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COLLABORATED EMPLOYEE-EMPLOYER TAX EVASION*

by

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ABSTRACT

Under a tax withholding system, an employer and his employees may find it mutually beneficial to strike a bargain underwhich the former withholds less than the taxes due (via underreporting his actual wage payments) while the latter accepts less than the free market wage rate. This paper inquires into the determinants of employee-employer tax collaboration, characterizes the bargains efficient for them both and, in view of the results, evaluates the ability of the withholding system to favorably affect tax collection.

I. INTRODUCTION

The tax fraud literature, initiated by Allingham and Sandmo (1972), has mainly been concerned with the taxpayer's decision to evade taxes through the underreporting of his actual income (e.g., Allingham and Sandmo, Yitzhaki (1974), Pencavel (1979), Sproule (1985)) as well as with the interrelationships that may exist between tax evasion, detection and penalties (e.g., Weiss (1976), Balachandran and Schaefer (1980), Koskela (1983), Greenberg (1984)). An implicit assumption underlying this literature is that actual income is fully received by the taxpayer who may then choose to declare a part of it only, accordingly paying less than his true tax liability. While this assumption seems appropriate, in general, for recipients of capital income or for the self-employed, it does not conform with real practice in the case of wage-earners, whose tax liability is mostly (if not entirely) deducted at source by withholding regulations. Consequently, unless, as suggested by Cowell (1985), the skillful evader switches to a job which is administratively difficult to tax, his evasion opportunities are confined to the case where the withholding rate does not reach as high as his final tax rate.[1]

The withholding system might, however, raise incentives for the employer and employees to collaborate in evading the latter's taxes. The employer might be willing to substitute his workers in the underreporting of their actual earnings, accordingly withholding less than the amount due, in return for his workers' agreement to accept less than the free market wage. A vivid example of such collaboration is the waiter's occupation, where wages are often low but a substantial portion of the overall compensation (tips) is concealed from the tax authorities. Collaborated evasion, however, may not only operate in small enterprises with fairly homogenous employees. It may also be relevant to certain groups of workers in large enterprises with many sepaerate wage bargains, where tax avoidance, in the form of paying part of the total compensation in non-taxable fringe benefits, is a very common practice. Avoidance and evasion are closely related decisions (see, for example, Cross and Shaw, 1982) and collaborating in the latter may be a substitute or a complementary activity to the former. Tax collaboration in the workplace to reduce employees' tax liability concerns also a general feature of the tax system that, if neglected, could undermine the most carefully designed tax policy. Tax authority agents, of whom withholding employers involuntarily constitute a part, might be open to offers of bribes (in this case, lower wages) on the part of taxpayers (see Chu, 1990). Combating dishonesty among tax agents may thus be a more effective way of controlling evasion than conventional sanctions against tax evaders.

Addressing the issue of employee-employer illegal tax collaboration, the present paper inquires into the properties of the bargains efficient for both parties, and, in view of the results, evaluates the ability of the withholding system to favorably affect tax collections. We begin by setting up the framework for the analysis of collaborated tax evasion (Section II), proceed to investigate the existence of a collaboration set consisting of bargains mutually beneficial to the parties (Section III), identify the solutions efficient for both parties and examine their sensitivity to possible variations in the tax and law enforcement parameters (Section IV) and conclude with a comparison between the amounts of tax evaded in the absence and presence of a withholding system (Section V).

II. THE NATURE OF EMPLOYEE-EMPLOYER TAX COLLABORATION

Consider a competitive employer facing a market wage, W_m, per worker employed over a given period of time, who is required by tax regulations to withhold (and remit to the government) a proportion, t, of his workers' earnings. Complying with this requirement, each employee's net income, I^c, will be

$$I^c = (1-t)W_m, \tag{1}$$

providing that the withholding rate reaches as high as his final tax rate and that labor is his only source of income. The employer's net profits, π^c, are independent, however, of the withholding rate, being

$$\pi^c = (1-\Theta)[V(N)-W_mN], \tag{2}$$

where N denotes the number of employed workers, V(N) - the market value of output (produced, by assumption, by labor input only), and Θ - the profit tax rate.

Suppose, however, that the employer considers the possibility of underreporting his actual wage payments - accordingly withholding less than his workers' true tax liability - in return for their agreement to cut down wages below the free market wage. Suppose, similarly, that each employee considers the possibility of foregoing part of the market wage in return for his employer's agreement to declare less than his actual earnings.[2] Assuming that all employees have identical tastes, collaboration with their employer would be desirable either to all or to none. The employer, on his part, would collaborate either with them all or with none, fearing that those uncollaborated with (although wishing to be) might inform the tax authorities. Consequently, collaboration, if agreed upon, would result in the determination of identical compensation packages for all employees.

The net payoff from tax collaboration depends on whether or not the employer is investigated by the tax authorities. If he is not, collaboration will remain undetected, in which case each employee's net income, I^{nd}, will be

$$I^{nd} = W_c - tW_d, \tag{3}$$

where $W_c(\leq W_m)$ and $W_d(\leq W_c)$ denote actual and declared wages, respectively. The employer's net profits, π^{nd}, will, in this case be

$$\pi^{nd} = (1-\Theta)V(N) - (W_c-\Theta W_d)N, \tag{4}$$

taking account of the fact that the underreporting of wage payments increases his profit tax liability. If, however, the employer is investigated by the tax authorities, detection is assumed to follow. The tax authorities will recover the non-withheld taxes from the workers - directly or through the employer - penalizing the latter in proportion, λ, to his undeclared wage payments. Each employee's net income, I^d, will then be

$$I^d = (1-t)W_c, \tag{5}$$

whereas the employer's net profits, π^d, will take the form of

$$\pi^d = (1-\Theta)[V(N)-W_cN] - \lambda(W_c-W_d)N. \tag{6}$$

Since the tax authorities get to know the exact amount of his wage payments, we assume that the employer will be refunded for his profit tax overpayments, or will actually pay $(\lambda-\Theta)(W_c-W_d)N$, where $\lambda>\Theta$.

III. THE COLLABORATION SET

Suppose first that each party aims at maximizing its expected net payoff. Each party would then find collaboration more (or equally) preferable to its present position only if collaboration is at least an actuarially fair option. That is, if

$$Eg = (1-p)g^{nd} + pg^d \geq g^c \tag{7}$$

where $g = I,\pi$, and p denotes the (exogenously given) probability of detection. This implies for the typical employee that

$$t(1-p)(W_c-W_d) \geq (1-t)(W_m-W_c), \tag{8}$$

i.e., that his expected tax savings due to wage underreporting more than (or equally) compensate for his net income loss due to wage reduction, and for the employer that

$$(1-\Theta)(W_m-W_c) \geq [(1-p)\Theta + p\lambda](W_c-W_d), \tag{9}$$

i.e., that his net gain per employee due to wage reduction more than (or equally) compensates for his expected penalty and profit tax overpayments due to wage underreporting. Combining (8) and (9), contracted actual and declared wages must satisfy

$$\frac{(1-p)\theta + p\lambda}{1-\theta} \leq \frac{W_m - W_c}{W_c - W_d} \leq \frac{(1-p)t}{1-t} \,. \tag{10}$$

This requires that

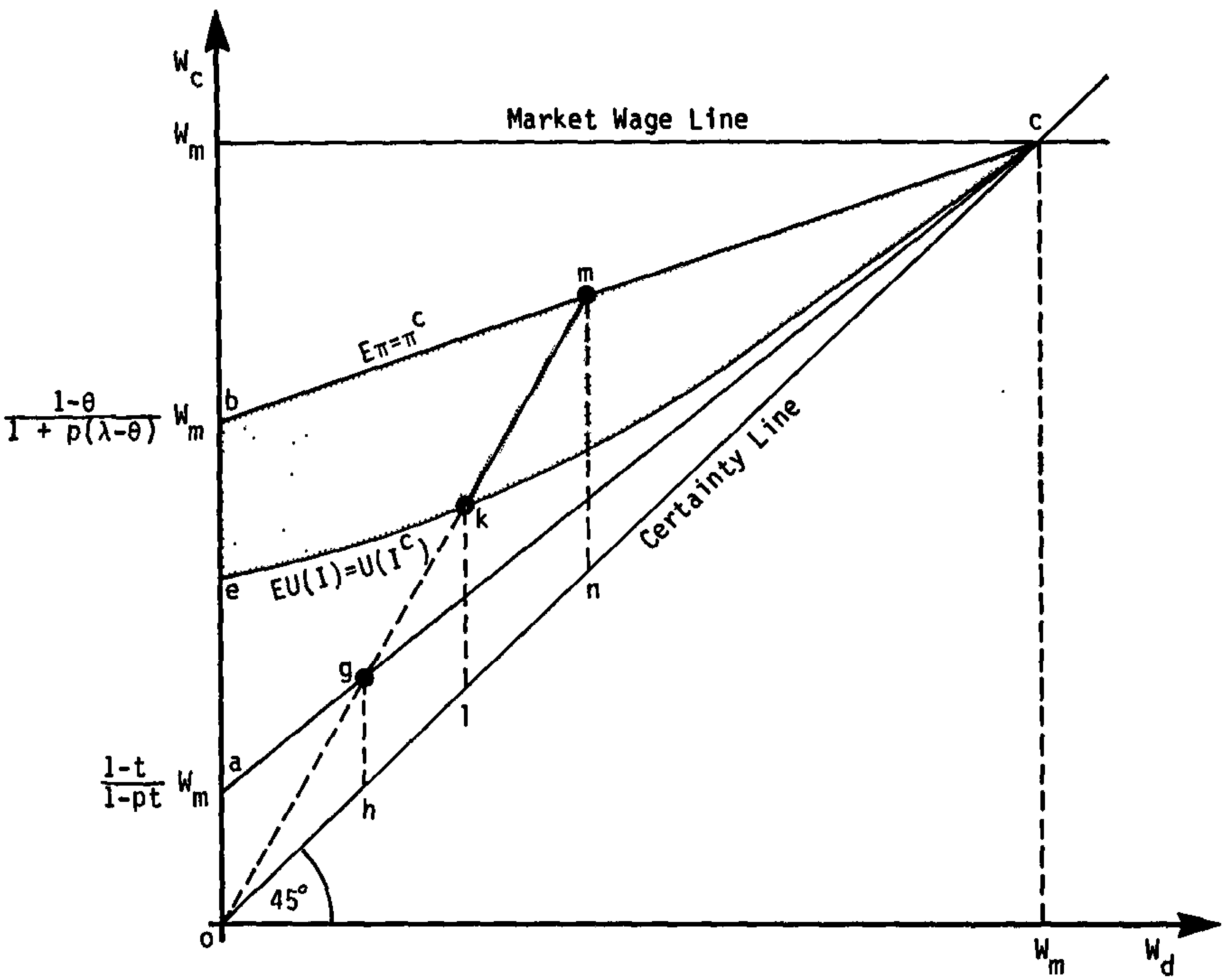
$$\frac{p\lambda}{1-p} \leq \frac{t-\theta}{1-t} \,, \tag{11}$$

a prerequisite for which is $t>\theta$.[3]

Employees, however, are conventionally assumed to maximize expected utility. Given that hours of work during the employment period are institutionally determined, the utility achieved from work, U, varies with net income only. We will assume that the marginal utility of income is positive $[U'(I)>0]$ and decreasing $[U''(I)<0]$, implying that employees are risk-averse. We will make use of the Arrow-Pratt absolute and relative risk-aversion measures, i.e., $R_A(I) = -U''(I)/U'(I)$ and $R_R(I) = -U''(I)I/U'(I)$, respectively, assuming , as being generally accepted, that the former is a decreasing $[R_A'(I) < 0]$ and the latter is a non-decreasing $[R_R'(I) \geq 0]$ function of income.

Under the expected utility hypothesis, each employee would find collaboration more (or equally) preferable to non-collaboration only if $EU(I) = (1-p)U(I^{nd}) + pU(I^d) \geq U(I^c)$, which implies that collaboration should be more than an actuarially fair option. Consequently, the collaboration set, defined as the set of all (W_c, W_d) combinations Pareto-superior to the market wage rate (i.e., mutually beneficial to the parties or beneficial to one party only without harming the other), would, if existing, lie inside the triangle abc (Figure 1), where ac (an isoincome line along which $EI = I^c$) and bc (an isoprofit line along which $E\pi = \pi^c$) divide the vertical distance between the market wage line and the certainty line in the proportions given by the right-hand-side and left-hand-side of restriction (10), respectively. To identify the borders of the collaboration set we may totally differentiate $EU(I) = U(I^c)$ with respect to W_c and W_d, obtaining

$$\left.\frac{dW_c}{dW_d}\right|_{EU(I)=U(I^c)} = \frac{(1-p)t}{1-p+(1-t)ph} \,, \tag{12}$$



W_c
W_m
Market Wage Line
c
m
$E\pi=\pi^c$
b
$\frac{1-\theta}{1+p(\lambda-\theta)} W_m$
k
$EU(I)=U(I^c)$
e
n
Certainty Line
g
l
a
$\frac{1-t}{1-pt} W_m$
h
45°
o
W_m
W_d

Figure 1

where $h = U'(I^{d})/U'(I^{nd})$. Eq. (12) represents the slope of the typical employee's indifference curve, ec, along which non-collaboration (at $W_d=W_c=W_m$) and collaboration (at $W_d<W_c<W_m$) yield the same level of utility. It implies that the indifference curve is positively sloped, decreasing in slope with a decline in W_d.[4] Thus, a necessary (and sufficient) condition for the existance of a collaboration set is that the slope of ec <u>at the non-collaboration position</u> (point c) exceed the slope of the isoprofit line, bc, obtained by totally differentiating $E\pi = \pi^{c}$ with respect to W_c and W_d:

$$\left.\frac{dW_c}{dW_d}\right|_{E\pi=\pi^c} = \frac{(1-p)\Theta + p\lambda}{1 + p(\lambda-\Theta)} . \tag{13}$$

This is ensured by restriction (11), since at that point $h=1$ ($I^{nd}=I^{d}$), and the slope of the ec curve coincides with the slope of the ac line, $(1-p)t/(1-pt)$. Hence, the collaborartion set is confined, under risk-aversion, to the closed (dotted) area ebc.

IV. <u>EFFICIENT COLLABORATION</u>

Holding expected utility and expected profits constant at higher than the non-collaboration level, indifference curves and isoprofit lines passing through any (W_c, W_d) combination inside the collaboration set may now be constructed for the employee and the employer, respectively. For any W_d, a higher W_c generates more utility to the employee and less profits to the employer, so the higher the indifference curve the better off is the former, but the higher the isoprofit line the worse off is the latter. Pareto-efficient bargains between the employee and the employer, (W_c*, W_d*), are thus restricted to a contract curve, mk (Figure 1), along which indifference curves and isoprofit lines are mutually tangent, satisfying an equality between (12) and (13). Assuming that tangencies can be reached within the limits of the collaboration set and totally differentiating (12) and (13) (held as an equality) with respect to W_c and W_d, the slope of the contract curve is given by[5]

$$\frac{dW_c^*}{dW_d^*} = \frac{tW_cR_A(I^{nd})}{tW_dR_A(I^{nd}) + R_R(I^{nd}) - R_R(I^{d})} , \tag{14}$$

which, under non-decreasing relative risk-aversion [$R_R(I^{nd}) \geq R_R(I^{d})$], is unambiguously positive. When the relative risk-aversion is constant (as is the case, for example, with the frequently applied logarithmic utility function), the slope of the contract curve reduces to $W_c/W_d > 1$; thus, the contract curve is linear, lying on a (higher than 45 degree) ray from the origin.

There is no generally accepted rule for selecting a particular point on a contract curve as the finally agreed-upon outcome. Thus, unless an arbitrary outcome is conveniently singled out, the effect of possible variations in the tax and law enforcement parameters may be examined only with respect to the entire locus of efficient bargains. Following this route, one can show that an increase in either the probability of detection or the penalty rate would shift the contract curve to the right, implying, as intuitively expected, that efficient bargains would exhibit less underreporting (and less evasion) at any level of actual wage. Appendix (A) shows that an increase in the profit tax rate would have a similar effect on the contract curve, but an increase in the withholding tax rate would shift the contract curve to the left, characterizing efficient bargains by more underreporting (and more tax evasion, as both the tax rate and undeclared wage increase) at any level of actual wage.[6]

V . WITHHOLDING VERSUS SELF-DECLARATION

Although the rationale underlying the inception of a withhoding system is that taxes become due when incomes are earned (rather than when returns are filed), a supporting belief is that a withholding system - if not entirely eliminating tax evasion opportunities - helps, at least, to ensure that less of wage-earners' taxes escape the tax collector. To examine the validity of this presumption with respect to the possibility that employers collaborate with their employees to evade the latter's taxes, suppose now that profits are not subject to taxation (i.e., $\Theta=0$) and that in the absence of a withholding system a tax evading employee would face the same law enforcement parameters currently faced by his employer. His alternative net income levels would thus be $Y^{nd} = W_m - tW_d'$ and $Y^d = (1-t)W_m - \lambda(W_m-W_d')$, where $W_d'(\leq W_m)$ denotes declared wages. Optimal declaration, $W_d'^*$, should then satisfy

$$\frac{dE[U(Y)]}{dW_d'} = -t(1-p)U'(Y^{nd}) + \lambda pU'(Y^d) = 0, \qquad (15)$$

being less than W_m if $p\lambda < t(1-p)$, which, given $\Theta=0$, is a stricter restriction than (11).

Evidently, a comparison between the amount of tax evaded in the absence of a withholding system, $t(W_m-W_d')$, to that evaded in its presence, $t(W_a-W_d)$, requires an assumption about the exact shape of the employee's utility function. We proceed by assuming that it is logarithmic, substituting $U(Y) = \ln Y$ into (15) to obtain

$$t(W_m - W_a'^*) = \frac{(1-t)[(1-p)t - p\lambda]}{\lambda} W_m, \tag{16}$$

which is positive if the entry condition is satisfied.

The amount of tax evaded in the presence of a withholding system depends, of course, on the finally agreed upon bargain. Consider first the case where collaboration is actuarially fair for the employer, i.e., where his (expected) gain over and above the non-collaboration position is zero. This occurs when bargaining results in an equilibrium at the upper end of the contract curve (point m in Figure 1), satisfying the tangency condition ($h = I^{na}/I^{a}$)

$$\frac{(1-p)tW_c}{W_c - ptW_a} = \frac{p\lambda}{1 + p\lambda}, \tag{17}$$

as well as $E\pi = \pi^c$, or

$$W_m - W_c = p\lambda(W_c - W_a). \tag{18}$$

Solving (17)-(18) for W_c^* and W_a^* we obtain

$$t(W_c^* - W_a^*) = \frac{(1-p)t - (1-t)p\lambda}{p\lambda[1 - \frac{1-t}{t} p\lambda]} W_m, \tag{19}$$

which is positive under restriction (11).

A quick glance at (16) and (19) reveals that $t(W_c^*-W_a^*)$ is greater than $t(W_m-W_a'^*)$ since its numerator is higher while its denominator is lower. Notice, however, that when the employer gains nothing, in expected terms, by collaborating with his employees, undeclared wages (depicted by the vertical distance between the contract curve and the certainty line) are the greatest (mn in Figure 1). As one moves down the contract curve, undeclared wages (and thus evaded taxes) fall monotonically,[7] reducing the gap between the amounts evaded in the presence and absence of a withholding system. Appendix (B) shows, however, that the amount evaded at any other point on the contract curve is still greater than that evaded in the absence of a withholding system. We thus conclude that if the employees' preferences may be approximated by a logarithmic function, and if the tax and law enforcement parameters allow for the existence of bargains mutually beneficial to the parties (which they do if they generate incentives for underreporting in the absence of tax withholdings), a withholding system would result in increased tax evasion regardless of the finally agreed-upon bargain on the contract curve.

VI. CONCLUDING REMARKS

Government tax revenue depends not only on the tax and law enforcement parameters but also on the way in which taxes are collected. Different tax collection systems may offer different evasion opportunities, thus resulting in different amounts collected under the same tax structure. Being widely accepted as a tax collection mechanism, the withholding systrem is not immune against tax evasion. In fact, the results obtained in this paper and in previous works by Yaniv (1988) and Hagedorn (1989) concerning employers' independent evasion of tax withholdings (i.e., non-remittance of actually withheld taxes) shed serious doubts on the ability of the withholding system to favorably affect tax collections. Whether the withholding system is nevertheless desirable is a question which should be answered within the framework of a collection theory, still strikingly absent in the public finance literature.

APPENDIX

(A) Totally differentiating (12) and (13) (held as an equality) with respect to W_d and Θ, holding W_c constant, we obtain

$$\frac{dW_d}{d\Theta} = \frac{(1-p)[1 - p(1-t)(1-h)]}{pt(1-t)[\Theta + p(\lambda-\Theta)]R_A(I^{nd})h} > 0,$$

observing that h>1. However, a total differentiation 0f (12) and (13) with resect to W_d and t yields

$$\frac{dW_d}{dt} = - \frac{1-p + ph\{1 - tR_R(I^d)[1 - \dfrac{W_dR_A(I^{nd})}{W_cR_A(I^d)}]\}}{p(1-t)t^2R_A(I^{nd})h} < 0,$$

assuming, as is often accepted, that the relative risk-aversion measure is of the order of unity or less.

(B) Does the amount of tax evaded at the lower end of the contract curve (point k) still exceed the amount evaded in the absence of a withholding system? While it is impossible to explicitly solve (17) and $EU(I) = U(I^c)$ for the amount evaded at that point, one is able to extract the amount that would have been evaded further down, where the contract curve ray intersects the isoincome line ab (point g), had the employee been pushed, for illustrative purposes only, to accept an actuarially fair bargain. Solving (17) along with $EI = I^c$, or

$$(1-t)(W_m-W_c) = t(1-p)(W_c-W_d), \tag{18'}$$

we obtain

$$t(W_c{*}-W_d{*}) = \frac{(1-t)[(1-p)t - (1-t)p\lambda]}{(1-t)p^2\lambda + (1-p)[(1-p)t - (1-t)p\lambda]} W_m, \tag{19'}$$

which is positive by restriction (11). Comparing (19') to (16) we immediately see that the numerator of the former exceeds that of the latter. We may now add and subtruct $(1-p)p^2\lambda t$ from the denominator of (19'), obtaining, after rearranging, $(1-tp)p^2\lambda - (1-p)[p\lambda - (1-p)t(1+p\lambda)]$, which must still be positive. This is less than λ, the denominator of (16), since the tangency condition (17) implies that the expression in the square brackets is positive. Consequently, the amount evaded at point g would still be greater than that evaded in the absence of a withholding system, and so would the amount evaded further up at the lower end of the contract curve (since the distance kl exceeds the distance gh) or at any other point on it.

F O O T N O T E S

[1]Depending on whether or not his tax return must be accompanied by his employer's statement of income earned (and tax withheld), a taxpayer may then evade either the entire amount of his non-withheld taxes by avoiding filing a return altogether, or a variable part of his non-withheld taxes by underreporting his actual income, respectively. The former case has been investigated by Yaniv (1988), in parallel to analyzing the employer's (uncollaborated) evasion of tax withholdings; the latter case has been discussed by Hagedorn (1989).

[2]Being single-job holders with no other income, whose entire tax liability must be deducted at source, employees will be assumed, as is the case in Israel, for example, to be exempt from the obligation to declare their earnings themselves through the filing of an income tax return.

[3]The likelihood of this condition to hold increases greatly by the fact that the effective tax rates on profits often lie drastically below the statutory rates due to generous tax credits and depreciation allowances. Peckman (1983) points out that while the statutory rate in the United States amounted in 1982 to 46 percent, the effective rate was, on average, as low as 13.1 percent. The withholding rates, on the other hand, are usually not subject to most of the deductions allowed to employees which are itemized upon filing a final tax return. Given that $t > \Theta$, condition (11) is satisfied for fairly reasonable values of the tax and law enforcement parameters such as: $t=0.3$, $\Theta=0.15$, $p=0.2$, $\lambda=0.75$.

[4]Eq. (12) indicates that the slope of the ec curve is negatively related to h. However,

$$\frac{dh}{dW_a} = [(\frac{dW_c}{dW_a} - t)R_A(I^{nd}) - \frac{dW_c}{dW_a}(1-t)R_A(I^d)]h < 0,$$

since by (12) $dW_c/dW_a < t$. Hence, the slope of the ec curve is positively related to W_a.

[5]A simplifying step in the derivation of (14) is the observation that $dh = [R_A(I^{nd})dI^{nd} - R_A(I^d)dI^d]h$.

[6]In contrast, the effect of an increase in the regular tax rate on self-declaration was found by Allingham and Sandmo (1972) to be ambiguous, given that the penalty rate is assessed, as presently assumed, on the undeclared income.

[7]Mathematically, $d(W_c{*}-W_a{*})/dW_a{*} = W_c{*}/W_a{*} - 1 > 0$, given constant relative risk-aversion.

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