

CASH-CUM-IN-KIND TRANSFERS, TAX RATES AND LABOR SUPPLY: QUALIFYING THE RECORD

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Resumo

Este artigo investiga a resposta da oferta de trabalho a mudanças na alíquota de imposto de renda levando em consideração transferências combinadas de moeda em espécie e bens físicos. É demonstrado que, sob certas hipóteses: lazer e transferências de bens físicos são complementares, lazer é um bem normal, e o montante adquirido do bem físico pode ser complementado - uma redução na alíquota do imposto de renda leva, sem ambiguidade, a um aumento da quantidade ofertada de trabalho se ocorrer um acréscimo concomitante na provisão do bem público. Ainda, mostra-se que isto causa um efeito negativo sobre a utilidade dos agentes. Estes resultados generalizam o debate entre Gwartney e Stroup (1983) e Gahvari (1986, 1990) e qualificam o papel das transferências em moeda e em bens físicos como instrumentos complementares para balancear o orçamento do governo após uma mudança na alíquota do imposto de renda.

Palavras-chave: oferta de trabalho, alíquota de imposto e transferências combinadas de moeda em espécie, bens físicos.

Abstract

This paper investigates labor supply response to tax rates changes taking into consideration cash-cum-in-kind transfers as a redistributive package. It demonstrates that under the standard assumptions: in-kind transfers and leisure are Hicks substitutes, leisure is normal, and in-kind transfer can be “topped up” - a marginal income tax cut unambiguously increases the quantity supplied of labor if there is a concomitant increase in the public good provision. In addition, that causes a negative effect on utility. These results generalize the debate between Gwartney and Stroup (1983) and Gahvari (1986, 1990) and qualify the role of both cash and in-kind transfer as complementary instruments to balance the governments budget after a tax rate change.

Key words: labor supply, tax rates, cash-cum-in-kind transfers.

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July 2007

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Área 7

JEL classification: H42, H31, H21, H23.

Keywords/Palavras-chave: Labor supply, tax rates and cash-cum-in-kind transfers/ oferta de trabalho, alíquota de imposto e transferências combinadas de moeda em espécie e bens físicos.

1 Introduction

In a recent attempt to stimulate the aggregated labor supply and job growth, there was an income tax rate cut in U.S. that caused discussions around the world about its final effect in terms of eliminating the recession in that country. The U.S. president argued in the Tax Cut Bill Signing Ceremony that such a tax cut would stimulate the economy and create jobs:

Tax relief makes the code more fair for small businesses and farmers and individuals by eliminating the death tax. Over the long haul, tax relief will encourage work and innovation... The money we return, or don't take in the first place, can be saved for a child's education, spent on family needs, invested in a home or in a business or a mutual fund or used to reduce personal debt.

The debate about labor supply response to income taxes changes is old-fashioned and centralizes the arguments in the general equilibrium effects on the labor supply. For instance Hausman (1981), presents a standard income-leisure analysis to make the point clear: lower tax rates increases the net wage that can be earned from an additional hour of work (substitution effect), but also can keep the same standard of living with less work (income effect).

However, Gwartney and Stroup (1983) and Ehrenberg and Smith (1985) point out that this analysis does not take the aggregated labor market into consideration. The authors argue that a tax cut does not increase aggregate real income by the amount of the tax reduction. In other words, it does not per se change the technical production possibilities of the economy. In their general equilibrium model, a tax cut will generate a decline in the public goods expenditures which in turn, will offset the expansion in private goods expenses. That eliminates the income effect,

leaving the unambiguously negative (substitution) effect of tax cut on labor supply.

On the other hand, Gahvari (1986) argues that this latter claim only would be correct if the tax revenues are handed back to individuals as cash transfers and both private and public goods can be bought freely in the market. The author explains that in the case that a tax cut causes a reduction in the provision of the public good, then individuals face a constrained market, which in turn forces them to consume different bundles than the ones they would choose if they receive the value in cash.¹

This paper argues that, first, if the government can hand back cash transfer to individuals then it could also impose a lump-sum tax instead of using a linear income tax. That achieves a first-best result without excess burden. This result can be obtained if one allows three instruments on the part of the government such as cash transfer, linear tax and the provision of public good. Second, the paper characterizes sufficient conditions to obtain an unambiguously negative effect of tax rates on labor supply, generalizing Gahvaris statement. Third, it shows that the final effect on the utility of individuals is undetermined.

The cash-cum-in-kind scheme is first described theoretically in Gahvari and Mattos (2007), however, such redistributive programs have been implemented in many developing economies.² Under these packages named Conditional Cash Transfer (CCT), the recipients are allowed to receive a monthly stipend in addition to consuming the publicly provided goods such as school or health centers. Gahvari and Mattos (2007) show that CCT mechanism achieve first-best redistribution and can redistribute more than an exclusive public goods provision policy. However, the authors use a model with exogenous income.

¹Gahvari (1986) presents a comparison between Gwartney and Stroups model and a compensated wage tax effect. Gwartney and Sroup (1986) reply Gahvari's model arguing that the main point is still in place, i.e., the standard "income effect" analysis ignores aggregated effects, however the the unambiguous negative effect of tax rates on labor supply is also questioned in Gahvari (1990).

²See Das, Do and Ozler (2004) and Rawlings and Rubio (2004). These programs usually propose many social objectives such as redistribution, human capital accumulation, and reduction of child labor supply.

In contrast, this paper focus on household labor supply response to tax rates change when conditional cash transfer is introduced, treating family individuals aggregated a la Becker (1991), i.e., labor supply decisions are made at the household level. Specifically, it proves that if in-kind transfers and leisure are Hicks substitutes, leisure is normal, in-kind transfer is not underprovided, the marginal tax is not underimposed, then a concomitant increase in the public good provision together with a marginal income tax cut *unambiguously* increases the quantity supplied of labor. Using the same assumption above this paper demonstrates that a marginal tax cut has ambiguous effect on the individuals utility.

2 The model

Consider an economy with n identical individuals. They have preferences over a private good x , a public good G and leisure, l . Assume, as in Gwartney and Stroup (1983) and Gahvari (1986), that both goods are produced using only labor L through linear technologies. That guarantees the relative prices of x , G and l are fixed. The private good x is produced in the market, but the public good G is financed through a linear income tax θ combined with a cash transfer, s ³. The last can be positive (lump-sum tax) or negative (rebate) and is provided to all individuals as long as they consume the public good⁴. The government budget constraint can be written as

$$npG + ns = n\theta w(1 - l) \tag{1}$$

where p is the individual price of G , and each individuals labor endowment is set equal to 1. The following definition is important at this stage,⁵

Definition 1 *Good G is said to be overprovided if, if in comparison to his current position, the transfer recipient strictly prefers an offer of one dollar cut in his amount of in-kind transfers, coupled with a one dollar increase in his cash grants. Otherwise, G is not overprovided.*

³This paper differentiates from Gahvari (1990) because both instruments s and G are allowed to be complementary and not substitutes instruments to compensate variations in θ .

⁴As in Gahvari (1986), the consumer is not allowed to sell the public good which makes its consumption mandatory as well as the cash transfer.

⁵This definition is usual in the literature, see Gahvari (1994, 1995).

Given the definition above, one can concentrate in the case that g is overprovided. If g is not overprovided then the agents can buy additional (or zero) units of that good and that is not going to affect their labor supply decision. Further, assume that $0 \leq \theta \leq 1$.⁶

The consumer treats s as fixed and maximize utility subject to $g = \bar{g}$ and the budget constraint,

$$x = w(1 - \theta)(1 - l) + s \quad (2)$$

The first order condition can be written as⁷

$$\frac{u_l}{u_x} = w(1 - \theta) \quad (3)$$

where subscripts of u denote partial derivatives. Both equations 2 and 3 determine the demand functions $l = l(p, \bar{g}, w(1 - \theta), s)$ and $x = x(p, \bar{g}, w(1 - \theta), s)$. Substituting these functions into the utility function gives,

$$u^* = v(w(1 - \theta), \bar{g}, s) = u(x(\bar{g}, w(1 - \theta), s), l(\bar{g}, w(1 - \theta), s), \bar{g}) \quad (4)$$

In addition, the compensated (constrained) demand for leisure, l^c may be derived from the dual to the constrained utility maximization derived above.

$$l(\bar{g}, w(1 - \theta), s) \equiv l^c(\bar{g}, w(1 - \theta), v(w(1 - \theta), \bar{g}, s)) \quad (5)$$

For later reference it is useful to present the following result derived in Gahvari (1994) (see his Lemma 1, p. 499).

Lemma 1 *If g and l are Hicks substitutes, then $(\partial l^c / \partial \bar{g} > 0)$.*

The main result of the paper demonstrates the conditions under which one can have a *unambiguously* negative effect of the tax rate on the labor supply. This is formally stated and proved below.

⁶This assumption can be easily relaxed.

⁷It is plain here that the government prefers to use lump-sum tax instead of wage tax. However, the paper shows that the combination of both taxes might induce interesting behavior of the individuals which are the object of this analysis.

Proposition 1 *Assume g and l are Hicks substitutes, leisure is normal, g is not underprovided, then a marginal income tax cut unambiguously increases the quantity supplied of labor if there is a concomitant increase in the public good provision.*

Proof. Totally differentiate the leisure function with respect to θ to get

$$\frac{dl}{d\theta} = \frac{\partial l}{\partial \theta} + \frac{\partial l}{\partial \bar{g}} \frac{d\bar{g}}{d\theta} + \frac{\partial l}{\partial s} \frac{ds}{d\theta} \quad (6)$$

Next, differentiate the governments budget constraint with respect to θ allowing for changes in s and \bar{g} ,

$$\frac{ds}{d\theta} + p \frac{d\bar{g}}{d\theta} = w(1-l) - w\theta \frac{dl}{d\theta} \quad (7)$$

Now, partial differentiate equation 5 with respect to \bar{g}, θ and s to obtain,

$$\begin{aligned} \frac{\partial l}{\partial \bar{g}} &= \frac{\partial l^c}{\partial \bar{g}} + \frac{\partial l^c}{\partial v} \frac{\partial v}{\partial \bar{g}} \\ \frac{\partial l}{\partial \theta} &= \frac{\partial l^c}{\partial \theta} + \frac{\partial l^c}{\partial v} \frac{\partial v}{\partial \theta} \\ \frac{\partial l}{\partial s} &= \frac{\partial l^c}{\partial v} \frac{\partial v}{\partial s} \end{aligned} \quad (8)$$

Substitute the equations 7 and 8 into 6 and after some algebra,

$$\frac{dl}{d\theta} = \frac{\frac{\partial l^c}{\partial \theta} + \frac{dg}{d\theta} \left[\frac{\partial l^c}{\partial \bar{g}} + \frac{\partial l^c}{\partial v} \left(\frac{\partial v}{\partial \bar{g}} - p \right) \right]}{[1 + \theta w (\partial l / \partial s)]} \quad (9)$$

Given the normality of leisure $(\partial l / \partial s) > 0$, the denominator is positive which implies that the sign of expression (9) depends on the numerator. Using Roys identity, one can find $|(\partial v / \partial \theta)| = |w(1-l)\partial v / \partial s|$. Note that when g is overprovided, the marginal utility of the last dollar spent by public provision of g is less or equal to the marginal utility of cash which leads to $(1/p)(\partial v / \partial \bar{g}) < (\partial v / \partial s)$, otherwise these terms are equal.⁸ It is clear then that if (i) l and g are Hicks substitutes $(\partial l^c / \partial \bar{g} < 0)$, (ii) normality of leisure $(\partial l / \partial s > 0)$, (iii) g can be topped up $(\partial v / \partial \bar{g} / (\partial v / \partial s) \leq p)$ and (iv) the government allows a concomitant movement in the opposite direction of the public provision of g in relation to θ $((dg/d\theta) < 0)$ are sufficient to ensure that equation (9) is positive. ■

⁸Remember that individuals can top up the amount of g in the case that the governments underprovide them.

This suggests that an increase in the net wage (decrease in the tax rate) must be reinforced by a boost in the provision of the public good, in addition to assumptions (i)-(iii), to guarantee the unambiguously increase in the labor supply. That qualifies the argument proposed in Gahvari (1986) that poses the problem with Gwartney and Stroup's model as a 'change in the provision of public goods is not identical to a change in the individuals purchasing power' (p.281). With an additional instrument to finance the movement in the tax rate, the government can redirect the labor supply decision of the agents. In particular, one has to have a tax cut followed by an increase in the provision of the public good to obtain an unambiguously negative response of the labor supply.⁹

A second natural question that raises from this analysis concerns the effect on the utility after a tax rate cut and negative effect on the labor supply (of course, under the assumptions above)¹⁰. The proposition below summarizes the result.

Proposition 2 *Assume g and l are Hicks substitutes, leisure is normal, g is not underprovided, then the effect of a tax cut on the utility is undetermined.*

Proof. Totally differentiate the Equation 4 and substitute equation 7 to obtain

$$\frac{dv}{d\theta} = \frac{\partial v}{\partial \theta} + \frac{\partial v}{\partial s} [wL + \theta w \frac{dL}{d\theta} + \frac{dg}{d\theta} [\frac{\partial v}{\partial g} - p \frac{\partial v}{\partial s}]] \quad (10)$$

Then substitute equations 8 into equation 10,

$$\frac{dv}{d\theta} = -[\frac{\partial v}{\partial s} \theta w \frac{dl}{d\theta}] + \frac{dg}{d\theta} [\frac{\partial v}{\partial g} - p \frac{\partial v}{\partial s}] \quad (11)$$

Similarly than equation (9), the first term is negative while the last one is negative which proves the statement. ■

The first term in the brackets establishes the substitution component affecting leisure. This term captures the negative substitution effect of a tax change, which causes a higher excess burden. The second bracket characterizes the composition effect which addresses how the new marginal tax rate is going to be financed:

⁹The income effect disappears if $dg/d\theta = 0$.

¹⁰Gwartney and Stroup (1986) argues that the analysis in Gahvari (1986) ignores utility effects of tax revenues.

either through public good provision or lump-sum rebate. It is positive due to the assumptions above, which means that composition effect increases utility.

3 Conclusion

This paper investigates labor supply response to tax rates changes taking into consideration cash-cum-in-kind transfers as a redistributive package. It demonstrates that under the following assumptions: in-kind transfers and leisure are Hicks substitutes, leisure is normal, in-kind transfer can be “topped up” - a marginal income tax cut *unambiguously* increases the quantity supplied of labor if there is a concomitant increase in the public good provision.

In particular, the model assumes that the tax rate and the government good are independent instruments, with cash rebates being adjusted to keep the government budget in balance. This means a tax increase can go hand-in-hand with an increase in government goods, as well as a decrease in government goods which will then have different impacts on labor supply. Other results may also be generated by treating cash as one of independent instruments and allowing provision of government goods to keep the government's budget constraint in balance.

The paper also characterizes the ambiguous effect on individuals utility even when labor supply is affected unambiguously by the tax rate. That leads to the argument that even a reduction in tax rate has unpredictable conclusions about social welfare.

Last, these results put in perspective the debate between Gwartney and Stroup (1983) and Gahvari (1986, 1990) on labor supply response due to tax rate change and qualify the role of both cash and in-kind transfer as complementary instruments to balance the government's budget after a tax rate change.

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