Public Spending, Transfers and the Laffer Curve

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Abstract

We demonstrate that the disposition of revenues matters for the shape of the government's tax revenue function. The rationale is that existing transfers and expenditures lead to a capitalization effect when tax rates change that may reinforce or weaken the overall equilibrium income effect of taxation. We show that the direction and the strength of the capitalization effect depends on whether tax rate changes are accompanied by cash transfers or public spending. Our analysis suggests that high cash transfers or low public spending make it more likely that a reduction in tax rates will increase revenues.

Key Words: Laffer Curve, Taxation, Transfers, Public Spending, Capitalization.

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Historically, the occurrence of government debt has been associated with wars, but the past generation has come to know chronic peacetime deficits. In the United States, deficits are a result of increasing social obligations, high defense expenditures, and a climate that has favored tax cutting. Whether these trends are a result of social welfare maximization, optimal voting behavior, or some institutional objectives is open to debate. We will not pursue the underlying causes for these trends, but instead we show that these trends change the nature of the government's revenue function. In particular, we examine claims that a reduction in tax rates may increase tax revenues if tax rates are too high (the Laffer effect). We show that the disposition of revenues matters for the shape of the government's tax revenue function and determines the likelihood of a Laffer effect.

The Laffer curve popularizes the notion that as tax rates rise, revenues steadily rise from zero to a peak from which they then decline back to zero. The public finance literature, as surveyed by Blinder (1981) and Fullerton (1982), was once comfortable with the classic smooth and inverted-U shape of the Laffer curve. However, Malcolmson (1986) argues that discontinuities are possible at high tax rates. Gahvari (1988 and 1989) shows that the discontinuity is likely when tax rate changes are accompanied by public spending rather than cash transfers. Also, Guesnerie and Laffont (1990) indicate that many shapes are possible in general equilibrium. We share the literature's interest in the shape of the Laffer curve. But we argue that the preceding analyses are severely restricted because public expenditures or transfers only serve to accompany tax rate changes. Once this assumption is relaxed, tax rates have capitalization effects that create non-convexities in the revenue function.

We advance the idea that the revenue-maximizing tax rate and the height of the revenue function depend on how the government balances its budget. We show this in a simple general equilibrium model with endogenous consumption and labor that we develop in the first section. The second and third sections consider tax rate changes that are accompanied by balanced-budget increases in public spending or cash transfers. We show that pre-existing transfers and expenditures give rise to a capitalization effect when tax rates increase. The capitalization effect may either offset or reinforce the income effect of higher tax rates on aggregate labor and, thus, push labor to a corner and cause non-convexities in the revenue function. We, also, show that some tax policies cause real capital losses that lengthen the upward-sloping portion of the revenue function relative to the downward-sloping portion and make Laffer effects less likely. Other tax policies may cause capital gains with the opposite effect on the revenue function. We characterize the shape of the equilibrium revenue function for various tax policies and show how the shape changes with changes in existing transfers and expenditures. A final section summarizes our results and we conclude that Laffer effects are more likely when cash transfers are large or public spending is small.

1 A Simple Static General Equilibrium Model

We consider a representative household that chooses consumption c and leisure to maximize its utility subject to a budget constraint. Because leisure equals the time not devoted to market work, or $1-h \in (0,1)$, we write preferences as

$$\frac{c^\beta}{\beta} + \alpha \frac{(1-h)^\theta}{\theta}$$

where the parameter $\alpha > 0$ indicates the relative desirability of leisure. To sharpen our results, we assume separability between consumption and leisure and symmetry by setting $\beta = \theta$. We focus mainly on $\beta \in [0,1)$, but we admit the possibility that $\beta \notin [0,1]$.[1]

The budget constraint for the household equates consumption to after-tax labor income and transfers, or

$$c = (1-t)\, wh + v \tag{1}$$

where the labor tax rate is given by t, the wage rate is w and lump-sum transfers is v.

Firms are assumed to be competitive and choose the amount of the labor input that maximizes profits. Output is produced using a linear production function Ah.

[1] Of course, our results are also more focussed by assuming utility functions with constant elasticity. The leading case in the literature is when $\beta \in (0,1)$, but the logarithmic case where $\beta \to 0$ also has been popular despite shortcomings that are discussed in the next section. Later we consider $\beta \notin [0,1]$ which has been discussed by others such as Gahvari (1988) who assumed $\beta = -1$.

The government pursues a balanced budget policy and sets the sum of expenditures g and transfers equal to revenues R, where revenues are a result of taxes on labor income. Thus, budget balance means

$$g + v = R = twh \tag{2}$$

Finally, market clearing in the goods market is given by

$$c + g = Ah \tag{3}$$

Because government spending only enters the market clearing condition, we are in effect assuming that spending affects utility separably. Thus, we ignore the public good aspects of government spending and focus only on the demand side.

An equilibrium for this model is defined as a (c^*, h^*)-pair that satisfies market clearing and is optimal in the sense of maximizing the objectives of firms and households subject to the relevant constraints and given the government variables and spending rules. In particular, household optimization implies

$$\frac{c}{1-h} = M \equiv \left[(1-t)\,\frac{A}{\alpha}\right]^{\frac{1}{1-\beta}} \tag{4}$$

where $w = A$ has been imposed from profit maximization. Thus, equations (3) and (4) together with the spending rule in (2) determine equilibrium consumption and labor.

If we substitute (3) into (4), we find that equilibrium consumption is:

$$c^*\left(t, g\right) = \frac{A - g}{1 + \frac{A}{M}} \tag{5}$$

where market clearing implies that $A \geq g$ because $h \in [0, 1]$. To find the equilibrium quantity of labor we substitute (5) into (3), yielding

$$h^*\left(t, g\right) = \frac{1 + \frac{g}{M}}{1 + \frac{A}{M}} \tag{6}$$

Thus, the tax rate reduces equilibrium labor by an amount that depends on g. The last two relationships are appropriate when analyzing tax rate changes that are accompanied by budget-balancing lump-sum transfers.

To analyze the effects of tax rate changes that are accompanied by budget-balancing public expenditures, we substitute $t - \frac{v}{Ah^*} = \frac{g}{Ah^*}$ from (2) into (6). Thus,

$$h^*(t,v) = \frac{1 - \frac{v}{M}}{1 + \frac{(1-t)A}{M}} \tag{7}$$

And if we substitute $1 - h^*$ into (4) we find

$$c^*(t,v) = \frac{(1-t)A + v}{1 + \frac{(1-t)A}{M}} \tag{8}$$

Now the effects of a tax rate change on labor are less clear than before, depending on whether transfers are positive or negative.[2] Next, we explore the various possibilities in detail.

2 Tax Effects under Logarithmic Utility

We now analyze the aggregate labor and revenue effects of a change in tax rates. In order to develop intuition about possible effects, this section analyzes the logarithmic utility case where $\beta \to 0$. After showing the shortcomings of this form of preferences, the next section moves to the leading case of $\beta \in (0,1)$.

To analyze the labor effects of taxation, we rewrite (6) and (7) as

$$h^*(t,v) = \frac{1 - \frac{v}{M}}{1 + \frac{1}{M^\beta}} \quad \text{and} \quad h^*(t,g) = \frac{1 + \frac{g}{M}}{1 + \frac{1}{M}} \tag{9}$$

and note that for the logarithmic utility case, $M = 1 - t$ and $M^\beta = 1$. Without any loss in generality, we have assumed in (9) that $\alpha = 1$ and $A = 1$. The latter normalization means that government transfers and expenditures, in particular, are all less than or equal to one.[3] Moreover, equilibrium tax revenues are given by $R(t,\cdot) = th^*(t,\cdot)$.

When $v = 0$ in (9), labor is independent of tax rate changes that are accompanied by public spending adjustments. The intuition for the neutrality of taxes for labor is

[2] Public spending raises labor in (6) while transfers reduce labor in (7). The two outcomes are equivalent, because lower transfers finance higher spending in the first case and lower spending finances higher transfers in the second case. Budget balance implies $dh^*(t,g) = \frac{\partial h^*(t,g)}{\partial g} dg = -\frac{\partial h^*(t,g)}{\partial g}\left(1 - t\frac{\partial Ah^*(t,g)}{\partial v}\right)^{-1} dv$. By comparison, $dh^*(t,v) = \frac{\partial h^*(t,v)}{\partial v} dv$ and it can easily be shown that $\frac{\partial h^*(t,v)}{\partial v} = -\frac{\partial h^*(t,g)}{\partial g}\left(1 - t\frac{\partial Ah^*(t,g)}{\partial v}\right)^{-1}$.

[3] While a decrease in α or an increase in A from unity would raise M and lead to a higher equilibrium level of labor, the qualitative effects of tax rate changes on labor are unchanged.

well known. Higher tax rates lower net wages and this yields a substitution effect that reduces equilibrium labor. At the same time, lower net wages cause a negative income effect that increases equilibrium labor. Also, because higher public spending increases the drain on net resources available to individuals, there is an additional negative income effect. For logarithmic preferences, the combined income effect just offsets the substitution effect. Thus, taxes are neutral for labor and revenues rise monotonically from zero when $t = 0$ to $\frac{1}{2}$ when $t = 1$. While this illustration is instructive, it also shows that the solution in (9) is incomplete, because intuition indicates that labor should be zero when all wages are confiscated. In other words, taxes create a discontinuity at $t = 1$ with labor and revenues falling to zero.[4]

Non-zero transfers (or $v \neq 0$) imply an additional income effect that changes the nature of labor's response to tax rate changes. When cash transfers are positive, labor falls when tax rates rise. The rationale for this result is that taxes now have a capitalization effect by raising the leisure value $\frac{1}{M}$ of existing transfer income. Higher tax rates create a real capital gain with a positive income effect that reduces labor. Because income and substitution effects just offset each other when transfers were zero, the new capitalization effect stands alone and labor falls with higher tax rates. By contrast, when transfers are negative, labor rises because of a real capital loss.

The capitalization effect of tax rate changes when $v \neq 0$ creates a non-convexity in the labor and the revenue functions. Suppose for ease of comparison that $|v| = g$. If transfers are negative (or $v = -g$), the revenue function rises monotonically from zero when $t = 0$ to unity as t rises to $1 - g$. Because labor is bounded by unity, tax rates higher than $1 - g$ have no effect on labor. This non-convexity in the labor function implies a non-convexity in the revenue function with $R(t, v = -g) = t$ for $t \in [1 - g, 1]$. By contrast when $v = g$, revenues rise from zero when $t = 0$ to a maximum of $\frac{t^2}{2}$ at $t^*(v = g) = 1 - g^{\frac{1}{2}}$ and then fall to zero at $t = 1 - g$. If tax rates were pushed even higher towards one, revenues would rapidly approach negative infinity according to (9), but because this is impossible there is a non-convexity with labor and tax revenues remaining at zero for $t \in [1 - g, 1]$.

[4] Malcolmson (1986) and Gahvari (1988 and 1989) also discuss the discontinuity at $t = 1$.

When lump-sum transfers accompany higher tax rates instead of public expenditures, we find that labor $h^*(t,g)$ falls. There are two distinct reasons for this response. The first reason is that the substitution effect of higher taxes dominates the income effect when lump-sum transfers adjust. Budget-balancing transfers create a positive income effect that offsets the negative income effect of the tax rate change on equilibrium labor. The second reason is that non-zero public spending creates a capitalization effect on labor that acts like the capitalization effect on labor when $v < 0$. Higher tax rates raise the leisure value of the drain on resources and cause a capital loss. Thus, the capitalization effect slows the overall fall of labor as tax rates rise. As tax rates move from zero towards one, labor falls by $\frac{1-g}{2}$ with the drop declining as g increases. While the capitalization effect is too weak to create a non-convexity, there still remains a discontinuity of the labor function at $t = 1$. Equation (9) suggests labor falls smoothly towards g as tax rates approach unity, but at $t = 1$ labor must fall to zero. Thus, except for the discontinuity $t = 1$, the revenue function takes on the classic inverted-U Laffer shape with a revenue-maximizing tax rate of $t^*(g \geq 0) = \inf\left(2 - \sqrt{2(1-g)}, 1\right)$. A higher g increases t^* and lengthens the upward-sloping portion of the revenue function relative to the downward-sloping portion.

We summarize our findings for the logarithmic case in Figure 1 below, where for comparability we assume $|v| = g$. We note that taxes create capital losses for $h^*(t, v = -g)$ and $h^*(t, g > 0)$ and capital gains for $h^*(t, v = -g)$. The figure suggests the following ranking of revenue functions:

$$R(t, v = -g) > R(t, v = 0) > R(t, g > 0) > R(t, g = 0) > R(t, v = g) \quad \text{for} \quad t \in (0,1)$$

with revenue-maximizing tax rates following the same order except that $t^*(v = -g)$ and $t^*(v = 0)$ both tend to one. As we show in the next section this ordering does not generalize to the case of $\beta \in (0,1)$. However, the conclusion remains that positive transfers and limited public spending imply Laffer effects, while negative transfers rule them out.

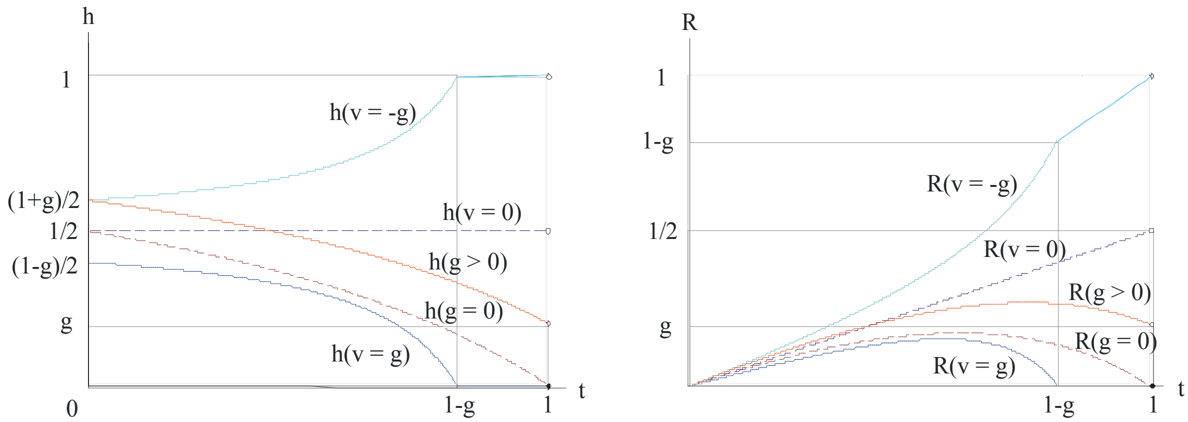

Figure 1: Aggregate Labor and Tax Revenues Assuming Logarithmic Utility

3 General Tax Effects on Labor and Revenues

In this section we broaden our scope and analyze the labor and revenue effects of taxation for $\beta \in [0, 1)$. The last section indicated that higher tax rates lead to discontinuities and non-convexities in the labor and revenue functions. Thus, we extend (9) to indicate where the critical areas are located. Assuming $\alpha = A = 1$ and $|v| = g \geq 0$, the solution for equilibrium labor when $\beta \in [0, 1)$ is:

$$h^* (t, v = g) = \left\{ \begin{array}{l} \frac{(1-t)^{\frac{1}{1-\beta}} - g}{(1-t)^{\frac{1}{1-\beta}} + (1-t)} \quad \text{for} \quad t \in \left[0, 1 - g^{1-\beta}\right] \\ \\ 0 \quad \text{for } t \in \left[1 - g^{1-\beta}, 1\right] \end{array} \right\} \tag{10a}$$

$$h^* (t, v = -g) = \left\{ \begin{array}{l} \frac{(1-t)^{\frac{1}{1-\beta}} + g}{(1-t)^{\frac{1}{1-\beta}} + (1-t)} \quad \text{for} \quad t \in [0, 1 - g] \\ \\ 1 \quad \text{for } t \in [1 - g, 1) \\ \\ 0 \quad \text{for } t = 1 \end{array} \right\} \tag{10b}$$

$$h^*(t,g) = \left\{ \begin{array}{l} \frac{(1-t)^{\frac{1}{1-\beta}}+g}{(1-t)^{\frac{1}{1-\beta}}+1} \quad \text{for } t \in [0,1) \\ \\ 0 \quad \text{for } t = 1 \end{array} \right\} \tag{10c}$$

The leading case of $\beta \in (0,1)$ differs in two significant ways from the logarithmic case. Now, when transfers are zero, tax increases that are accompanied by public spending adjustments tend to reduce labor. As taxes rise from zero to unity, labor falls smoothly from $\frac{1}{2}$ to zero. Thus, the substitution effect on equilibrium labor outweighs the combined negative income effect from higher taxes and spending. Also, there is no discontinuity in labor as tax rates rise towards unity. In this case, we have the classic Laffer shape of the revenue function. Revenues rise from zero at $t = 0$ to a maximum after which revenues fall to zero as tax rates approach unity.[5]

While a tax-with-spending increase when $v = 0$ is qualitatively different for $\beta \in (0,1)$ than for $\beta \to 0$, this is not true for the same experiment when $v \neq 0$. However, a tax-with-transfers increase does not differ significantly for $\beta \in (0,1)$ and $\beta \to 0$. To see this most easily we graph the equilibrium labor functions from equations (10a) through (10c) and the associated revenue functions in Figure 2 for the illustrative case of $\beta = \frac{1}{2}$.

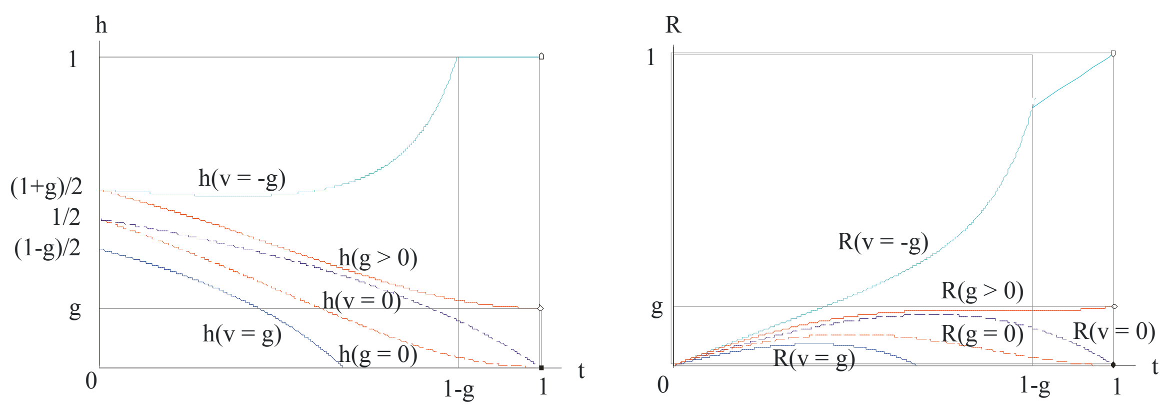

Figure 2: Equilibrium Labor and Revenue Functions Assuming $\beta = \frac{1}{2}$

[5]The revenue-maximizing tax rate t^* solves $\frac{\beta}{1-\beta} = (1-t)\frac{1}{1-\beta} + (1-t)^{\frac{1}{1-\beta}}$. If $\beta = \frac{1}{2}$, $t^* = 2 - \sqrt{2}$.

The capitalization effect of higher taxes is a factor in the response of labor when $v \neq 0$ and spending accompanies tax changes or when $g \neq 0$ and transfers accompany tax changes. Specifically, when higher tax rates are accompanied by public spending, a capital loss occurs when $v < 0$ and a capital gain occurs when $v > 0$. As before, the income effect of the capital loss when $v = -g$ causes labor to rise as the tax rate rises and forces labor to unity at $t \geq 1 - g$. However, the income effect of the capital gain when $v = g$ pushes labor to zero for $t \geq 1 - g^{1-\beta}$, or much earlier than indicated by log preferences. When transfers accompany tax rate increases, taxes again cause capital losses when $g > 0$ that weakens the negative response of labor. For higher tax rates this means that labor becomes less responsive to tax increases and the tax elasticity diminishes.

Revenue functions generally have the same shape for $\beta \in (0, 1)$ as when $\beta \to 0$. The main exception is that $R(t, v = 0)$ now has the classic Laffer look. The revenue functions for the other experiments differ mainly in the details with the capitalization effects of tax changes a prime factor in determining the shape. A capital gain occurs for $R(t, v = g)$ when $v > 0$ and public spending accompanies higher tax rates. The capital gain tends to shorten the upward-sloping region of the revenue function and lengthen the downward-sloping region. Thus, the capital gain reduces the revenue-maximizing tax rate for $R(t, v = g)$ as compared to $R(t, v = 0)$. Higher cash transfers increase the capital gain and cause a reduction in $R(t, v = g)$ for all t, a decrease in the revenue-maximizing tax rate $t^*(v = g)$, and an increase of the region where tax revenues are zero.

By contrast, tax rates create capital losses for $R(t, v = -g)$ and $R(t, g > 0)$. Capital losses tend to lengthen the upward-sloping region of the revenue function and shorten the downward-sloping region. In other words, when tax rates create capital losses the revenue-maximizing tax rate rises compared to situations without capitalization effects. Thus, comparing revenue-maximizing tax rates, we see that $t^*(v = -g) > t^*(v = 0)$ and $t^*(g > 0) > t^*(g = 0)$. When public spending accompanies higher tax rates and $v = -g$, the capitalization effect of tax rates is enhanced the larger is $|v|$, in which case revenues rise faster to their upper bound at $t = 1 - g$. Alternatively, when transfers accompany higher tax rates, higher pre-existing public spending enhances the capital loss. This stretches the upward-sloping region of the revenue function, raises $R(t, g > 0)$ at all t and also increases the revenue-maximizing tax rate.

We can easily compare revenue functions and revenue-maximizing tax rates. It is always true for $\beta \in [0, 1)$ that $R(t, v = -g) > R(t, v = 0) > R(t, v = g)$ and $R(t, g > 0) > R(t, g = 0)$ for $t \in (0, 1)$. However, $R(t, v = 0) > R(t, g = 0)$ for $\beta \in (0, 1)$, whereas the opposite is true for $\beta \to 0$. If we assume $\beta \in (0, 1)$ and if we set $|v| = g$, we can make comparisons of tax-and-spend policies and tax-and-transfer policies. In particular we, find

$$R(t, v = -g) > R(t, g > 0) > R(t, v = 0) > R(t, g = 0) > R(t, v = g) \quad \text{for all } t \in (0, 1)$$

Generally, revenue-maximizing tax rates follow the same order as the revenue functions. These rankings suggest that Laffer effects are more likely for $R(t, v = g)$ when cash transfers are high, but more likely for $R(t, g > 0)$ when public spending is low. Laffer effects are ruled out for $R(t, v = -g)$. Thus, lowering tax rates does not seem to promise higher revenues given that these conditions are counterfactual. However, if revenue-maximization is an over-riding concern, the analysis suggests that because the disposition of revenues matters all available policy instruments (t, v, and g) should be used and the highest feasible revenue function should be chosen. The first choice $R(t, v = -g)$ is based on politically unpopular poll taxes, while the second choice $R(t, g > 0)$ rises with g and encourages government bloat.

Finally, we briefly describe what happens when $\beta < 0$.[6] As before, higher tax rates accompanied by transfers reduce labor when public spending is zero, or $h^*(t, g = 0)$. However, in contrast to the response when $\beta \in (0, 1)$, higher tax rates accompanied by public spending increase labor when transfers are zero, or $h^*(t, v = 0)$. Thus, $h^*(t, g = 0)$ slopes downward but $h^*(t, v = 0)$ slopes upward. The reason for this is that when $\beta < 0$ substitution effects are relatively weaker than when $\beta \in (0, 1)$. For $h^*(t, g = 0)$, the combined income effect of higher transfers and tax rates on equilibrium labor still is zero. However,

[6] For instance, Gahvari (1988) assumes $\beta = -1$ so that $M \equiv (1 - \tau)^{\frac{1}{2}}$ and $M^{\beta} \equiv (1 - \tau)^{-\frac{1}{2}}$ in equation (9). Thus, when $\beta < 0$ only $M^{-\beta}$ is a decreasing function of t, while M^{-1} is an increasing function. By contrast, when $\beta \in (0, 1)$, tax rates increase M^{-1} and $M^{-\beta}$. Finally, we note that capitalization effects depend on the response of M^{-1} to t.

for $h^*(t, v = 0)$, the combined negative income effect of higher public spending and tax rates is now sufficiently strong to overwhelm the substitution effect of higher tax rates.

Also, the capitalization effects when $\beta < 0$ work in the same direction as when $\beta \in (0, 1)$. Thus, taxes create capital losses for $h^*(t, v = -g)$ and $h^*(t, g > 0)$ and capital gains for $h^*(t, v = -g)$. This means that the shape of $h^*(t, g > 0)$ and $R(t, g > 0)$ for $\beta < 0$ is essentially unchanged from $\beta \in (0, 1)$. Given that $h^*(t, v = 0)$ slopes up, capitalization effects mean that $h^*(t, v = -g)$ moves to one faster than before and $h^*(t, v = g)$ moves to zero slower than before when $\beta \in (0, 1)$. Beyond this, the shape of revenue functions for $\beta < 0$ resemble those for $\beta \in (0, 1)$. The difference is that the upward-sloping region for $\beta < 0$ increases relative to the downward-sloping region. Thus, assuming $\beta < 0$ makes Laffer effects less likely than assuming $\beta \in (0, 1)$.[7]

4 Summary and Conclusions

We analyze the effects of labor taxation in a simple but standard static general equilibrium model. We show that higher tax rates have capitalization effects that depend on the disposition of government revenues. The capitalization effect must be added to the combined equilibrium income effect of a tax-and-spend policy or a tax-and-transfer policy. The capitalization effect reshapes the government's equilibrium revenue function in two ways. First, capital gains shorten and capital losses lengthen the upward-sloping region of the revenue function relative to the downward-sloping region. Second, the capitalization effect may lead to non-convexities in the revenue function.

Specifically, we demonstrate that if budget-balancing lump-sum transfers accompany tax rate changes, higher tax rates create capital losses that increase with existing public expenditures. Thus, we conclude that low public spending increases the likelihood of Laffer effects, but at the cost of fewer publicly provided goods. Alternatively, we show that if

[7] Although it is beyond the scope of this paper, we note that the quadratic utility function with $\beta = 2$ is an example of $\beta > 1$ where $M \equiv (1-\tau)^{-\frac{1}{2}}$ and $M^{\beta} \equiv (1-\tau)^{-1}$. When $\beta > 1$, both M^{-1} and $M^{-\beta}$ are decreasing functions of t. Thus, both $h^*(t, v = 0)$ and $h^*(t, g = 0)$ slope upward. Moreover, capital losses under $\beta < 1$ turn into capital gains under $\beta > 1$ and *vice versa*. This reverses the rankings for the labor and revenue functions under $\beta < 1$.

budget-balancing public expenditures accompany tax rate changes, higher tax rates create capitalization effects that depend on the sign and the size of initial transfers. If cash transfers are negative a capital loss results that pushes labor towards its upper bound and creates an upward-sloping revenue function. Alternatively, if cash transfers are positive a capital gain occurs that pushes labor towards zero, increasing the downward-sloping region of the revenue function but also creating a region where revenues are zero at high tax rates. Because the capitalization effects increase with the size of existing transfers, we conclude that high positive cash transfers increase the likelihood of Laffer effects, but at a cost of a low revenue yield overall.

Our findings on the capitalization effects of taxation should carry over to environments with more general preferences and technologies than considered here. It would be interesting to know how our results change when more realistic forms of transfers (with incentive effects) and public spending (with public goods aspects) are considered. Finally, while the static revenue effects of labor taxes in our model carry over to dynamic environments, it would be interesting to see how they compare with the dynamic revenue effects of labor taxes. Some arguments about the possibility of Laffer effects stress the growth effects of taxation. But such arguments must be weighed against the level effects of taxation that are considered here.

References

[1] Blinder, Alan S. (1981), "Some Thoughts on the Laffer Curve," in Laurence H. Meyer, ed., *The Supply-Side Effects of Economic Policy*, Center for the Study of American Business, Washington University, St. Louis and Federal Reserve Bank of St. Louis.

[2] Fullerton, Don (1982), "On the Possibility of an Inverse Relationship Between Tax Rates and Government Revenues," *Journal of Public Economics,* 19(1), 3-22.

[3] Gahvari, Firouz (1988), "Does the Laffer Curve Ever Slope Down?" *National Tax Journal,* 41(2), 267-269.

[4] Gahvari, Firouz (1989), "The Nature of Government Expenditures and the Shape of the Laffer Curve," *Journal of Public Economics,* 40(2), 251-260.

[5] Guesnerie, Roger and Michael Jerison (1991), "Taxation as a Social Choice Problem: The Scope of the Laffer Curve Argument," *Journal of Public Economics,* 44(1), 37-63.

[6] Malcolmson, James M. (1986), "Some Analytics of the Laffer Curve," *Journal of Public Economics* 29(3), 263-279.