The Earned Income Tax Credit (EITC) began in 1975 as a small program to compensate low-income working households for the social security taxes they paid. The maximum benefits available to qualifying families were doubled in 1996 and then doubled again in 1993 so that the EITC program became, next to the food stamp and SSI programs, the best-funded federal anti-poverty program. Given strong bipartisan support, Congress enacted these dramatic expansions without debate in times when large budgetary deficits discouraged any increases in social spending. The EITC’s role has grown still further as policy changes have reduced the number of households receiving federal welfare payments by 40 percent.

A number of studies (Greenstein and Shapiro, 1996; Lieberman, 1998) have documented the anti-poverty benefits of the EITC program, and other studies (Eisen and Lieberman, 1995; Meyer and Rosenbaum, 1999; Dickert, Hauser, and Scholz, 1998; Eisen and Hoynes, 1998) note its positive net effect on labor supplies. However, there has also been concern with a number of its shortcomings. With any means tested program, benefits are reduced as income rises, and are ultimately phased out. For households in this phase-out range, the net increase in earnings from additional labor market effort may be quite meager. Besides the lost credits, these households’ net earnings are reduced by social security taxes, federal and state income taxes, and increased business and childcare expenses.

The impact of these very high implicit marginal tax rates on labor supply is uncertain. Some studies (General Accounting Office, 1993; Dickert, Hauser, and Scholz, 1995) estimate a substantial labor market withdrawal of married women whose household income places them in the phase-out range while other studies (Olson and Davis, 1994; Eisen and Lieberman, 1996) suggest that the withdrawals are negligible because EITC recipients have little knowledge of how their work effort affects the credits they receive. However, equity considerations, not labor supply effects, should be primary: it is simply not equitable for the workers in near-poor households to experience higher marginal implicit tax rates than better-paid workers in richer households. In addition, these high rates make it more difficult for families to distance themselves from poverty.

There is also some concern that the EITC program exacerbates the very high marriage penalties faced by poor female household heads. Once married, these women are no longer eligible for food stamps, housing, childcare subsidies, or welfare benefits. As David Ellwood (1999) demonstrates, these losses alone create large marriage
TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>Phase-In Rate</th>
<th>Phase-In Range</th>
<th>Maximum Benefit</th>
<th>Phase-Out Rate</th>
<th>Phase-Out Range</th>
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<tr>
<td>One Child</td>
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<td>$6-$6679</td>
<td>$2312</td>
<td>15.9%</td>
<td>$12,550-$26,860</td>
</tr>
<tr>
<td>Two Children</td>
<td>40.17</td>
<td>$6-$8500</td>
<td>$3816</td>
<td>28.8%</td>
<td>$13,560-$30,650</td>
</tr>
</tbody>
</table>

Penalties. A single parent with significant wage income who marries will also lose benefits from the EITC program.

The high marginal implicit tax rates and marriage penalties could be reduced if the government reduced the phase-out rate, currently 21 and 16 percent for households with one and with two or more children, respectively. Of course, simply reducing phase-out rates increases the cost of the program by providing more generous credits to an expanded group of recipients. This paper proposes that these costs could be reduced by combining the EITC with other child-related benefits provisions of the present tax code into a Generalized Child Credit (GCC).

While significantly reducing marriage penalties and implicit tax rates faced by the poor and near poor, the GCC also solves another problem associated with the EITC. The EITC provides substantial government benefits to poor and near poor families with children. In addition, the dependent allowance provides benefits that rise with income. Families with no taxable income receive no benefits. Each dependent child reduces tax liabilities by $413 for those in the 15 percent tax bracket and by $770 for those in the 26 percent bracket. As a result, those households in the 15 percent tax bracket who receive little or no EITC benefit gain less tax benefit per child than either poorer or better-off families. David Ellwood and Jeffrey Lieberman (2000) have characterized this as the “middle-class parent penalty.”

INADEQUACIES OF THE EITC

The features of the EITC include: a phase-in range in which a credit is paid as a proportion of adjusted gross income (AGI) up to a maximum amount; a range of income in which the maximum credit is paid; a phase-out range in which the credit is reduced at a specified or phase-out rate; and an income cutoff point when the credit is reduced to zero. All families with nonwage income of $2,400 or more are ineligible. Table 1 illustrates these program characteristics for families with one child and with two or more children.4

In the phase-in range, for each additional dollar earned, the EITC increases substantially. For example, if a worker with two dependent children is paid $6 for an additional hour of employment, the EITC increases by $2.40 so that the hourly wage is really $8.40 or 40 percent more. The phase-in rate is somewhat lower (34 percent) for households with one dependent child.

For both groups of households, the maximum credit continues until AGI equals $12,500. Above $12,500, households are in the phase-out range where, for each additional dollar of earned income, the EITC declines by the phase-out rate. Eventually, incomes reach a cut-off level where the credit is reduced to zero and eligibility is terminated. Since 1986, the EITC has been indexed to inflation.

Once credits are completely phased in, the implicit marginal federal tax rate (MTR) equals the effective federal tax rate plus the EITC phase-out rate. Figure 1 indicates the implicit federal tax rate for single-headed households with one dependent child. Once the federal tax rate becomes effective at $15,183, these households are subject to both a 15 percent federal rate and a 16 percent phase-out rate. This high MTR persists until credits are completely phased out at $25,500. Though not quite as large, nor at such low income levels, there is a similar range for all the other qualifying household types where additional incomes are subject to both federal taxes and the phasing out of credits. It is in this range that the combined phase-in and phase-out rate is over 30 percent, creating one of the shortcomings of the current program.

The EITC is one of a number of provisions of the federal tax code that benefit families with children. Besides the EITC, all families with children also gain benefits from the dependent allowance and child credit provisions of the tax code. As already mentioned, the federal tax code exempts $2,750 of income from taxation for each dependent child so that its benefits depend upon the family's marginal tax bracket. In 1998, the federal government enacted a child credit of $400 per child, increased to $500 per child the following year. Both the dependent allowance and child credit are nonrefundable so that benefits cannot exceed tax liability. To judge equity of treatment of all families with children, we should aggregate benefits from these three major tax policies.

The solid line in Figure 2 indicates the benefits currently from these three tax provisions for married couple with two dependent children as AGI varies. The calculations assume all households have only wage income, take the standard deduction, and have no other tax credits or adjustments to income. Households with incomes of $12,700 or less only benefit from the EITC program because their incomes are too low to benefit from either child credits or dependent allowances.
Benefits rise in the phase-in range, reaching the maximum of $3,916 at income of $9500 and remain at that level until income of $12,500 where ETIC phase-out begins. As income rises above $12,700, the additional benefits from the phasing in of dependent allowance and child credits offset somewhat the ETIC phase-out. At income of $24,867, the benefits of the child credit and dependent allowances for households in the 15 percent tax bracket are completely phased in. At that point, the net benefits equal $3,967; the sum of the $1000 from child credits, $825 from dependent allowances; and $1,242 from ETIC.

After this point, total benefits decline at the 20.8 percent phase-out rate. At $30,860 households no longer qualify for the ETIC so that total benefits are reduced to $1825. Benefits of $1825 continue as income rises. Above income of $55,760, the last dollar would be taxed at a higher 28 marginal tax rate if there were no dependent allowances. New dependent allowances are worth more so that once households gain the full effect, at income of $61,250, total benefits equal $2,540. This total benefit schedule indicates that the children of middle-class households receive less in benefits than either their wealthier or poorer counterparts.

**GENERALIZED CHILD CREDIT PROPOSAL**

The GCC eliminates the child credit and dependent allowance but compensates families by expanding the ETIC program. The GCC begins with the basic elements of the ETIC in the phase-in range. It replaces the phase-out rate with a phase-down rate until total benefits reach the level that households in the 28 percent currently receive—$2,540 for a family with two dependent children. Its basic structure and its ability to solve the three inadequacies of the current system can be shown if we refer to Figure 2.

Let us begin by assuming that the benefits for households up through $12,500 are equivalent to those currently received from the ETIC, maximizing at $3816. They could then be reduced continuously—-the dotted line in Figure 2—until they are phased down to $2,540 at $61,250. Because credits are only phased down over a much larger income range, the phase-down rate can be substantially below the current phase-out rates. If the actual GCC followed the pattern in Figure 2, the phase-down rate would only have to be 2.6 percent.

Because child-related benefits slowly decline to a minimum level, the middle-class child penalty is eliminated. Low phase-down rates substantially reduce the marriage penalty. However, the GCC for married couples with two children illustrated in Figure 2 provides no benefits to families with incomes below $12,500; little benefits to families with incomes between $12,500 and $20,000; and losses for families (not shown) in the 31 percent tax bracket. Indeed, if the GCC only mimics the ETIC at income levels below $12,500, some single-headed households with low incomes will actually be worse off. Because the GCC has no dependent allowance or child credits, effective taxation and the 28 percent tax bracket begin at lower income levels. For single-headed households, effective federal taxation would begin at $9,100. Single-headed households earning $12,500 would have to pay federal income taxes of $510 under the GCC. If they only received the same credit as their current ETIC, those families would be worse off, though as we discuss later, their losses would be reduced if they had qualifying child-care expenses.

The GCC has imposed a complicated effect on the implicit tax rate. It certainly would solve the high MTR faced by the near-poor highlighted earlier. With a 2.6 percent phase-down rate, MTR would drop by 13.4 and 19.4 percentage points for families with one and two children, respectively, in the portion of their phase-out range where these families are currently subject to the 15 percent federal tax rate. However, the GCC does increase the MTR for middle-class households. In particular, households above the current ETIC eligibility now would be subject to the GCC’s phase-down rate that must be added to the 15 percent tax rate they already pay. In addition, because the GCC has no dependent allowances, the effective 28
percent tax rate begins at a somewhat lower income level: $43,650 for single-headed households and $55,750 for married couples. Thus, if the GFC reflected the parameters in Figure 2, the MTR for married couples with two children would increase from 15 to 17.6 percent for the income range $30,850 to $35,750 and from 15 to 8.6 percent in the income range $55,750 to $61,250. Comparable increased rates would also be replicated in the other household types.

To some extent, these problems can be avoided by adjusting parameters. To make sure that poorer households benefit, maximum credits are increased by $510, and the plateau ranges are extended by $5,000 so that the phase-out does not begin until $13,500. To eliminate losses for those in the 31 percent tax bracket, the minimum credit is increased to $1,353 per child. Because dependent allowances are eliminated, there is no way to eliminate the rise in the MTR due to the 28 percent tax bracket beginning at somewhat lower income levels. However, by phasing down benefits to their minimum levels by $43,650, no family would be subject to both the phasing out of benefits and the 28 percent bracket. This requires somewhat higher phase-down rates—5.22 and 5.76 percent for one and two-child families, respectively.

Table 3 summarizes the proposed parameters. It also includes the parameters of three variants of the GFC proposal based on an earlier draft of this paper: David Ellwood and Jeffrey Lehman’s (2000) Three Step Refundable Credit (TSRC), Robert Cherry and Max Sawicky’s (2000) Universal Unified Child Credit (UCC), and Congressman Dennis Kucinich’s Simplified Family Credit (SFC).

Program costs could be lowered by reducing maximum credits. However, this would cause losses for many poor households. Instead, minimum credits could be reduced by extending the phase-down ranges beyond $43,650. They could be extended until minimum credits are lowered sufficiently to create a revenue-neutral proposal.
Elwood and Liebman’s TSiRC proposal focused on the middle-class parent penalty because they sought to minimize the difference between the maximum and minimum credits. As a result, they have lower maxima and higher minima than the GGC, and hence are less generous to families with incomes below $15,000 and more generous to families with incomes above $80,000. The other two proposals have higher maxima and lower minima than the GGC proposal. Thus, they provide more benefits to families with incomes below $15,000 and less to families with incomes above $60,000.

**Implicit Marginal Federal Tax Rate (MTR)**

Figure 3 indicates how the GCC changes MTRs for single parents with one child and no qualifying child-care expenses. Notice the dramatic rate decline in the income range in which families are subject to both the federal 16 percent tax rate and the EITC 18.06 percent phase-out rate. More generally, the U.S. Bureau of Labor Statistics [1998] estimated that 5.3 percent of married couples with children and 16.5 percent of single parents with children had incomes subject to both the current EITC phase-out rate and the 15 percent income tax rate. In these income ranges, the GCC reduces MTR from 31.06 to 20.22 percent for one-child families, and from 35.80 to 22.76 percent for two-child families.

Inherent in all variants of the GCC proposal, there will be a small income range in which families will be shifted from the 15 to 28 percent bracket because they no longer have dependent allowances that reduce their taxable income. Other families whose income made them ineligible for the EITC but are now eligible for the GCC, would have their MTR increased from 15 percent to slightly more than 20 percent. Approximately 16.9 and 16.2 percent of single-headed households and married couples with children, respectively, would experience this modest increase. Because these families would also be receiving a substantial income benefit, both the income and substitution effects of the GCC would predict lower labor force participation.

**Figure 3**

**Implicit Federal Tax Rate for Single Householders with One Child, 1999**

To avoid limiting the number of families that would be subject to increased MTRs, the TSiRC proposal has higher phase-down rates (10 percent) to reach their minimum credits just when current EITC eligibility is terminated. My concern, however, is with tax equity, not labor supply responses. Having a 20 percent tax bracket between 15 and 25 percent seems quite reasonable. Moreover, the likelihood that some spouses will respond by reducing participation in the paid labor market to take care of their young children should not be viewed negatively from a public policy perspective. Thus, I accept these higher MTRs for some households because I believe the benefits from the resulting lower phase-down rates are more substantial.

The GCC selected phase-down rates to reach minimum credits at $43,650 so that no families would be subject to both the phasing down of credits and the 28 percent tax bracket. Both the UUCC and SPC proposals have higher maximum and lower minimum credits than the GCC to target more of the net benefits to lower income families. Because both proposals also have somewhat lower phase-down rates, these variants continue phasing down benefits above $43,650. As a result, in both proposals, the MTRs of approximately 3.9 percent of all single-parent households would rise to over 20 percent. Because minimum credits are reached before $55,750, MTRs would not rise above 28 percent for married couples.

**Marriage Penalties**

The size of the marriage penalty caused by the EITC is hard to quantify. Much of the overall marriage penalty faced by poor single parents derives from the loss of transfer payments from programs that only serve a segment of the population, such as welfare, food stamps, housing subsidies and subsidized health and child care. To avoid this complication, researchers often restrict themselves to estimating the marriage penalty due to the federal tax system.

If the tax system has no effect on the marriage decision, one can simply look at those filing joint returns to determine financial gains and losses to various household types. A number of studies (Fossberg and Rosen, 1995; Alm and Whittington, 1993) of the EITC marriage penalty take this approach. These studies usually find that the aggregate marriage penalty is modest. A recent study by Janet Holtzblatt and Robert Rebelein [1999] uses the tax returns of married taxpayers filing joint returns who were collecting credits or would have done so if they were not married. They estimate that under standard assumptions, in 2000, 45.3 percent of those filing joint returns will have a marriage penalty, 41.9 percent will have a marriage bonus, and the remaining 9.8 percent will have neither a penalty nor bonus. Separating out the effect of the EITC alone, they estimate that net aggregate marriage penalties increase by $534, on average, for the 6.7 million joint filers affected by the EITC (12 percent of joint filers).

The problem with this approach is that couples who choose not to marry are not included in the estimates. These are probably the couples facing the most severe marriage penalty so that studies that only look at joint taxpayers may substantially underestimate the marriage penalty. For this reason, I focus on the potential marriage penalty faced by single heads of households.
### TABLE 5
Marriage Penalties, Current and with GCC (in italics) by Income of Potential Spouses and Number of Children, 1999

<table>
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<tr>
<th>Parent's Income</th>
<th>$0</th>
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<th>$10,000</th>
<th>$15,000</th>
<th>$20,000</th>
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</table>

Negative values are marriage bonuses.

Table 5 indicates the current marriage penalty associated with the federal tax system for single parents as their income and that of their prospective childless spouses vary. Notice that when single parents with incomes of $5,000 or less marry, they generally will obtain marriage bonuses. This occurs because the low-earning household heads were not obtaining all the tax benefits available from dependent allowance credits, and the standard deduction. In addition, the single parent was not obtaining maximum EITC benefits so that the reduction in credits after marriage might not be substantial. As long as tax liabilities decline by more than credits, couples gain marriage bonuses. Once single parents are receiving substantial credits, they will suffer marriage penalties. When they marry, these couples will have less disposable income because their tax liabilities decline only slightly while the credits received decline substantially. This is particularly the case if the combined income is above the level at which EITC eligibility is terminated. For many of these couples, marriage penalties reflect close to 10 percent of their gross income. Not surprisingly, facing this situation, couples might decide to tie to the IRS to avoid their new marital status. Indeed, John Karl Scholz (1991) reports that 31 percent of overclaimed EITC amounts reflects taxpayer claiming single status when they were married.

Determining the effect that the GCC will have on marriage penalties is straightforward. The reduction in the marriage penalty is equal to the benefits from the GCC if couples married minus the benefits to single parents if they didn’t. Currently, single parents with two children and income of $19,000, with partners earning $20,000, face a marriage penalty of $2,468. Using Table 4 we would find that the GCC would reduce their marriage penalties by $1,425; $1490 the couples gain if they married minus minus $65 that single parents gain if they didn’t.

Table 5 indicates that the GCC substantially reduces the marriage penalties (or increases the marriage bonuses) many low-income wage earners now face. Because the SFC and UUCC proposals provide more benefits to poor single parents, they would not reduce the marriage penalties for these wage earners by as much. The GCC does increase marriage penalties for some couples; for single parents with one child and incomes of at least $25,000 and those with two children and incomes of at least $30,000. This is unavoidable because the SFC targets benefits to families in the $25,000 to $40,000 income range. As a result, single heads of households with incomes in this range gain a great deal from the SFC if they remain single while if they marry and have combined incomes above $50,000 they would gain little.

**CONCLUDING REMARKS**

The GCC presents a method of mitigating some of the inadequacies of the current EITC program. Extrapolating from the TSRC proposal, the GCC would cost about $26 billion annually, only modestly more than the $23 billion cost of President Bush’s proposal to double child credits to $1,000 per child. Edelberg and Liebman (2000) compared the impact of their TSRC proposal to four other proposals, one of which was President Bush’s child credit proposal. In 2000, 17.4 percent of households with children and adjusted gross income of $40,000 faced a MTR of over 30 percent. According to estimates in Edelberg and Liebman, the TSRC would reduce this to 5.3 percent and the results should be exactly the same for the GCC proposal. By contrast, Bush’s proposal only reduces the share of families with such high rates to 10.4 percent.

The GCC also does a better job of reducing marriage penalties for those single parents who face the highest marriage penalties as a share of income. In particular, for single heads of households with incomes of $15,000 or lower who marry and have combined incomes below $45,000, the marriage penalty reductions are quite substantial. However, marriage penalties are increased for parents who gain the most from the GCC if they remain single. The only way to overcome this problem would be to substantially increase the minimum credits so that these parents would also gain significantly if they married.
President Bush’s child credit proposal reduces marriage penalties for couples with two children and combined incomes above $24,867; $1000 for all couples with incomes above $31,533. As Table 5 indicates, for many couples with incomes below $15,000, the GCC reduces marriage penalties by more than the Bush proposal. Figure 4 compares the proposal for a single parent with two children and income of $12,500. If this single parent marries a childless partner, as long as their combined income is $41,580 or less, the GCC proposal would reduce their marriage penalty by more than the Bush child-credit proposal. Comparable results would occur if the single parent only had one child. Elwell and Liebenau [2000, Table 7] also find that the marriage penalty reduction is larger under their TBSR proposal when combined incomes total $20,000 or less.

Finally, the Bush child-credit proposal moderates but does not eliminate the middle-class parent penalty. For example, in the income range from $31,533 until $55,750, married couples with two children would receive child-related benefits of $2825. This is still less than those families receiving the maximum EITC of $3816 and less than married couples with incomes over $61,250 who would be receiving $3840. In addition, the GCC provides more net benefits to all families with incomes below $41,500 than Bush’s child credit proposal. And the net benefits from the GCC are only slightly lower for married couples with incomes between $43,660 and $55,750—the income level at which the 28 percent bracket begins. The underlying approach presented has found support among policymakers, including Gene Steuerle [2000], architect of the 1986 tax reform bill. Dennis Kucinich’s proposed Simplified Family Credit proposal is an outgrowth of this support. While his proposal is not perfect, by combining a number of programs, it enables government child-support policies to be provided in both a more efficient and more equitable manner.

REFERENCES


AGGREGATE PRODUCTION FUNCTIONS AND THE MEASUREMENT OF INFRASTRUCTURE PRODUCTIVITY: A REASSESSMENT

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INTRODUCTION

Since the publication of Aeschauer's 1989a seminal paper, the question of the quantification of the effect of government expenditures on private sector output and on productivity has been a subject of debate. The concern is that the estimated elasticities of infrastructure, in particular those using time series, seem to be too high to be believable [Aaron, 1990; Rubin, 1991]. In a survey of the literature Munnell concluded: "In my view, the implied impact of public infrastructure investment on private sector output emerging from the aggregate time series studies is too large to be credible" [1992, 191]. Most of this literature has used econometric estimation, and the most common framework has been an extended aggregate production function (APF), often Cobb-Douglas, with a proxy for public infrastructure as a third factor of production. This has been estimated, also in most cases, using OLS. Critics suggest that the high elasticities are the result of problematic econometricizing: that is, the estimated parameter of infrastructure is biased upward because the regressions have not taken into account the possibility of unit roots in time-series estimations; or the possible endogeneity of the regressors [Aaron, 1989; Berndt and Hansonn, 1992; Granlich, 1994].

Ford and Perot, using data for eleven OECD countries, concluded: "...time series regressions tend to yield non-robust and sometimes implausible parameter estimates, suggesting a fundamental problem with the underlying methodology" [1991, 65; italics added]. This paper argues that the issue at stake is not econometric, and that it is indeed methodological. The problem is much more serious than that of how to properly estimate an aggregate production function. Indeed, there is a large body of literature that some time ago questioned the notion of APF on theoretical grounds. Fisher [1965; 1969a; 1971; 1983] derived the theoretical conditions for successful aggregation. His conclusion was that the conditions under which the production possibilities of an economy can be represented by an APF are so stringent that one can hardly believe that actual economies satisfy them. And in the three-factor production function, the case at hand here, the conditions for successful construction of a sub-aggre-