



NATIONAL INSURANCE INSTITUTE
Administration of Research and Planning

Jerusalem, November 1995

Discussion paper 60

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TAX EVASION BY MISINFORMING WITHHOLDING AGENTS

by
Gideon Yaniv

Jerusalem, November 1995

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A B S T R A C T

This paper inquires into a wage-earner's decision to fraudulently reduce his tax withholdings by splitting his work efforts among more than one job, while misinforming his employers regarding employment elsewhere. Under exact withholding by progressive marginal tax rates, this behavior results in the application of lower tax brackets to earnings. After deriving optimum and entry conditions, the paper examines the effect of changes in tax progressivity, carried out through changes in the amount withheld or the amount due, showing that neither would help reduce the amount evaded. The paper concludes with demonstrating that approximate withholding, considered to be less costly than exact withholding, may also be less evadable.

I. INTRODUCTION

Under most tax systems, wage-earners' taxes are deducted at source by withholding regulations.¹ Two major forms of withholding exist: exact withholding without obligatory filing of an end-of-year tax return (the British system) and approximate withholding with obligatory end-of-year filing (the American system). Surprisingly, the former is considered more costly to administer than the latter (despite its lower load of returns),² but, on the other hand, non-evadable, as approximate withholding allows for the evasion of *non-withheld* taxes simply by failing to file a return.³

However, exact withholding by progressively graduated tax rates is not immune against tax evasion. This is so since a wage-earner may choose to split his work efforts among several jobs (rather than work in one job only), failing to inform his employers (as the law requires) that he is also employed elsewhere, or fraudulently stating that he is not. Consequently, each employer will treat him as a single job-holder, applying to his earnings the exact progressive tax schedule. Not only will the wage-

¹Peckman (1983) regards the withholding system as the 'backbone of the individual income tax'. While aiming mainly at taxing income when it is earned (rather than when returns are filed), and to ensure that taxes due are collected before the associated income has been spent, withholding at source naturally confines wage-earners' evasion opportunities.

²See Kay and King (1990, p. 52-56) for a discussion on the cost and administration of the alternative systems.

³See Yaniv (1988) for an analysis of this behavior. Notice, however, that both systems may generate incentives for the employer to evade his employees' taxes by remitting to the tax authorities less than the amount withheld [Yaniv (1988, 1995a), Hagedorn (1990)] or by collaborating with employees in withholding less than required [Yaniv (1992), Baldry (1993)].

earner enjoy lower tax brackets, but he may also gain multiple tax allowances for personal attributes (such as residency, military service, non-working spouse, etc.), in excess of his true entitlement. Misinforming withholding agents must obviously be accompanied by non-filing of an end-of-year return, an option legally limited to single-job holders only.

The present paper investigates a wage-earner's tax evasion behavior under exact progressive withholding. Section II begins with analyzing his effort allocation problem in the presence of multiple job offers, deriving optimum and entry conditions. Section III examines the effect on the allocation of work efforts and on tax evasion of changes in tax progressivity, carried out through changes in the amount withheld or the amount due, showing that neither would help reduce the amount evaded. Section IV compares between the amount evaded under exact and approximate withholding, assuming that the latter involves a standard withholding tax rate. A lower bound on the standard rate is derived, which ensures that approximate withholding is not only less costly but also less evadable than exact withholding. Section V concludes with some related remarks.

I. THE MODEL

Consider a wage-earner facing n job offers of identical characteristics, with the exception of the hourly wage rate, w_i ($i = 1, \dots, n$), which may vary across jobs. Suppose that the wage-earner is interested in working a total of H hours per period and may choose his work intensity in either job. Obviously, he would devote his entire working time to the better paying job, say Job s , or would be indifferent between accepting Job s and other jobs offering a wage rate equal to w_s .

Suppose, however, that the wage-earner's income, I , is subject to progressive taxation, $T(I)$, where $T'(I) > 0$ and $T''(I) > 0$. Suppose also

that taxes on earnings are withheld at source by the employer, and that the wage-earner is required to notify his employer whether or not he is also employed elsewhere. If he is not, taxes due will be fully withheld by the employer according to the progressive tax schedule. If he is, taxes will be withheld according to the *highest* marginal tax rate, unless the wage-earner provides a formal certificate from the tax authorities instructing the employer to apply lower rates. Under these circumstances, the wage-earner might be better off splitting his work efforts among several jobs, notifying each employer that he is *not* employed elsewhere, and, of course, avoiding filing a tax return, an option legally open to single-job holders only. Denoting by $h_i \geq 0$ the number of hours allocated to Job i ($i = 1, \dots, n$), his total tax withholdings will be $\Sigma T(w_i h_i)$, which, under progressive taxation, is less than the amount due, $T(\Sigma w_i h_i)$. To focus on the effect of progression on tax evasion, we will assume that the wage-earner is not eligible for any form of tax allowance.⁴

Misinforming employers (and failing to file a return) is, however, risky. With a given probability, p , the wage-earner's fraudulent maneuver will be detected and a penalty at the rate of $\delta > 1$ will be imposed on the amount of tax evaded. His final net income will thus be

$$Y = \Sigma w_i h_i - \Sigma T(w_i h_i) \tag{1}$$

in case of non-detection, and

$$Z = \Sigma w_i h_i - \Sigma T(w_i h_i) - \delta [T(\Sigma w_i h_i) - \Sigma T(w_i h_i)], \tag{2}$$

in case of detection, assuming, for simplicity that labor is his only source of income, and that movement between jobs does not entail any cost

⁴See the Concluding Remarks section for an elaboration of this point.

in terms of time or money. The wage-earner's problem is now to choose h_i^* ($i = 1, \dots, n$) so as to maximize his expected utility, $EU = (1-p)U(Y) + pU(Z)$, subject to (1)-(2) and the time constraint $\sum h_i = H$. We will assume that $U(\cdot)$ is increasing and strictly concave, implying that the wage-earner is risk-averse [$U''(\cdot) < 0$]. Forming the Lagrangian, $L = EU - \mu(\sum h_i - H)$, the Kuhn-Tucker first-order optimality conditions are

$$\frac{dL}{dh_i} = \frac{d[EU]}{dh_i} - \mu \leq 0, \quad i = 1, \dots, n \quad (3)$$

where

$$\left(\frac{d[EU]}{dh_i} - \mu \right) h_i = 0, \quad (4)$$

and $h_i \geq 0$. For all m ($\leq n$) job offers *accepted* by the wage-earner, $h_i^* > 0$. Hence, $d[EU]/dh_i = d[EU]/dh_2 \dots = d[EU]/dh_m$ at the optimum. In particular, for $k, s = m$, we have

$$\begin{aligned} \frac{d[EU]}{dh_k} - \frac{d[EU]}{dh_s} &= (1-p)U'(Y) \{w_k[1 - T'(w_k h_k)] - w_s[1 - T'(w_s h_s)]\} \\ &+ pU'(Z) \{w_k[1 + (\delta-1)T'(w_k h_k)] - w_s[1 + (\delta-1)T'(w_s h_s)] \\ &- \delta(w_k - w_s)T'(\sum w_i h_i)\} = 0, \quad (5) \end{aligned}$$

where s denotes the best-paying job ($w_s \geq w_k$). A sufficient condition for tax

evasion, through shifting some work efforts to Job k rather than concentrating in Job s, is

$$\frac{d[EU]}{dh_k} \Big|_{h_k=0} - \frac{d[EU]}{dh_s} \Big|_{h_s=H} = w_k[1 - T'(0)] - w_s[1 - T'(w_s H)] - p\delta w_k[T'(w_s H) - T'(0)] > 0, \quad (6)$$

which implies that the post-tax return on the first hour shifted to Job k should be greater than the post-tax return on that hour in Job s (the alternative cost) plus the expected penalty on the tax evaded through this reallocation. A prerequisite for (6) is that in the absence of risk, the differential return from shifting an hour to Job k is positive. This requires that

$$\frac{w_k}{w_s} > \frac{1 - T'(w_s H)}{1 - T'(0)}, \quad (7)$$

which clearly holds for $w_k = w_s$, but not necessarily for $w_k < w_s$. Given (7), the entry condition into tax evasion may be restated as

$$p\delta < \frac{w_k[1 - T'(0)] - w_s[1 - T'(w_s H)]}{w_k[T'(w_s H) - T'(0)]} \leq 1, \quad (8)$$

which collapses to $p\delta < 1$ for $w_k = w_s$, but is stricter than that for $w_k < w_s$. Consequently, given that the hourly wage rate varies across jobs, the tax-evading wage-earner would not necessarily accept every job offer. Once evasion is practiced through the splitting of work efforts among more than one job, increasing evasion through the acceptance of an additional job

might not be desirable if (a) the lower tax brackets are insufficient to compensate for the lower wage rate, or (b) the differential return, although positive, is outweighed by the increment in expected penalty. Mathematically, this implies that $d[EU]/dh_j < \mu$, for $j \in n-m$.

Assuming, however, that the hourly wage rate is identical for all jobs, $w_1=w$, the entry condition into any job will be independent of the wage rate. Thus, given that $p\delta < 1$, the wage-earner would split his work efforts among all jobs, the optimum condition (5) reducing to

$$w[T'(wh_m) - T'(wh_k)][(1-p)U'(Y) - (\delta-1)pU'(Z)] = 0. \quad (9)$$

In the absence of risk ($\delta=0$ or $p=0$), condition (10) implies that $T'(wh_m^*) = T'(wh_k^*)$, or that $h_m^* = h_k^*$. Hence work efforts would be equally divided among all jobs, such that $h_1^* = H/n$. The presence of risk prevents this intuitive solution. Rather, it requires that the allocation of efforts between any two jobs will not be equal. Consequently, the amount of efforts devoted to any given job will be different than that devoted to any other.

III. CHANGES IN TAX PROGRESSIVITY

Since the opportunity to evade taxes arises because of the progressivity of the tax schedule, it is interesting to examine how changes in progressivity affect tax evasion. To answer this we confine the analysis to the more common situation where the wage-earner faces only two job offers, Job 1 and Job 2. We simplify further by assuming that $w_2=w_1$, and by normalizing the wage rate to unity. Alternative net incomes thus reduce to

$$Y = H - T^w \quad (1')$$

$$Z = H - T^w - \delta[T(H) - T^w], \quad (2')$$

where $T^w = T(h_1) + T(h_2)$ denotes the amount withheld. Figure 1 describes graphically the amount of tax evaded at any allocation of H between h_1 and h_2 . The curve $T(h)$ represents the progressive tax schedule, whereas $2T(h)$ is a vertical summation of two tax schedules. In the absence of risk, the wage-earner would allocate $H/2$ hours to each job, evading the amount ac . In the presence of risk, the wage-earner allocates more hours to one job (say, Job 1) than to the other, thus $h_1^* > h_2^*$. As more hours are allocated to the former, the amount withheld, $T(h_1^*) + T(h_2^*)$, increases (at increasing marginal rates) along the curve ab .⁵ Consequently, the amount evaded, measured by the vertical distance between $T(H)$ and ab , falls as h_1 increases (or as h_2 decreases), disappearing at $h_1 = H$. Net penalty on tax evasion (penalty in excess of taxes due) is measured by the distance between the curve db and $T(H)$.

There are two changes affecting the progressivity of the tax schedule which seem to be of interest in a tax evasion context: a change in the amount withheld, T^w , and a change in the amount due, $T(H)$, each carried out holding the other constant. Suppose first that the tax schedule is changed such that the amount withheld at the wage-earner's optimum (h_1^* , h_2^*) increases without affecting the amount due. To capture this change, let us rewrite the tax schedule as $T(\alpha, h)$, where α is a shift parameter. Obviously we assume that $T_h > 0$ and $T_{hh} > 0$. As for changes in α , suppose that $T_\alpha > 0$ for $h \leq H$.⁶ Figure 2a depicts an increase in α as a shift of the tax curve from $T(\alpha, h)$ to $T(\alpha', h)$.

⁵The curve ab is constructed by adding $T(h_2)$ on top of $T(h_1)$ at each allocation of H between h_1 and h_2 . The curve is convex to the origin as $dT^w/dh_1 = T'(h_1) - T'(h_2) > 0$ and $d^2(T^w)/d(h_1)^2 = T''(h_1) + T''(h_2) > 0$.

⁶for example, $T(\alpha, h) = h^2 + \alpha(H-h)$, defined for $h > \alpha/2$, satisfies the above assumptions on the tax function.

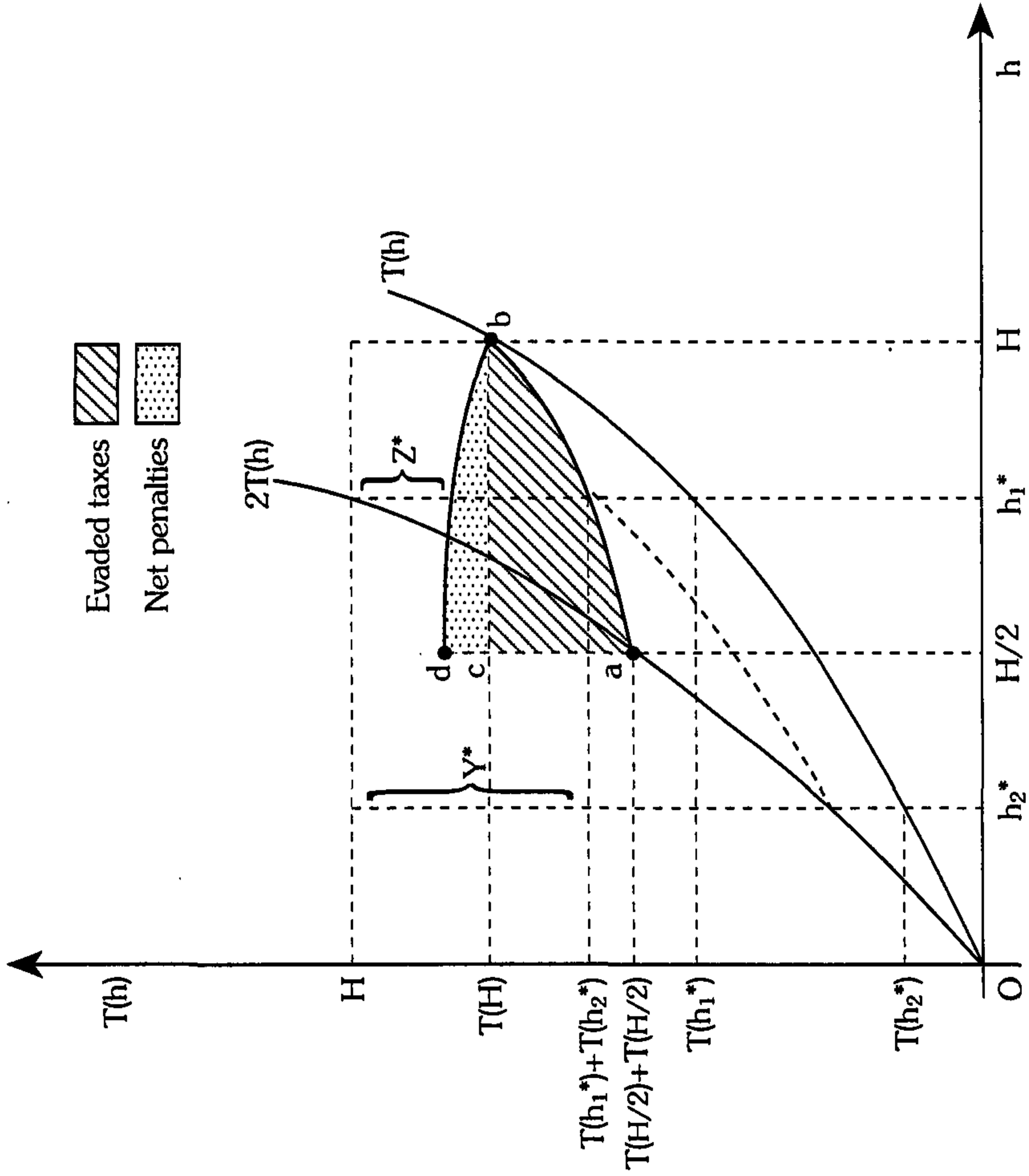


Figure 1: Tax evasion and the allocation of time

Maximizing expected utility with respect to h_2 , subject to (1')-(2'), the first-order condition for an interior optimum becomes (substituting $H - h_2$ for h_1)

$$\frac{d[EU]}{dh_2} = [T_h(\alpha, h_1) - T_h(\alpha, h_2)][(1-p)U'(Y) - (\delta-1)pU'(Z)] = 0, \quad (9')$$

which is obviously a variant of condition (9). Totally differentiating (9') with respect to h_2 and α , holding $T(H)$ intact, we obtain⁷

$$\frac{dh_2^*}{d\alpha} = \frac{T_\alpha(\alpha, h_1) + T_\alpha(\alpha, h_2)}{T_h(\alpha, h_1) - T_h(\alpha, h_2)} > 0, \quad (10)$$

so that an increase in α increases h_2^* , and

$$\frac{dT^w}{d\alpha} = T_\alpha(\alpha, h_1) + T_\alpha(\alpha, h_2) - [T_h(\alpha, h_1) - T_h(\alpha, h_2)] \frac{dh_2^*}{d\alpha} = 0. \quad (11)$$

Hence, the wage-earner responds to an increase in the amount withheld by shifting more hours to Job 2 such as to keep the amount withheld unchanged. Since the amount due is kept constant, tax evasion would remain at its

⁷This simple expression, which depends solely on derivatives of the tax function (rather than involving utility terms, as is usually the case in comparative static analysis of tax evasion models) is due to the fact that while $dh_2^*/d\alpha = - (d^2[EU]/dh_2d\alpha)/D$, where $D < 0$ is the second-order condition for the maximization of expected utility, the joint derivative of expected utility with respect to h_2 and α is, in this case, proportional to D . Specifically, $d^2[EU]/dh_2d\alpha = - [T_\alpha(\alpha, h_1) + T_\alpha(\alpha, h_2)]D / [T_h(\alpha, h_1) - T_h(\alpha, h_2)]$, where $D = [T_h(\alpha, h_1) - T_h(\alpha, h_2)][(1-p)U''(Z) + (\delta-1)pU''(Z)]$.

initial level (a shift from point e on ab to point e' on $a'b$ in Figure 2a). The skilful evader would thus foil any attempt to reduce his tax evasion through the increasing of tax withholding.

Consider now a change in the tax schedule such that the amount of taxes due is increased without affecting the amount withheld at the optimum. This is depicted in Figure 2b as a shift of the tax curve from $T(h)$ to $T(h)'$. Since the marginal tax rate increases at h_1^* and decreases at h_2^* , we intuitively expect the wage-earner to shift more hours from job 1 to job 2, increasing tax evasion. However, totally differentiating (9') with respect to h_2 and $T(H)$, holding T^w intact, reveals that

$$\frac{dh_2^*}{dT(H)} = - \frac{\delta(\delta-1)pU''(Z)}{[T'(h_1) - T'(h_2)][(1-p)U''(Y) + (\delta-1)^2pU''(Z)]} < 0, \quad (12)$$

so that an increase in $T(H)$ decreases h_2^* , and

$$\frac{dT^w}{dT(H)} = - [T'(h_1) - T'(h_2)] \frac{dh_2^*}{dT(H)} = \frac{\delta(\delta-1)pU''(Z)}{(1-p)U''(Y) + (\delta-1)^2pU''(Z)} > 0. \quad (13)$$

Hence, the wage-earner actually responds to an increase in the amount due by shifting hours back to Job 1, allowing for an increase in the amount withheld. However, since the amount due has increased as well, the effect on tax evasion depends on

$$\frac{d[T(H) - T^w]}{dT(H)} = 1 - \frac{dT^w}{dT(H)} = \frac{(1-p)U''(Y) - (\delta-1)pU''(Z)}{(1-p)U''(Y) + (\delta-1)^2pU''(Z)} = 0, \quad (14)$$

as the numerator must sum to zero at the optimum. Again we obtain, and

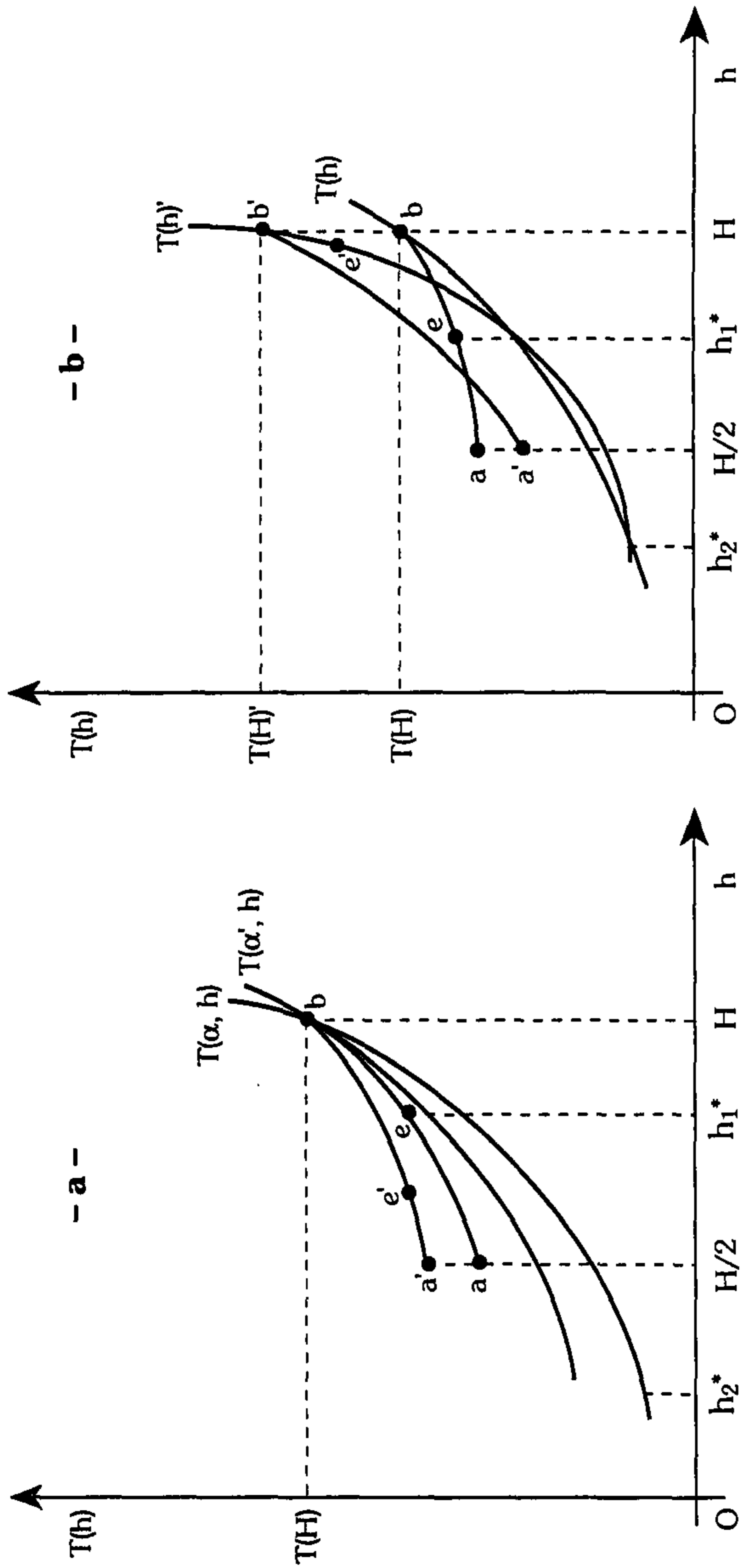


Figure 2: Changes in tax progressivity

contrary to intuition, that tax evasion remains intact (a shift from point e on ab to point e' on $a'b'$ in Figure 2b), this time due to the fact that the amount withheld increases, through a reallocation of H , by the same magnitude as does the amount due.

IV. EXACT VERSUS APPROXIMATE WITHHOLDING

After arguing that exact withholding is not evasion-proof, and demonstrating the robustness of the amount evaded to possible changes in progressivity, some insight into the relative magnitude of evasion under exact and approximate withholding is worth gaining. Suppose that the latter is carried out through the application of a standard withholding rate, t , to earnings, as is usually the case with taxes withheld at source on interest, dividends or annuities. Hence, nothing could be gained by splitting work efforts among more than one job. Still, given that the amount withheld falls short of the amount due (i.e., that t is set below the wage-earner's average tax liability), the *non-withheld* amount can be evaded by avoiding filing an end-of-year return.

A decision in favor of non-filing will be made if $EU = (1-p)U(Y) + pU(Z) > U(X)$, where Y and Z defined as in (1') and (2'), only now $T^w = tH$, and

$$X = H - T(H) \tag{15}$$

denotes legitimate net income. Expressing Y and Z in terms of X ,

$$Y = X + T(H) - T^w \tag{1''}$$

$$Z = X - (\delta-1)[T(H) - T^w] \tag{2''}$$

and approximating $U(Y)$ and $U(Z)$ by second-order Taylor expansions around

$U(X)$, the non-filing condition becomes (after rearranging)

$$R_A(X)[T(H) - T^w] < \phi(p, \delta), \quad (16)$$

where $R_A(X) = -U''(X)/U'(X) > 0$ is the Arrow-Pratt absolute risk-aversion measure, and $\phi(p, \delta) = 2(1-p\delta)/[1 - p\delta(2-\delta)]$.^a While the incentive not to file is greater the lower is risk-aversion at the legitimate net income level, or the lower are the law enforcement parameters (the penalty multiplier and the probability of detection), it is also, contrary to intuition, greater the closer is the amount withheld to the amount due. Evidently, the reduction in the gain from non-filing is outweighed by the reduction in the expected penalty.

To derive a condition on the withholding rate sufficient to induce non-filing, we adopt the frequently applied logarithmic utility function, $U = \ln X$. Substituting $R_A(X) = 1/X$ into (16) and rearranging, we obtain

$$t > [1 + \phi(p, \delta)]t^a - \phi(p, \delta) = t^0, \quad (16')$$

where $t^a = T(H)/H$ denotes the wage-earner's average tax liability. Since wage-earners may vary in H , and thus in t^a , the non-filing condition may hold for some (whose H is sufficiently low) and not for others. Given that all wage-earners are identical, the non-filing condition would either hold for all or for none. Obviously, the government could lower t sufficiently to eliminate non-filing. This, however, might be too low to conform with other objectives of tax withholding. To enable a comparison with tax evasion under exact withholding, suppose that t is set such that condition (16') holds.

^aNotice that $p\delta < 1$ is a prerequisite for non-filing, and that the denominator of $\phi(p, \delta)$ is positive, since subtracting from and adding p to it yields $1 - p + p(1-\delta)^2 > 0$.

Under exact withholding, the wage-earner, splitting his work efforts among several jobs, chooses his preferred withholding rate. Solving (9) for the logarithmic utility function, yields

$$t^* = \frac{(1-p)\delta}{\delta-1} t^a - \frac{1-p}{\delta-1}, \quad (17)$$

where $t^* = \Sigma T(h_i^*)/H$. If $t^* < t^a$, setting t in accordance with (16') ensures that despite non-filing, more taxes are withheld (thus less are evaded) under approximate withholding than under exact withholding. If, however, $t^* > t^a$, a prerequisite for which is

$$t^a < \frac{(\delta-1)\phi(p, \delta) - (1-p)}{(\delta-1)[1 + \phi(p, \delta)] - \delta(1-p)}, \quad (18)$$

more taxes would be withheld under approximate withholding if t is set above t^* . This would suffice to ensure that approximate withholding is not only less costly but also less evadable than exact withholding.

V. CONCLUDING REMARKS

We have examined some behavioral aspects of the tax-evading wage-earner under exact withholding, suggesting that the progressivity of the tax schedule may generate incentives to split work efforts among more than one job, while misinforming employers regarding employment elsewhere. A simplifying assumption underlying the analysis has been that the wage-earner is not eligible for any form of tax allowance. However, progressive tax schedules usually contain a wide variety of tax allowances, some of which may be claimed at source. Multiple-job holding with

misinformed employers might thus result in the unlawful receipt of multiple tax allowances. It may also result in the *foregoing* of tax allowances which can only be claimed upon filing a tax return. Tax systems usually vary in the scope of allowances that may be claimed at source, as well as in the type and structure of the allowances, which may take the form of tax exemptions or tax credits (or both). The former constitutes a deduction from taxable income (itemized or standard), whereas the latter constitutes a deduction from tax liability (refundable or nonrefundable). The model in this paper has been designed to capture only the property common to all exact withholding mechanisms, i.e., progressive marginal tax rates, without committing itself to a specific allowance. Its implications may (or may not) be sensitive to the provision of a particular allowance, depending on its form and claiming procedure. Considering, for example, a nonrefundable tax credit which may be claimed at source, the wage-earner's entry and optimum conditions would remain intact as long as his work effort endowment is sufficiently large to produce an allocation among jobs for which the net amount withheld by each employer is still positive. At the other extreme, if no tax at all is due at source, the tax function derivatives would disappear from the optimum condition, dissatisfying the entry condition into tax evasion. This is so since no taxes could be evaded by shifting an hour of work to another job. The wage-earner would only lose (if the other job pays a lower wage) or gain nothing (if the other job pays the same wage) from such reallocation.

Notice finally, that the rationale underlying multiple-job holding for the purpose of tax evasion is the same as that characterizing many tax avoidance decisions. A tax structure with increasing marginal rates, or with differential taxation of individuals or income sources, is known to generate a variety of tax shifting behaviors, some of which are perfectly legal. A taxpayer at a high marginal rate may attempt, for instance, to shift income to one with a low marginal rate (as is the case with parents shifting income to their children by giving them some assets), or to carry

out profitable business as a partnership rather than as a corporation.⁹ As demonstrated by Stiglitz (1985), most tax avoidance devices involve tax arbitrage manipulations which take advantage of the different rates at which different kinds of income or different individuals are taxed. While many of these activities are riskless, entailing legal maneuvers to reduce one's tax obligations, others are illegal, containing pure tax evasion. This is the case, for example, with fraudulently declaring a higher-taxed income as stemming from a lower-taxed source (Yaniv, 1990) or with laundering undeclared income (to make it appear as stemming from a tax-exempt source) at a unit cost lower than the regular tax rate (Yaniv, 1995b), as well as with the subject matter of this paper.

⁹Slemrod (1995) points out that the Tax Reform Act of 1986, which lowered the top personal tax rate from 50% to 28% and the basic corporation income tax rate from 46% to 34%, left the former below the latter for the first time in the history of the US income tax system. Consequently, it became more advantageous to shift income from one tax base to another, as indeed reflected by the surge in elections of a Subchapter-S status (under which shareholders are taxed as if they were partners), beginning in 1987.

REFERENCES

Baldry, J., 1993, Collusive income tax evasion in small business: A theoretical analysis, Paper presented at the 49th Annual Congress of the International Institute of Public Finance (Berlin, 1993).

Hagedorn, R., 1989, Withholding and non-withheld tax evasion: A comment, mimeo, Fernuniversitat Hagen, FRG.

Kay, J.A., and M.A. King, 1990, The British tax system (Oxford University Press, New York).

Peckman, J. A., 1983, Federal tax policy (The Brookings Institute, Washington, DC).

Slemrod, J., Income creating or income shifting? Behavioral responses to the Tax Reform Act of 1986, American Economic Review 85 (Papers and Proceedings), 175-180.

Stiglitz, J. E., 1985, The general theory of tax avoidance, National Tax Journal 38, 325-337.

Yaniv, G., 1988, Withholding and non-withheld tax evasion, Journal of Public Economics 35, 183-204.

Yaniv, G., 1990, Tax evasion under differential taxation: The economics of income source misreporting, Journal of public Economics 43, 327-337.

Yaniv, G., 1992, Collaborated employee-employer tax evasion, Public Finance / Finances Publiques 47, 312-321.

Yaniv, G., 1995a, A note on the tax-evading firm, National Tax Journal 48 113 -120.

Yaniv, G., 1995b, Tax evasion and the laundering decision, Paper presented at the 51st Annual Congress of the International Institute of Public Finance (Lisbon, 1995).



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