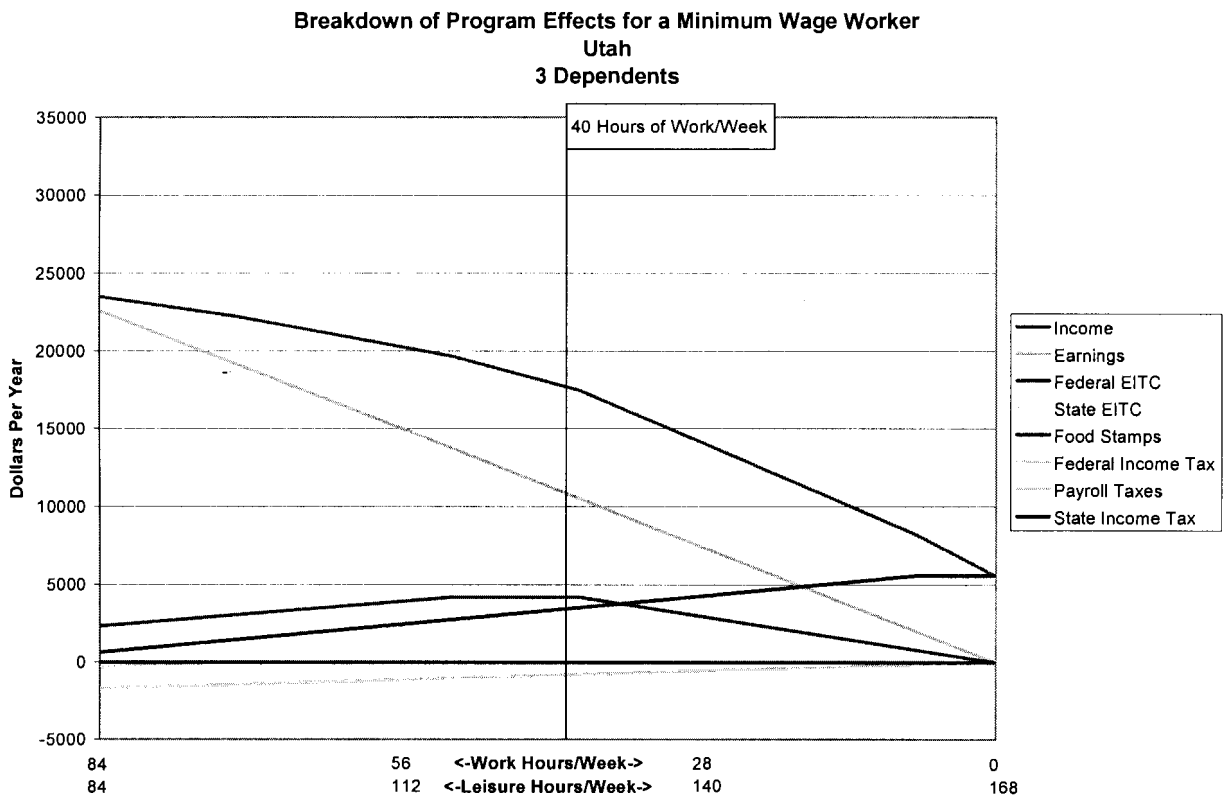
For full time single workers with no dependents, the federal EITC has very little effect. The federal EITC completely phased out in 2003 at \$11,230 of gross income, which means that any full time single worker without dependents received the tax credit on the phase-out region.



The federal EITC provides a work disincentive for full time single workers. The work disincentive is not strong, because the tax credit was only \$382 at the most.

The federal EITC effectively targets minimum wage families with two or more dependents in states with minimum wages at the federal minimum wage. Full time minimum wage workers with two or more dependents from states with a minimum wage of \$5.15 an hour earn the maximum federal EITC credit (or slightly less than the maximum credit), as shown on the breakdown for Utah below.

Figure 12



Most full time workers are still on the phase-in portion of the federal EITC, which provides non-workers an incentive to work and increases the labor supply, and others earn just enough to receive the maximum credit.

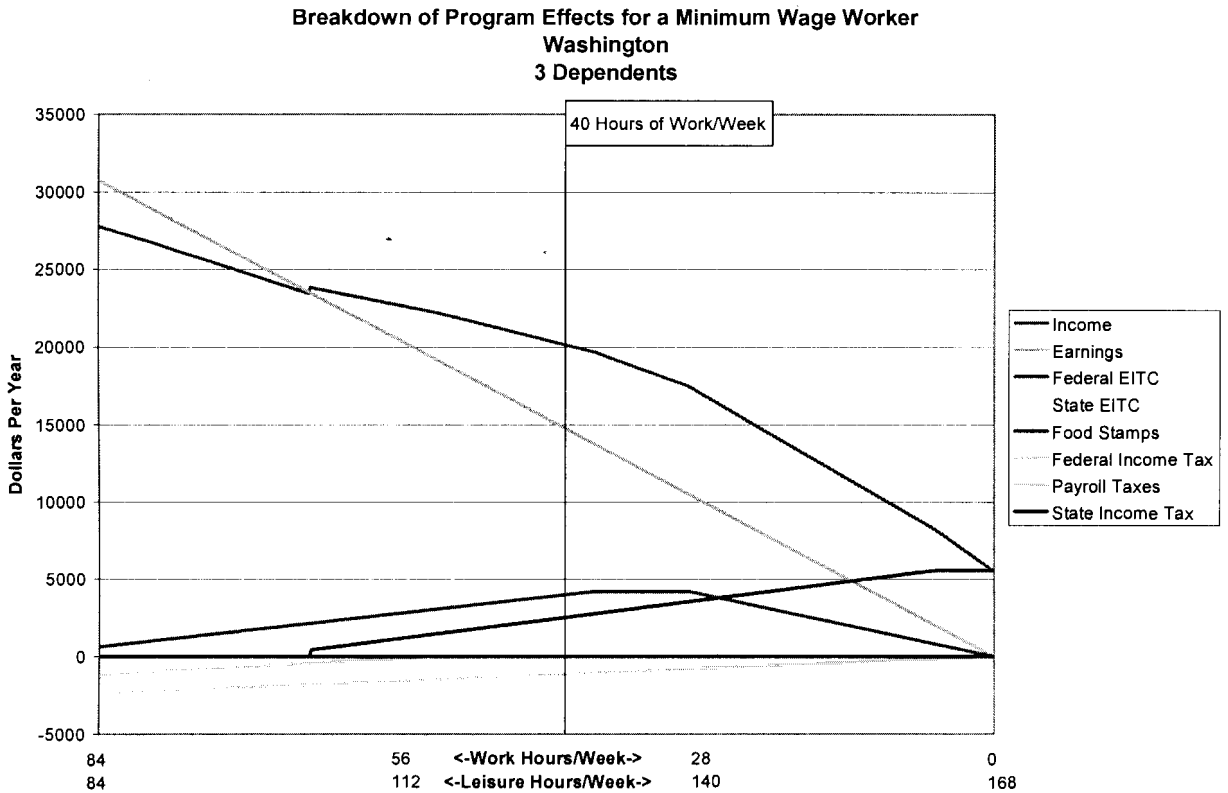


significant relationship between an increase in the EITC and a decrease in the number of hours worked by women already in the labor force in the short run. They argued that no work disincentive existed, because workers receive the benefits in a lump sum after they file their taxes, so they do not necessarily know about the increase in the marginal tax rate on the phase-out region of the EITC.

#### The Effect of High State Minimum Wages on EITC Work Incentives

High state minimum wages negate some of the effects of federal initiatives, such as the federal EITC. Since earnings levels trigger the phase-in and phase-out regions of the EITC, workers who earn higher wages will surpass the phase-in and phase-out earnings levels with fewer work hours. For states with lower minimum wages, full time minimum wage workers earn enough to ensure that they receive approximately the maximum benefit under the EITC. Workers with any number of dependents from states with the highest minimum wages, such as Oregon and Washington, do not benefit from the federal EITC as much as workers from other states.

Figure 14



Full time workers with any number of dependents from the states with a high minimum wage are on the phase-out region of the federal EITC, as shown by Figure 14 of Washington. While no state minimum wage is high enough to result in no EITC benefits for workers with two or more dependents (indeed, full time workers with wages over \$10 an hour still receive a small EITC credit), states with minimum wages significantly higher than the federal minimum wage impose an implicit tax on full time minimum wage workers with one or more dependents. The federal EITC does not adjust for the cost of living in a state, which is a part of the problem. If a higher state minimum wage implies a higher cost of living, minimum wage workers are worse off in states with higher minimum wages than in states with lower minimum wages.

The federal EITC program could be adjusted to fix the incentive problem in two ways. First, a lower phase-in rate for the EITC would result in a higher earnings level at which the maximum credit is achieved. The phase-out region of the EITC would need to be adjusted so that the maximum credit region of the EITC exists. A lower phase-in rate acts as a wage decrease and reduces the work incentive for people who otherwise would not work. Some who work because of the EITC may leave the labor force because of the lower effective wage. The number of people eligible for the federal EITC would also increase, so the cost of the EITC programs would increase (even at the state level). Second, the phase-in rate of the EITC could remain the same, but the maximum credit of the EITC could be increased. A quick calculation shows that for the second idea to be effective in Washington state for the three dependent case, the maximum credit of the EITC would need to be around \$6,500. Government budget considerations are the obvious drawback to the second idea, though work incentives would not be harmed for workers who would otherwise leave the labor force under the first idea. State EITC programs could fill the role of the federal government. State government budgets are already tight, and it is unlikely that states would foot the bill for an EITC expansion.

#### How Do State EITC's Affect Minimum Wage Workers?

Across the states, the rates at which the federal EITC phase-in and phase-out are equal. Payroll and federal taxes and food stamps are equal across the states as well. States can control state income taxes, state EITC programs, and state minimum wages. The minimum wage does not affect the marginal tax rate; it just shifts the income levels at which marginal tax rates are applied. States only affect the marginal tax rate through state income taxes and state EITC programs. The marginal rate is always higher in the presence of income taxes, but state EITC programs increase marginal tax rates only on the phase-out portion of the EITC. No state EITC

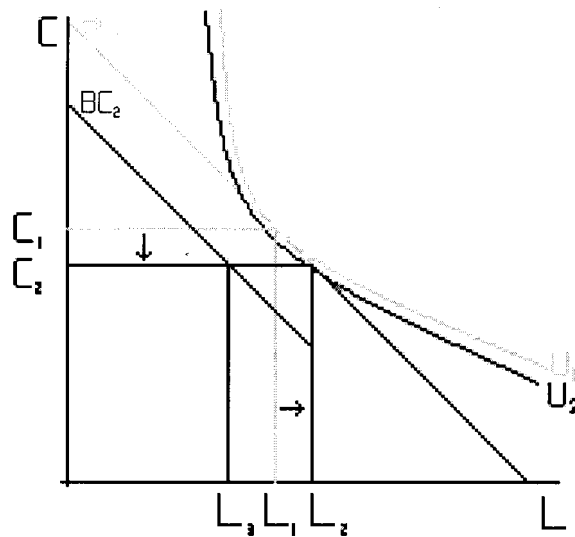


maximum marginal tax range occurs only in the unlikely case the workers work over seventy hours per week. States that provide benefits to workers must take them back at some income level, so the maximum marginal tax rate for workers is higher in states with greater state EITC benefits and state income taxes. Hence, work incentives are greater initially in a state with a state EITC, but work incentives are relatively lower at some higher level of income because of the higher marginal taxes.

### The Problem of Benefit Taxes

The government must take away aid targeted to low-income people at some level of earnings to target effectively low-income people at the least cost possible. While most programs gradually phase out benefits in the form of a marginal tax, some programs take away all of the benefits in a lump sum at a certain level of earnings. Such “notches” in the budget constraint caused by the benefit taxes cause regions of the budget constraint where no worker would rationally work. Notches can also be caused by marginal tax rates that exceed 100%. If workers enroll in enough programs, then they may face regions of their budget constraints where their marginal tax rate exceeds 100% (Shaviro, 1999; Walden, 1996; Wolfe, 2002).

Figure 16: Demonstration of the Effects of a Benefit Tax



On Figure 16, a benefit tax occurs at  $C_2$ , which results in a notch at  $C_2$ . The new budget constraint becomes  $BC_2$ , and the worker's optimal choice point moves from  $(L_1, C_1)$  to  $(L_2, C_2)$ . The worker is unequivocally worse off because of the tax on benefits. Also, Figure 16 shows that workers would not choose to have leisure hours between  $L_2$  and  $L_3$ , because workers receive less income for working more hours. Workers realize that they can be worse off because of the notches as demonstrated by one woman's testimonial for the Day Care Action Council of Illinois (Stohr and Nyman, 2002, 18):

I got an increase in pay of \$20 a week and [went] from \$250 a month in child care to \$800 a month in child care. It put me over the limit. The income part was not enough to match the child care part and it was like, "Sorry, you make too much money." I went to my employer and said I don't want a raise. I need my pay reduced. He was like, "Are you nuts?"

Several different cases of benefit taxes exist in the computations.



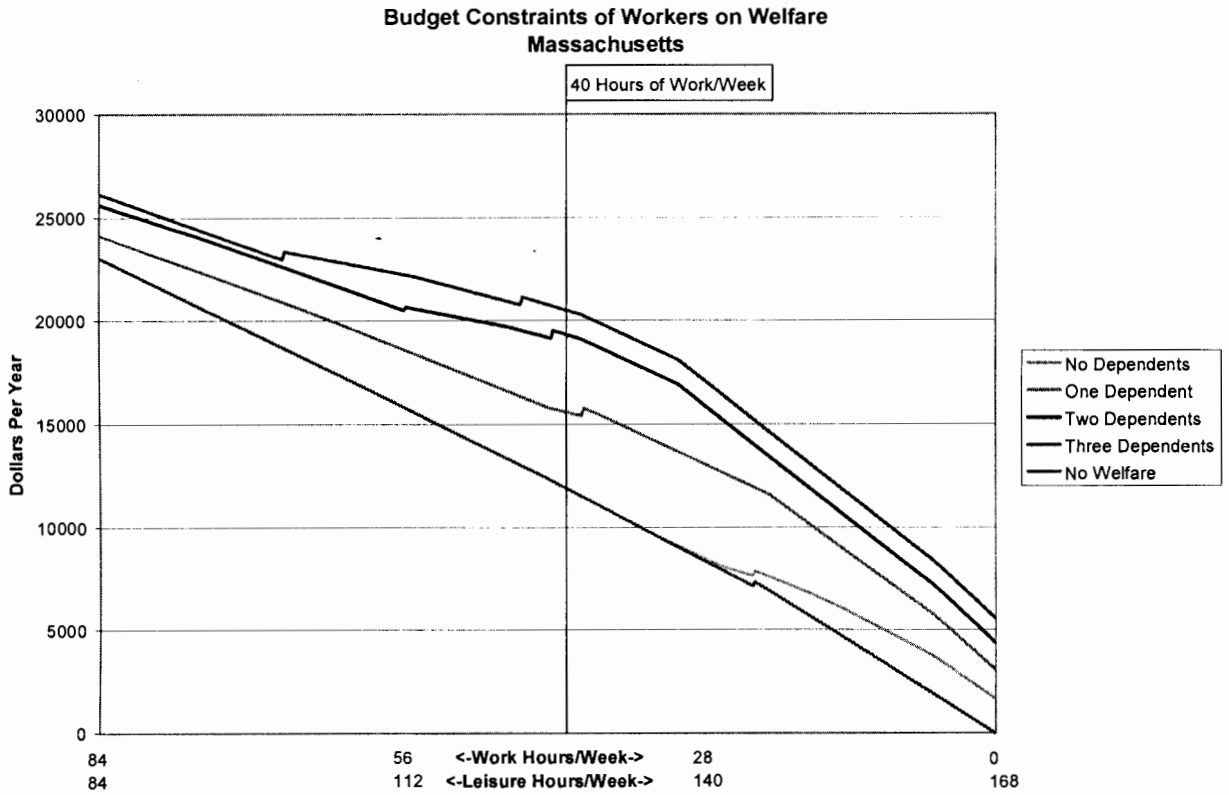


insignificant scale. New Mexico's Low income Comprehensive Tax Rebate is an insignificant example of implicit benefit taxes.

Second, the Food Stamp Program income tests produce a benefit tax on benefits for single workers with two or more dependents. Administratively, it is inefficient to issue food stamps to families who only would receive a few dollars a month. The effect is negligible, and it only occurs if the workers moonlight.

Third, three states offer tax breaks to people with incomes under a certain gross income level. Below the income level determined by the state governments, people in New Jersey, Virginia, and Massachusetts do not pay state income taxes. At the gross income threshold, people become liable for the state income taxes, which causes a tax similar to a benefit tax. In New Jersey, the gross income threshold is \$10,000, and the effect on the tax system is quite limited (Russell, 2005). Only single workers with no dependents receive the benefit tax, and the benefit tax is only about \$15. Virginia's gross income threshold is \$5,000. It affects single workers with either no dependents or one dependent. The amount of the benefit tax is again insignificant—under \$25 in both cases. In Massachusetts, the gross income threshold varies by the number of dependents and the filing status of the worker. The rule affects all minimum wage workers if they moonlight and work enough hours, but the rule only affects single workers with one dependent or no dependents excluding moonlighting.

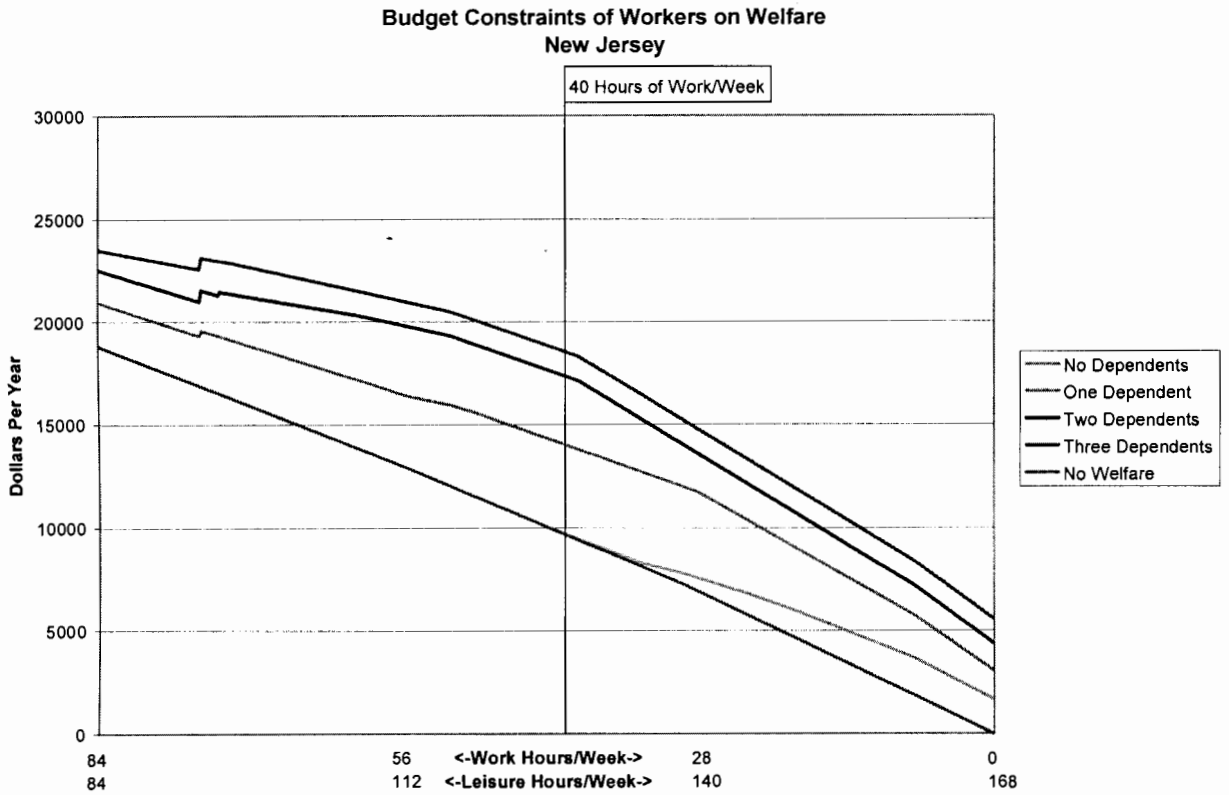
Figure 18



The benefit tax is more significant than in the other states: about \$250 for single workers with no dependents and about \$400 for single workers with one dependent. If the worker has two or more dependents and moonlights, then the worker would likely suffer from the benefit tax.

Fourth, the calculations show that the controversial New Jersey state EITC does not have a significant effect on minimum wage workers.

Figure 19



The New Jersey budget constraints indicate that a minimum wage worker would have to work over 70 hours per week to lose the state EITC benefits. The benefit tax is significant in size, about \$575 for workers with two or more dependents and about \$300 for workers with one dependent, but it is at an earnings level that most minimum wage workers would not obtain.

The benefit taxes, however, do not make workers worse off than if the government did not offer the benefits or did not offer any special rules governing taxes if workers realize that the benefit taxes exist. All four cases result from a reduction of welfare benefits or a delay in applying state income taxes. The design is not efficient, however, because the benefit tax produces a region of the budget constraint in which no worker would rationally work. As

correctly pointed out by Moffitt (2003), any method of reducing benefits will result in work disincentives.

### **Conclusion**

My study computed the budget constraints of workers across 47 states and the District of Columbia and concluded that the federal welfare and tax systems are not perfect. If states set their minimum wages much above the federal minimum wage, then minimum wage workers do not have as strong of an incentive as in other states to work full time because of the high marginal tax rates produced by the phase-out region of the federal EITC. The higher marginal tax rates exist for minimum wage workers who moonlight and for workers with wages higher than the federal minimum wage already. A relatively high state minimum wage shifts the high marginal tax rate range to the right on the model diagrams and into the range of hours worked by full time minimum wage workers. It follows that if the federal minimum wage is increased, then the federal EITC needs to be adjusted to provide a work incentive to full time minimum wage workers. The empirical evidence hinted that workers do not understand the structure of the EITC system, so it is imperative that the problem is fixed on the federal or state level. People may not understand the system well enough to determine that the phase out region of the EITC should provide them a work disincentive.

People may not understand the rules of the various programs to avoid an implicit benefit tax either. Only a few examples of implicit benefit taxes exist, but implicit benefit taxes exist for workers with wages significantly above the federal minimum wage. Workers may not realize that an additional hour of work results in a significantly lower income, so implicit benefit taxes can lead to inefficient outcomes. Large implicit benefit taxes should be phased out of the welfare system wherever they exist.

All else equal, a state that offers a higher state EITC has higher marginal tax rates, but the marginal tax rate, holding out the cases of the lump sum taxes, never reaches 100%. The design of the federal EITC and tax system ensures that the marginal tax rate never exceeds 80%. TANF programs may lead to some cases where the marginal tax rate exceeds 100%, especially in states with a state EITC and high state income taxes.

This paper only computes the budget constraints for workers without special circumstances who receive benefits under the EITC and the Food Stamp Program. Many other programs exist for workers and non-workers with or without children, so the budget constraints computed only provide beneficial data to researchers who are concerned about these specific programs. A complete analysis of the budget constraints across all states would include the budget constraints of workers under all possible combinations of government programs and taxes. The basic formulas exist to extend the computations to many other government programs that cover specific circumstances with some slight modifications. Even programs that are difficult to measure, such as TANF, could be modeled with more specific information about the recipients. The greatest barrier to overcome is the lack of centralized information from recent years about government benefits. Some government programs are forthright about benefits, but other programs, such as TANF, do not freely distribute benefit formulae. If completed and maintained, a data set of welfare benefits and taxes across the states would be invaluable to future researchers.

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