THE MEASURE OF TAX DISTORTIONS ON LABOR

by

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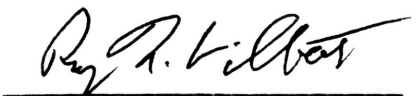

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ABSTRACT

THE MEASURE OF TAX DISTORTIONS ON LABOR. (May 1984)

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The estimation of the Laffer curve (which shows the government's income tax revenues as a function of the national average tax rate) requires an equation which states national income as a function of the national average tax rate (because revenues are equal to the product of income and the tax rate). This must be accomplished through a two step procedure. First, income is derived from the amount of labor utilized in the market (a production function). Second, labor is determined as a function of some aggregate tax measure (a labor market). The question that remains is: what is the best aggregate tax measure to use in the labor market?

While at least one economist has argued that there is no appropriate rate, various others have proposed several alternatives. One is the national average tax rate. Another possibility is an aggregate weighted-average marginal tax rate. Arguments that government spending is the best measure of the true tax burden suggest the plausibility of

using the percentage of gross national product devoted to government spending. This paper examines the usefulness of a new possibility, the progresivity of the tax structure.

ACKNOWLEDGEMENTS

I am regularly amazed whenever I think about how long I was a student of economics without learning some truely basic economic skills: finding economic data and statistics from primary sources, searching the literature to find the most recent work on relavent topics, creating the simplist of econometric models, and using computers in conjunction with those models to turn raw data into finished statistics. Without fifteen months of consistently patient instruction from Doctor Roy Gilbert in all those areas and more, this research could not have been started, conducted, nor completed. His vital effort and continuous support are greatfully acknowledged.

No one else assisted me in any way during the course of my research except my wife who did not divorce me.

DEDICATION

To Lynn, who did not divorce me no matter how little time I spent with her, and no matter how much time I spent with this project, my "mistress."

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THE MEASURE OF TAX DISTORTIONS ON LABOR

In 1974, Arthur Laffer drew his famous Laffer curve on a cocktail napkin in a Washington restaurant. Since that time there has been continuing debate over the possibility that a decrease in tax rates could result in a long run increase in tax revenues. Proponents of this new school of thought (supply-side economics) theorize that high marginal tax rates distort labor employment and lead to a lower national income than would otherwise exist. Since theory does not indicate the degree to which employment might be distorted, the question becomes an empirical one. However, it is not immediately obvious which tax rate should be used to determine the size of any labor distortion. This paper examines the rationale for using progressivity measures and the significance of two of these measures.

Section I is a review of the literature. Section II explains why the use of progressivity seems plausible as a variable in the labor market. Section III developes the model used to test the significance of tax progressivity. Section IV shows the results of the econometric analysis. And Section V gives some tentative conclusions based on the inconclusive evidence herein presented.

I. REVIEW OF THE LITERATURE

Roy Adams (1981) pointed out the relationship between the labor market and the Laffer curve (see Figure 1). Panal (a), the labor market, gives employment as a function of wages (ω), taxes (τ'), and the elasticity of labor to after-tax real wages (ε). Panal (b) shows income (Y), as a function of employment. Panal (c) combines the two into one function. Panal (d) is the Laffer curve, in which revenues (R), equal the product of income and the average tax (τ).

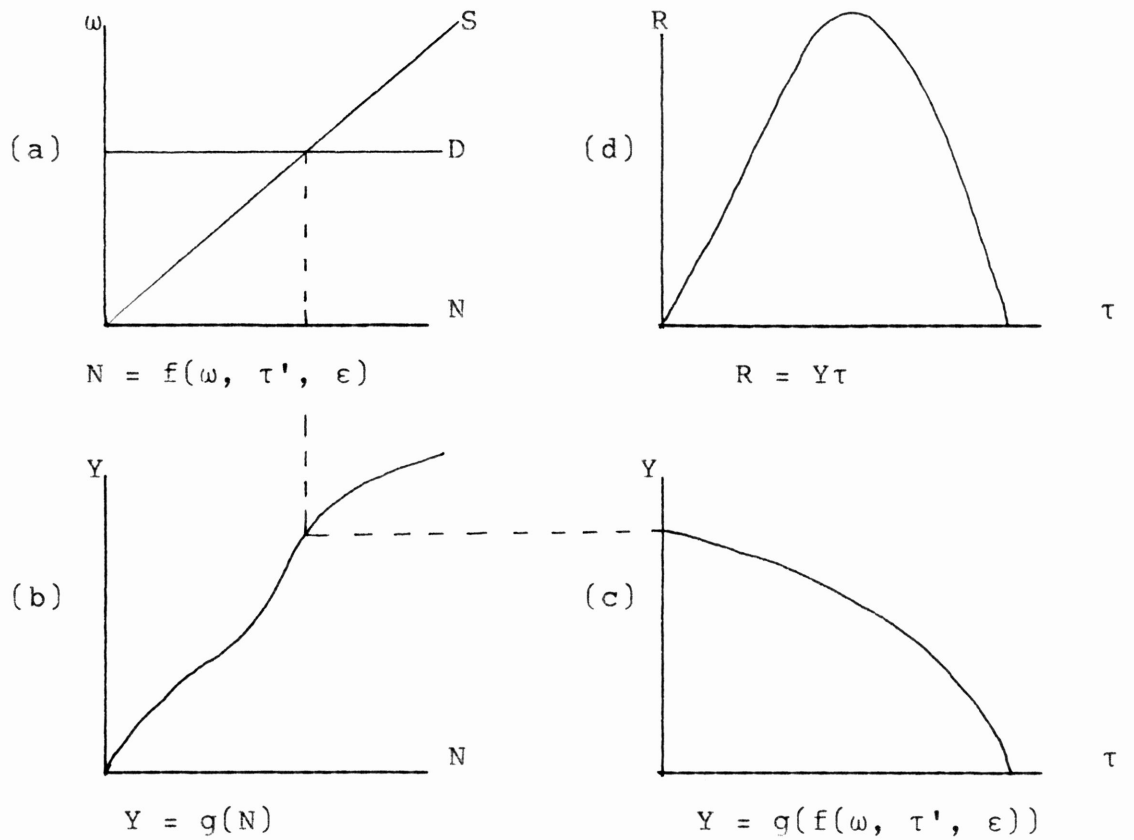

Figure 1--Laffer Curve Theory

Fullerton (1980) indicates that the tax rate in the Laffer curve (τ) can be an aggregate average or an aggregate marginal tax rate. Laffer (1981) states that the national marginal tax rate is more correct because it has more impact on incentives. Indeed, Stuart (1981) uses marginal rates in the labor market portion of his model for estimating the Laffer curve for Sweden.[1] However, Musgrave (1959) defined the tax wedge in the labor market as the difference between gross and net real wages. This differential includes all taxes on the receipt and expenditure of wages: income taxes, payroll taxes (whether paid by employer or employee), and sales and excise taxes. Since not all these taxes are constant across the nation, it is very difficult, if not impossible to calculate the aggregate marginal rate. Donald Kiefer (1978) goes so far as to state that there is no appropriate measure of the tax rate for this model!

The Federal Reserve Bank of Minneapolis (1979) claims that government spending is the real measure of the tax burden. This implies that the percentage of gross national product (GNP) taken up by public spending may be a useful measure. However, it is impossible to construct an identified model with such a variable. In addition, Paul Craig Roberts (1980) states that there is an even better measure. "The

[1]Note that the tax rate used in the labor market (τ') does not have to be the same as the average tax rate (τ) in the Laffer curve as long as there is a clear relationship between τ' and τ. (If $N = f(\tau')$, $Y = g(N)$, and $\tau = h(\tau')$, then $Y = g(f(\tau'))$, and $R = g(f(\tau'))(h(\tau'))$.)

total resources claimed by government is a better measure of the tax burden than tax revenues alone. But some economists let this adding up of concrete resources blind them to another measure of the real tax burden--the production that is lost to disincentives."[2] Thus, the question becomes: what is the best measure of labor disincentives?

[2]Paul Craig Roberts, "Caricatures of Tax-Cutting," Wall Street Journal, April 28, 1980, p. 29.

II. A RATIONALE FOR PROGRESSIVITY

Of all the different theories presented above, the aggregate marginal tax rate seems best. However, it is computed as a weighted average of all the individual marginal rates. This means that the aggregate marginal rate is really a weighted-average marginal rate. It is a function not only of the marginal rates defined by the tax code but also of the distribution of income. In short, as long as income distribution is not held constant, ceteris paribus conditions can not be met in a model which uses the aggregate marginal tax rate.

Another problem with the marginal rate is that tax brackets are very small--typically one to two thousand dollars. Therefore, a large number of real world income decisions will involve movement from one tax bracket to another. This means that the marginal tax rate will not be as important an indicator of incentives as will be the degree of progressivity of the tax structure. Indeed, Jerry Hausman of M.I.T. found evidence that progressivity could be important:

> The progressivity of taxation may be leading to substantial deadweight loss due to the tax induced distortion....The finding of a significant income effect and concomitant welfare cost for male heads of households is contrary to the received knowledge in the field, e.g., Pechman (Federal Tax Policy)....To the extent that our findings are substantiated in future research, the previous presumption that the efficiency effect of

> a progressive income tax system is quite small or zero needs to be revised.[3]

A good measure of progressivity must have two desirable characteristics. First, it must have a summary statistic that describes the marginal tax rate structure and the distribution of income. Second, it must have a clear mathematical relationship with the aggregate marginal tax rate (τ). If it does not have this second characteristic, then only the labor market and the production function can be estimated (as noted in footnote 1 above). If the effective marginal tax rates were a linear function of income, then the slope of that function would be the perfect measure. However, Okner (1978) estimated the effective marginal rates, and they can not be adequately estimated as a linear function.

For the purposes of testing the significance of progressivity in the labor market, it was deemed that the first characteristic was more important than the second. As long as the summary statistic exists, the effects of progressivity can be tested. Therefore, two measures of progressivity were chosen: the Suits and Kakwani coefficients as presented in Formby, Seaks, and Smith (1981). Both provide summary statistics of the tax structure and income distribution. Neither has an immediately obvious mathematical relationship to the aggregate average tax rate. This means that the labor

[3]Jerry A. Hausman, "The Effect of Taxes on Labor Supply," a paper presented to the Brooking Conference on Taxation, October 18-19, 1979, pp. 43-44.

market and the production function in Figure 1 can be estimated, but without a endogenous estimate of the average tax rate, the Laffer curve can not be estimated by this model using either of these coefficients.

III. THE MODEL

This is a simple, neo-classical, one-sector, general equilibrium model based on Panals (a) and (b) in Figure 1. The procedure entails three steps. First, the production function (1) is estimated using employment and real income figures from various issues of the Federal Reserve Bulletin. Estimates of the real, net capital stock are taken from Musgrave (1981) and adjusted for capacity utilization rates also found in the Federal Reserve Bulletin. The stochastic equation is:

$$Y = \alpha K^{\beta} N^{\epsilon} \qquad (1)$$

Where: Y is real national income, K is real net capital utilized, N is the amount of labor employed, and α, β, and ϵ are parameters.

Once the parameters are estimated, the second step is to determine the wage rate (ω). It is assumed that there is a homogenous labor supply. It is also implicitly assumed that the unemployed fall into a second sector which is not examined in this paper. Following Stuart (1981), it is assumed that wages are determined competitively, which is to say that wages equal the marginal product of labor ($\partial Y/\partial N$):

$$\omega = \partial Y/\partial N = \epsilon\alpha K^{\beta} N^{\epsilon-1} \qquad (2)$$

Given the wage as generated by (2), the third step is the estimation of the labor market to test the significance of progressivity in equation (3). The parameters, δ_1 and δ_2,

are both theoretically expected to be positive. If δ_2 is statistically significant, and if it has the expected positive sign, then it would represent evidence that progressivity does distort the employment of labor. Note that the tax rate (τ') can be either the Suits or Kakwani coefficients or any other reasonable measure of the tax burden.

$$N = \gamma\omega^{\delta_1}(1 - \tau')^{\delta_2} \qquad (3)$$

It is important to realize that only equations (1) and (3) are estimated. Equation (2) is simply calculated given the parameters from equation (1). All final estimations were made using the two-stage least squares method. The model is identified as each equation contains one right hand endogenous variable (N or ω) and excludes one exogenous variable (K or τ').

IV. RESULTS

The results of several scenarios are summarized in Table 1. The scenarios are established by the interaction of two broad classes of assumptions. The first class involves capital. Capital was first assumed to be real net private non-residential stock. Real net fixed government-owned capital was added in under the second assumption. A third version of capital included both the above plus real net private residential capital. This third version could not be used as it invariably produced estimates of equation (3) which had high multicolinearity (typically, the coefficient of determination exceeded seventy-five percent, but no parameters were significant).

Table 1--Results of the Regressions

K	τ'	α	β	ε	γ	δ_1	δ_2	
(1)	S	6.17	0.840	0.178	1.90	0.446	-0.988	A
		(1.34)	(2.66)	(0.17)	(0.69)	(3.72)	(-1.79)	
(1)	T	5.23	0.735	0.537	1.02	0.523	1.300	B
		(1.24)	(1.87)	(0.41)	(0.02)	(4.31)	(1.23)	
(1)	K	6.39	0.862	0.101	1.56	0.530	-1.078	C
		(1.35)	(2.93)	(0.11)	(0.46)	(3.63)	(-1.87)a	
(2)	S	0.57	0.919	0.354	1.56	0.432	-0.996	D
		(-0.27)	(2.19)	(0.30)	(0.39)	(3.19)	(-1.67)	
(2)	T	0.60	0.869	0.506	1.16	0.512	1.29	E
		(-0.26)	(1.47)	(0.29)	(0.12)	(3.44)	(1.03)	
(2)	K	0.542	0.978	0.178	1.26	0.507	-1.06	F
		(-0.28)	(2.31)	(0.15)	(0.19)	(3.27)	(-1.61)	

Notes:
(1) Private nonresidential capital stock
(2) All nonresidential capital stock
(3) a: significant at the ninety percent level
(4) Tax burden (τ'): S means Suit's coefficient, K means Kakwani's coefficient, and T indicates the average tax rate was used.
(5) The numbers in parentheses are t ratios. there are eleven degrees of freedom.

The second class of assumptions involved the measure of the tax burden (τ'). In addition to testing both progressivity coefficients, the aggregate average tax rate (τ) was substituted for τ' under each capital assumption as a control measure. While τ' does not appear in equation (1), it does affect the value of the production function parameters due to the simoutaneous estimation aspect of the two-stage least squares procedure. Therefore, in each scenario, the exogenous variables (K and τ') must be used consistently in estimating equations (1) and (3).

As can be seen in Table 1, the parameter δ_2 never had the expected sign when progressivity measures were used. They did have the correct sign when the aggregate average tax rate was used as the measure of the tax burden. Of all the various sets of assumptions, only set C provided a δ_2 which was significant at the ninety percent level. While the wage and capital elasticities were almost always significant, the labor elasticity never was.

IV. CONCLUSION

Since the progressivity estimators invariably were of the wrong sign, there is strong evidence that the measure has no effect on employment levels. However, there are several factors which tend to mitigate the evidence. The impact of the aggregate average tax rate on employment should be sufficiently strong to make δ_2 significant when τ is substituted for τ' in equation (3). As this was not the case, there exists evidence that there is something wrong with the model. The consistant nonsignificance of the labor elasticity is further conformation of some intrinsic flaw.

One possible problem could be that the tax burden τ' is not a function of just average tax rates or marginal rates or even progressivity, but rather it may be a combination of all three. Another difficulty was pointed out in Rosen (1980): the labor supply is different from the employment rate. The labor supply includes the number of hours worked by labor (employment), and the intensity of the work, and the quality of the work effort. It is the labor supply, rather than employment which is theoretically subject to incentive distortions. Rosen points out that there is a dearth of research on the measure of the labor supply. Nonethe-less, there is some literature which indicates that the labor supply is significantly different from employment

levels. To the degree that it is different, this model is incomplete.

On the whole, the evidence seems inconclusive at best. This paper will not provide the further substantiation that Jerry Hausman was hoping for in 1979. However, it does not refute his theories either. Progressivity may indeed have more effect on the labor supply than it has on employment. More research is required in this regard.

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