OPTIMAL INCOME TAXATION WITH MOBILITY BETWEEN THE LEGAL AND BLACK LABOUR MARKETS

X. Ruiz del Portal *

Abstract
This paper contributes to the literature on optimal income taxation with tax evasion by incorporating labour mobility between the legal sector and the black economy. The conclusions from the traditional analysis strongly contrast with those that result when extensive margin responses are taken into account. We find that individuals indifferent between working in either of the two sectors play a crucial role in determining both the marginal tax rate and the optimal policy against tax evasion. Likewise, technological changes affecting relative wages are influential in the choice for each labour market, by either boosting or lowering the benefits from tax evasion. Interestingly, it may be welfare improving under risk neutral preferences to permit the existence of a hidden sector where evasion is possible and marginal tax rates are higher.

Keywords: optimal income taxation; tax evasion; extensive margin responses.

JEL classification: C6-D6-D8-H2

1. Introduction
Tax evasion represents a major problem in most developed countries, as it imposes limits on the attainment of public policy goals such as income redistribution and economic stability. Strangely enough, while the issue of income redistribution constitutes one of the main focuses of optimal tax theory, most research in this area has been developed under the assumption that evasion decisions are inexistent.

An early exception was however the paper of Sandmo (1981), who formulated a model that captures the implications of income underreporting for redistribution through linear taxation. This enabled him to derive a formula for the marginal tax rate and a complete characterization of the instruments for the control of tax evasion, namely, the probability of detection, the penalty rate and the fine. Nevertheless, Sandmo (1981) simplified the analysis to two ability levels, one for non-evaders and another for evaders. On the other hand, in his setting non-evaders cannot elude tax, unlike evaders, who may or may not do it according to the magnitude of the policy parameters.

Of these simplifications Sandmo (1981, 2005) commented: “A more careful analysis would take the aggregation problem more seriously and base predictions on a model of many taxpayers, differing both with respect to their income and evasion opportunities.” And similarly: “The assumption that the relative size of the two groups is fixed is of course a simplification. In the long run one would like to assume that occupational choice would be influenced by the opportunities for tax evasion, so that the size and

* Department of Applied Economics/ University of Lleida (Spain). E-mail: rportal@econap.udl.cat
Cremer and Gahvari (1994) generalized Sandmo’s (1981) framework to multiple ability levels without imposing asymmetries among taxpayers as well as considered other important factors such as the role played by concealment technology. Even so, these extensions were made at the cost of considering quasi-linear in consumption utility, which is equivalent to the assumption of risk-neutral preferences.

In the present paper, Sandmo’s (1981) framework is extended to a continuum of earning abilities, without imposing any special restriction on the form of the utility function. In addition, thanks to the use of participation constraints, we allow both evaders and non-evaders to have the choice of working in either of two labour markets, regular and irregular, so that the size of each group is endogenously determined. Specifically, what the participation constraints express is that an individual will leave one of the labour markets if his utility is less than the one that would be obtained in the other labour market in terms of consumption, leisure and expected tax evasion benefits.

To the best knowledge of this author, no work on optimal income taxation uses our approach to incorporate the problem of tax evasion. While other studies such as Chander and Wilde (1998) and Richter and Boadway (2006) also deal with distributional concerns under a principal–agent setting, their analyses and the class of problem studied differ in a significant way from the ones considered here.

Among the advantages of our model, there is a superior allowance for the extensive margin than in previous studies of tax evasion. According to Sandmo (2012), the amount of tax evasion undertaken can be related either to the extent of non-compliance by the individual evader (the intensive margin) or to the number of taxpayers that engage in evasion (the extensive margin). In the literature, most attention has been devoted to the first approach, but the decision to work in the hidden economy must not be presupposed but predicted as a consequence of the model.

As another advantage, our model can explain different situations that are found in the real world. Thus, we may think that there is only one economic sector where everybody works as self-employed, so that people’s income derives exclusively from independent business activities. A second interpretation would be that the model describes two legal sectors, one where the audit rate equals one because taxpayers’ incomes are withheld by the employer, and another where there is self-employment. This is the case studied in Pestieau and Possen (1991), where individuals choose between being entrepreneurs, with opportunities for tax evasion, and wage earners, without them. The third possible situation consists of a legal sector that coexists with a hidden sector in which employees are free to declare their income according to their perceptions of risk, given the absence of withholding by employers. Although our attention focuses mainly on this third interpretation, most of the analysis in this paper applies as well to the other two with minor adaptations to their own specific environments.

Our results can be summarized as follows. From the perspective of individual behaviour, therefore without taking distributional aspects into account, the effects on the extensive margin of policy tools against evasion are more clear-cut than those on the intensive margin. In particular, any increase in the penalty rate, the fine and the
The probability of detection will immediately relax the evasion constraint of non-evaders while restricting the evasion constraint of evaders, thereby favouring a reduction in the number of evaders. This is appealing since, when there is a large mass of taxpayers almost indifferent between working in each labour market, public policy objectives may be achieved with just a moderate increase in the cost for inspections and the magnitude of penalties. The extensive margin effects of an increase in the marginal tax rate are however less obvious, except if taxpayers become risk neutral, since then such increase will unambiguously boost the number of evaders.

When social preferences about income distribution are further considered, the marginal tax rate, the penalty function and the frequency of audits should have positive marginal revenue, provided evasion constraints only bind at isolated points. Nevertheless, if the evasion constraint for non-evaders binds on any interval, or equivalently, if many non-evaders threaten to move to the informal sector, changes in the policy parameters may lead to negative marginal revenue. This finding means that it might be optimal to set the penalty and audit system above their revenue-maximizing levels, so as to prevent the potential migration of non-evaders to the informal sector.

We obtain in addition a new characterization revealing the existence of an optimum size for the hidden sector. Specifically, equilibrium conditions between the two labour markets require that, for each taxpayer, the gain (loss) in social utility plus the informational rent from working in the legal (black) market should not be inferior to the opportunity cost in terms of revenue from working in the black (legal) market. In this context, an interesting situation occurs when there are intervals of ability where the conditions are satisfied as equalities, thereby indicating that the government is indifferent about the particular labour market chosen (legal or black) by a large mass of taxpayers. This is because, in that case, small changes in the enforcement parameters will usually imply drastic variations in the groups of evaders and non-evaders.

Apart from this, the same characterization has been used to prove that any productivity improvement that boosts the wage rate in the legal sector will lower the number of evaders. This seems logical since the associated increase in the legal wage rate usually offsets the potential advantages from tax evasion in the hidden sector.

In order to explore how the size of the hidden sector is affected by changes in the enforcement parameters, we have considered the situation in which individuals display quasi-linear preferences and the government is utilitarian. Under these circumstances, it is shown that an increase (reduction) in the penalty rate, the fine or the frequency of audits unambiguously involves a reduction (increase) in the size of the hidden sector. The fact that under risk aversion the result does not work, despite that the propensity to evade taxes is lower in this case, may be explained because the income effects from changes in policy parameters, which are non-existent under risk neutral preferences, operate in the opposite direction through labour supply.

Concerning marginal tax rates, we derive a formula that captures the factors influencing them when the induced effects on the extensive margin are taken into account. Such a formula tells us that, even if the number of evaders is small, the marginal tax rate is no longer exclusively determined by equity-efficiency considerations. It is also decided by a third term, which suggests that tax rates crucially depend on those taxpayers who threaten to switch from one labour market to the other. This is so to the point that, still when everybody works in the regular labour market, marginal tax rates may differ from those that would result without the existence of an irregular labour market.
As to the question of if the presence of tax evasion is a reason for lower marginal tax rates, our answer is negative, as in the two-class model, although for different reasons. To be precise, the conclusion is ambiguous as the signs of the effects along the intensive and extensive margins sometimes coincide and sometimes differ. Therefore, nothing definite may be said without imposing structure on the utility and social welfare functions. In spite of this, the increased ambiguity that results can be viewed itself as an argument against the opinion that evasion justifies a reduction in tax rates.

With the aim of obtaining further insights into tax rates, we provide an explicit solution for the marginal tax rate in the special case when taxpayers are risk neutral and the government is Rawlsian. This enables us to check that the conclusion in Cremer and Gahvari (1994), according to which the marginal tax rate is lower with tax evasion, also holds in our model if no mobility between labour markets is at stake. However, when taxpayers may migrate to the other labour market, the final impact of tax evasion on marginal tax rates changes in a drastic way. In this sense, we have detected two cases where the effects through changes in the number of evaders dominate those produced through the extent of non-compliance, thereby calling for equal or even higher tax rates than in the absence of a hidden sector.

In this context, a relevant aspect also influencing the extensive margin responses is the existence of wage differences between the legal and hidden sector. Strikingly, it has been found that, in the most plausible case when there is a wage gap in favour of the legal sector, nobody chooses to work in the hidden sector and tax evasion is non-existent. This solution with zero tax evasion suggests that the assumption of risk neutral preferences is less realistic in models with variable labour supply and mobility between labour markets.

The same special case has also served to illustrate the welfare effects produced by tax evasion when there is mobility between labour markets. Most notably, the optimal tax policy in low technologically developed countries should permit some tax evasion in order to reduce the excess burden of taxation and use the extra revenues for redistribution. This can be explained because the government then ends up collecting more taxes and penalties from the most productive taxpayers. We thus discover that, under some circumstances, evasion may function as a beneficial policy tool in terms of social welfare. Needless to say that this insight could not have been obtained without mobility of taxpayers provided, in that case, the same optimal redistributive scheme would have fallen outside the policy maker’s sphere of action.

In section 2, we set up the model for both the taxpayer and the government. Sections 3, 4 and 5 analyze the effects on tax evasion, marginal revenue and the size of the hidden sector from changes in policy instruments. Section 6 deals with the derivation of a tax formula, discussing the properties of optimal tax rates in the presence of evasion. The quasi-linear utility case under maximin is studied in section 7. Our final comments are discussed in section 8. Most formal proofs can be found in the working-paper version (Ruiz del Portal, 2015).

2. Model and problem
The population is represented by a single parameter, \( \sigma \), which describes ability in efficiency hours. \( \sigma \) is distributed on \( [\sigma, \bar{\sigma}] \subseteq \mathbb{R}^+ \) according to a density function \( f(\sigma) \equiv F'(\sigma) > 0 \). While \( F(\sigma) \) is common knowledge, \( \sigma \) is considered private knowledge.

Let \( w' \) denote the hourly wage of a \( \sigma \) person who produces \( \sigma \) efficiency units per hour worked. Such a wage satisfies \( w' = \bar{\sigma} \cdot \sigma \), for \( \bar{\sigma} > 0 \) being the wage per efficiency hour.

Reported earnings to the tax authority \( w'L \) are subject to a linear tax schedule \( T(w'L) = -a + tw'L \), in which \( t \) represents the marginal tax rate and \( a \geq 0 \) a lump sum grant. Unreported earnings \( w'E \) are subject to a linear penalty schedule \( M(w'E) = -b + \theta w'E \), in which \( \theta \) represents the marginal penalty rate and \( b \) a fixed negative fine imposed when evasion is detected. It is assumed that \( \theta > t \) and \( M(0) = 0 \).

All individuals share the same preference ordering, which is captured by the von Neumann–Morgenstern utility function:

\[
EU^i = (1 - p)U(C^i_1, L^i + E) + pU(C^i_2, L^i + E)
\]  

(1)

In this expression, \( p \) denotes the probability of detection for tax evasion and \( U(C^i_1, L^i + E) \) a twice continuously differentiable, strictly quasi-concave sub-utility function. \( U(C^i_1, L^i + E) \) is assumed to be increasing in consumption \( C^i_1 \) and decreasing in hours worked \( L^i + E \). Concerning the functions \( C^i_1 \) and \( C^i_2 \), they reflect the alternative budget constraints when evasion is undetected and detected, respectively, i.e.

\[
C^i_1 = w'L^i(1 - t) + a + w'E
\]  

(2)

\[
C^i_2 = w'L^i(1 - t) + a + w'E + b - \theta w'E
\]  

(3)

There are two labour markets or sectors: a regular or formal one where there is no evasion and an irregular or informal one where evasion is possible. Individuals working in the regular sector are called “non-evaders” and will be identified by \( i \equiv n \); those working in the irregular sector are called “evaders” and will be labeled by \( i \equiv e \).

A) The regular labour market

In this market, we have \( p = 1 \) because total earnings are subject to withholding by the employers. Consequently, the maximization of (1) subject to (2) and (3) is equivalent to the maximization of \( U(C^n, L^n) \) subject to \( C^n = w^nL^n(1 - t) + a \).

Let \( \{C^n_\sigma, L^n_\sigma\} \) be the optimal bundle for non-evaders with ability \( \sigma \). The first-order conditions for incentive compatibility are therefore given by:

\[
U_C(C^n_\sigma, L^n_\sigma) - \lambda^n_\sigma = U_L(C^n_\sigma, L^n_\sigma) + \lambda^n_\sigma w^n(1 - t) = 0
\]  

(4)

where the Lagrange multiplier \( \lambda^n_\sigma \) can be identified as the marginal utility of income. From condition (4), we derive the indirect utility function:
with partial derivatives:

\[ V_i^n = -\lambda^n w^n L^n, \quad V_a^n = \lambda^n \]  \hspace{1cm} (6)

**B) The irregular labour market**

In this market \(1 > p \geq 0\), so tax evasion is possible and only detectable at a certain cost.

Evaders maximize their expected utility function (1) subject to constraints (2) and (3). If \(\{C^e_{1,\sigma}, C^e_{2,\sigma}; L^e_{\sigma}, E_{\sigma}\}\) depicts the solution for a \(\sigma\) evader, the Lagrangian will be given by

\[
Z^e_{\sigma} = EU^e_{\sigma} - \lambda^e_{\sigma,1}[C^e_{\sigma,1} - w^e L^e_{\sigma}(1-t) - a - w^e E_{\sigma}] \\
- \lambda^e_{\sigma,2}[C^e_{\sigma,2} - w^e L^e_{\sigma}(1-t) - a - b - w^e E_{\sigma} + \theta w^e E_{\sigma}] 
\] \hspace{1cm} (7)

where \(\lambda^e_{\sigma,1}\) and \(\lambda^e_{\sigma,2}\) are the Lagrange multipliers. The first-order conditions are:

\[
(1-p)U_C(C^e_{1,\sigma}, L^e_{\sigma} + E_{\sigma}) - \lambda^e_{\sigma,1} = 0, \hspace{1cm} (8)
\]

\[
pU_C(C^e_{1,\sigma}, L^e_{\sigma} + E_{\sigma}) - \lambda^e_{\sigma,2} = 0, \hspace{1cm} (9)
\]

\[
(1-p)U_L(C^e_{1,\sigma}, L^e_{\sigma} + E_{\sigma}) + pU_L(C^e_{2,\sigma}, L^e_{\sigma} + E_{\sigma}) + \lambda^e_{\sigma,1} w^e (1-t) + \lambda^e_{\sigma,2} w^e (1-t) = 0 \hspace{1cm} (10)
\]

\[
(1-p)U_E(C^e_{1,\sigma}, L^e_{\sigma} + E_{\sigma}) + pU_E(C^e_{2,\sigma}, L^e_{\sigma} + E_{\sigma}) + \lambda^e_{\sigma,1} w^e + \lambda^e_{\sigma,2} w^e (1-\theta) = 0 \hspace{1cm} (11)
\]

From the above conditions we get the expected indirect utility function:

\[
V^e(t, \theta, a, b, p, w^e) = (1-p)U(C^e_{1,\sigma}, L^e_{\sigma} + E_{\sigma}) + pU(C^e_{2,\sigma}, L^e_{\sigma} + E_{\sigma}) 
\] \hspace{1cm} (12)

with partial derivatives

\[
V_i^e = -\lambda^e_{\sigma,1} + \lambda^e_{\sigma,2} w^e L^e_{\sigma}; \quad V_a^e = \lambda^e_{\sigma,1} + \lambda^e_{\sigma,2} \hspace{1cm} (13)
\]

\[
V_{\theta}^e = -\lambda^e_{\sigma,2} w^e E_{\sigma}; \quad V_{\theta}^e = \lambda^e_{\sigma,2} \hspace{1cm} (14)
\]

\[
V_{\theta}^e = -U(C^e_{1,\sigma}, L^e_{\sigma} + E^e) + U(C^e_{2,\sigma}, L^e_{\sigma} + E_{\sigma}) 
\] \hspace{1cm} (15)

where \(V_i^e\) and \(V_{\theta}^e\) denote the expected marginal utility of income in states 1 and 2.

**C) The government’s problem**

\[
V^n(t, a, w^n) = U(C^n_{\sigma}, L^n_{\sigma}) 
\] \hspace{1cm} (5)
From now on, we associate any expression \( \tau_\sigma \Gamma_\sigma + (1-\tau_\sigma)\Gamma_\sigma^- \) to either a non-evader or an evader according to whether, at \( \sigma \), we have \( \tau_\sigma = 1 \) or \( \tau_\sigma = 0 \), respectively.

The government is concerned about the welfare of all individuals in the population, non-evaders and evaders, although this is done with intensities or weights \( \gamma^n \) and \( \gamma^e \), such that \( \gamma^n \geq \gamma^e \). The social welfare function is therefore formulated as:

\[
W = \int_{\mathbb{G}} \left[ \tau_\sigma \gamma^n \cdot G[V^n(t,a,w^n)] + (1-\tau_\sigma)\gamma^e \cdot G[V^e(t,\theta,a,b,p,w^e)] \right] dF(\sigma) \tag{SW}
\]

where social utility \( \gamma^i G(V^i) \) is assumed to be a twice differentiable, increasing and concave function of \( V^i \). Well-known cases are the utilitarian criterion \( G(V^i) = V^i \), the Bernoulli–Nash criterion \( G(V^i) = \log V^i \) and the Rawlsian criterion \( G(V^i) = \min_i V^i \).

Aside from (SW), the government must take account of the participation constraint that indirect utility for non-evaders should be no lower than their reservation utility (i.e. the indirect utility they would obtain if they worked in the irregular sector). To see why, let \( S^n_\sigma \) be the informational rent of \( \sigma \) persons, understood as the excess of their indirect utility over their reservation utility. Since the government ignores the values of \( \sigma \) such that \( S^n_\sigma = 0 \), the following condition is necessary and sufficient for working in the regular sector is:

\[
S^n_\sigma \equiv V^n(t,a,w^n) - V^e(t,\theta,a,b,p,w^e) \geq 0, \quad \forall \sigma : \tau_\sigma = 1 \tag{PC}
\]

By using an identical argument from the angle of evaders, the government will also have to take account of the following participation constraint, which we call exclusion constraint:

\[
S^e_\sigma \equiv V^e(t,\theta,a,b,p,w^e) - V^n(t,a,w^n) \geq 0, \quad \forall \sigma : \tau_\sigma = 0 \tag{EX}
\]

where \( S^e_\sigma \) stands for the informational rent of a \( \sigma \) evader.

Given that the audit strategy with evasion entails an additional deadweight loss of taxation, the following revenue constraint is also imposed on the government:

\[
R(t,\theta,a,b,p) - \varphi(p) \int_{\mathbb{G}} (1-\tau_\sigma) dF(\sigma) \geq \bar{R} \tag{RC}
\]

\[
R(t,\theta,a,b,p) = \int_{\mathbb{G}} \{ \tau_\sigma (-a+tw^n L^n_\sigma) + (1-\tau_\sigma)[-a+tw^e L^e_\sigma + p(b+\theta w^e E_\sigma)] \} dF(\sigma)
\]

The constraint (RC) states that \( \bar{R} \), a per-capita income that is not redistributed, must be covered by total revenue \( R(t,\theta,a,b,p) \) net of the cost of inspections \( \varphi(p) \int_{\mathbb{G}} (1-\tau_\sigma) dF(\sigma) \).

Here, \( \varphi(\cdot) \) depicts the average unitary cost of inspections, an exogenously given function satisfying \( \varphi'(p) > 0 \) and \( \varphi''(p) \geq 0 \).
The problem faced by the government can now be formulated as

**Setup 1** Find the parameters \( t, a, \theta, b \) and \( p \), together with the function \( \tau_\sigma \), that maximize \( (SW) \) subject to constraints \( (PC) \), \( (EX) \) and \( (RC) \).

### 3. Intensive and extensive margins

In this section, we compare the intensive and extensive margin responses of labour supply (both regular and irregular) to changes in each of the policy parameters.

**A) Intensive margin**

Attention is focused on the amount of hours worked in either the legal or the shadow sector. More specifically, we are interested in the effects produced by variations in \( t, a, \theta, b \) and \( p \) on \( E_\sigma \) versus those produced on \( L_\sigma \), for \( i = \{n, e\} \).

Following the approach based on the expenditure function, it is easily checked that the resulting Slutsky equations coincide with those in Sandmo (1982, pp. 272–273) for each value of the ability rate. In particular, regarding \( t \) and \( \theta \) we have:

\[
\frac{\partial L_\sigma}{\partial t} = -w^L L_\sigma \frac{\partial L_\sigma}{\partial a} + \frac{\partial L_\sigma}{\partial t} \bigg|_{a-\text{comp}} \tag{16}
\]

\[
\frac{\partial E_\sigma}{\partial \theta} = -w^E E_\sigma \frac{\partial E_\sigma}{\partial b} + \frac{\partial E_\sigma}{\partial \theta} \bigg|_{b-\text{comp}} \tag{17}
\]

The first term on the right of these expressions is the income effect, while the second is the substitution effect. By pursuing, as in the two-class model, the analogy with Diamond and Yaari’s (1972) two-period model of portfolio consumption decisions, the following unambiguous responses stem from equations (16) and (17):

\[
\frac{\partial L_\sigma}{\partial t} \bigg|_{a-\text{comp}} < 0; \quad \frac{\partial E_\sigma}{\partial \theta} \bigg|_{b-\text{comp}} < 0 \tag{18}
\]

These results were obtained by Sandmo (1981) and need therefore no further discussion. The problem is that, since it is reasonable to expect that labour supply decreases with lump sum income (i.e. \( \partial L_\sigma/\partial a < 0 \) and \( \partial E_\sigma/\partial b < 0 \)), no firm conclusion may be drawn concerning the signs of \( \partial L_\sigma/\partial t \) and \( \partial E_\sigma/\partial \theta \), in the light of equations (16) and (17).

Concerning \( \partial L_\sigma/\partial \theta \), \( \partial E_\sigma/\partial t \), \( \partial L_\sigma/\partial p \) and \( \partial E_\sigma/\partial p \), their signs are unclear even in the absence of income effects. These indeterminacies have been stressed, in the context of other models, by Andersen (1977), Baldry (1979), Pencavel (1979) and Cowell (1981).

**B) Extensive margin**

In our model, the extensive margin effects are measured through the function \( \tau_\sigma \), which in turn depends on the interaction of constraints (PC) and (EX). It should be observed in
any case that the corner solution $E_\sigma = 0$ becomes impossible whenever $w^e < w^n$, since then $(1-p)U(w^eL^e_\sigma(1-t) + a, L^e_\sigma) + pU(w^eL^e_\sigma(1-t) + a + b, L^e_\sigma) < U(w^nL^n_\sigma(1-t) + a, L^n_\sigma)$, so evaders $\sigma$ would improve their situation by working $L^e_\sigma$ hours in the regular sector. The advantage of this is that, unless $w^e = w^n$, mobility from the legal to the hidden sector always implies responses along the extensive margin, as the performance of irregular labour ($L^e_\sigma + E_\sigma > 0$) always involves tax evasion ($E_\sigma > 0$). Notwithstanding this, we will not make any assumption about the relative magnitudes of $w^n$ and $w^e$ until section 7, in which we analyze in detail an example under different wage gaps.

The next result, which derives directly from equations (14) and (15), reflects how extensive margin responses manifest in the face of changes in the audit and penalty system.

**PROPOSITION 1** Informational rents in each labour market satisfy:

$$\frac{\partial S^e_\sigma}{\partial \theta} = \frac{\partial S^e_\sigma}{\partial b} = V^e_\theta > 0; \quad \frac{\partial S^e_\sigma}{\partial b} = \frac{\partial S^e_\sigma}{\partial b} = V^e_\theta < 0$$

(19)

$$\frac{\partial S^e_\sigma}{\partial p} = \frac{\partial S^e_\sigma}{\partial p} = V^e_p > 0$$

(20)

Conditions (19) and (20) imply that an increase in $\theta$ and $p$, as well as a reduction in $b$, will produce a flow from the black to the regular sector of those taxpayers whose informational rents are zero (namely, their evasion constraints are binding).

The conclusion that arises after comparing the results in (18) and Proposition 1 is that the effectiveness of policy tools against evasion is more obvious regarding their impact along the extensive margin than along the intensive margin. Not only are the results in the last case less abundant, but they are also mainly expressed in terms of substitution effects, therefore ignoring income effects. Contrarily, conditions (19) and (20) clearly express the relaxation of constraint (PC) and the activation of constraint (EX).

Concerning the effects from changes in $t$ and $a$, we use conditions (6) and (14) to obtain:

$$\frac{\partial S^e_\sigma}{\partial t} = \frac{\partial S^e_\sigma}{\partial t} = -\lambda^e_\sigma w^n I^n_\sigma + (\lambda^e_\sigma,1 + \lambda^e_\sigma,2)w^e L^e_\sigma$$

(21)

$$\frac{\partial S^e_\sigma}{\partial a} = \frac{\partial S^e_\sigma}{\partial a} = \lambda^e_\sigma - \lambda^e_\sigma,1 - \lambda^e_\sigma,2$$

(22)

In principle, one cannot sign these expressions without imposing structure on the utility function. This motivates sub-section C.

**C) Quasi-linear in consumption utility function**

Suppose that the sub-utility function in (1) satisfies
\[ U(C^i, L^i + E) = C^i + \log(1-L^i - E) \]  

(23)

where \( E = 0 \) if \( i = n \). Note that (23) implies that taxpayers are risk neutral. Given the absence of income effects in this case, we may write in light of (18):

\[
\frac{\partial L_\sigma}{\partial t} < 0; \quad \frac{\partial E_\sigma}{\partial \theta} < 0
\]

(24)

In the next sections we shall make use of the fact that, in the present case, the first-order conditions (4) and (8)–(11) turn out to be:

\[
\lambda_\sigma^i = 1; \quad \lambda_{\sigma,1}^e = 1 - p; \quad \lambda_{\sigma,2}^e = p \]

(25)

\[-(1-L_\sigma^e)^{-1} + w^e(1-t) = 0 \]

(26)

\[-(1-L_\sigma^e - E_\sigma^e)^{-1} + w^e(1-t) = -(1-L_\sigma^e - E_\sigma^e)^{-1} + w^e(1-p\theta) = 0 \]

(27)

From (26) and (27), we obtain:

\[ w^e L_\sigma^e = \varepsilon \sigma + w^e (L_\sigma^e + E_\sigma^e) \]

(28)

\[ t = p\theta \]

(29)

Note that condition (29) ensures the existence of an interior solution for evaders, i.e. \( L_\sigma^e > 0 \) and \( E_\sigma > 0 \). Finally, we also note that in this case conditions (21) and (22) reduce to

\[ \frac{\partial S_\sigma^e}{\partial t} = -\frac{\partial S_\sigma^e}{\partial t} = -(w^e E_\sigma + \varepsilon \sigma) < 0 \quad \text{for} \ \varepsilon \geq 0 \]

(30)

\[ \frac{\partial S_\sigma^e}{\partial a} = -\frac{\partial S_\sigma^e}{\partial a} = 0 \]

(31)

Condition (30) states that, whenever there is a wage gap in favour of the legal economy, an increase in \( t \) will always boost the number of evaders. This and conditions (24) constitute the entire responses along both the extensive and intensive margins.

### 4. Effects from changes in the policy parameters on tax revenues

A natural question is how high should the policy parameters be? One possible answer is that, same as required in Richter and Boadway (2006), they should be chosen to maximize revenue from taxes and penalties. Another answer could be that policy parameters should be raised below their revenue-maximizing levels. Both possibilities arise as a logical feature of the solution in the two-class model.

However, what seems to be much less intuitive in principle is the prescription that the penalty and audit rates should be set above their revenue-maximizing levels. On this, Adam Smith in his Wealth of Nations wrote: “...and other penalties which those unfortunate individuals incur who attempt unsuccessfully to evade the tax, it may
frequently ruin them, and thereby put an end to the benefit which the community might have received from the employment of their capitals”.

Now let us see what happens in our model when mobility between markets is possible. We shall distinguish two cases, according to whether the migration constraints may bind on isolated points or on a set of intervals.

**A) Constraints (PC) and (EX) may only bind at isolated points**

If \( \gamma^e > 0 \), we are back (see the Appendix) to conditions (45) in Sandmo (1981), i.e.

\[
\frac{\partial R}{\partial t} > 0; \quad \frac{\partial R}{\partial \theta} > 0; \quad \frac{\partial R}{\partial b} < 0; \quad \frac{\partial R}{\partial p} - \phi'(p) \int_{\tau^e}^{\infty} (1 - \tau_\sigma) dF(\sigma) > 0 \quad (32)
\]

These inequalities indicate that \( t, \theta \) and \( p \) should have positive marginal revenue, while \( b \) negative marginal revenue. Otherwise, if the inequalities were reversed the situation would be non-optimal since a distortion could be reduced at no cost by lowering \( t, \theta \) and \( p \), or by raising \( b \), and the revenue collected could be used for lump sum redistribution.

In case \( \gamma^e = 0 \), inequalities (32) turn into equalities:

\[
\frac{\partial R}{\partial \theta} = 0; \quad \frac{\partial R}{\partial b} = 0; \quad \frac{\partial R}{\partial p} = \phi'(p) \int_{\tau^e}^{\infty} (1 - \tau_\sigma) dF(w) \quad (33)
\]

Conditions (33) emphasize the fact that, in the limiting case when evaders’ welfare does not count, the enforcement instruments should be raised to maximize revenue, since the money collected from evaders can be used to reduce the tax burden on non-evaders.

**B) Constraints (PC) and (EX) bind on intervals of values of \( \sigma \)**

The necessary conditions turn out to be in this case (see the Appendix): \(^2\)

\[
\frac{\partial R}{\partial \theta} + \int_{\tau^e}^{\infty} (1 - \tau_\sigma) \tau_\sigma \frac{\partial S^u_\sigma}{\partial \theta} + \frac{\partial S^e_\sigma}{\partial \theta} d\sigma \geq 0 \quad (34)
\]

\[
\frac{\partial R}{\partial b} + \int_{\tau^e}^{\infty} (1 - \tau_\sigma) \tau_\sigma \frac{\partial S^u_\sigma}{\partial b} + \frac{\partial S^e_\sigma}{\partial b} d\sigma \leq 0 \quad (35)
\]

\[
\frac{\partial R}{\partial p} - \phi'(p) + \int_{\tau^e}^{\infty} (1 - \tau_\sigma) \tau_\sigma \frac{\partial S^u_\sigma}{\partial p} + \frac{\partial S^e_\sigma}{\partial p} d\sigma \geq 0 \quad (36)
\]

In light of conditions (19) and (20), plus the fact that \( \mu > 0, \pi^u_\sigma \geq 0 \) and \( \pi^e_\sigma \geq 0 \), it is obvious that, on intervals where non-evaders are almost indifferent between working in either of the two labour markets, it may be optimal to set \( \theta, -b \) and \( p \) above their revenue-maximizing levels. An example of this possibility is contained in Proposition 2.

---

1 This quote has been borrowed from Sandmo (2004, pg. 25).

2 \( \pi^u_\sigma \) and \( \pi^e_\sigma \) represent for all \( \sigma' \geq \sigma \) the shadow prices of a uniform marginal increase in \( V^e(i, \theta, a, b, p; w^e) \) where \( \tau_\sigma = 1 \) and in \( V^u(i, a, w^u) \) where \( \tau_\sigma = 0 \), respectively.
**PROPOSITION 2** If $\gamma^e = 0$ and there are many non-evaders threatening to work in the shadow sector while only few evaders threatening to work in the legal sector:

\[
\frac{\partial R}{\partial \theta} < 0; \quad \frac{\partial R}{\partial b} > 0; \quad \frac{\partial R}{\partial p} - \varphi'(p) < 0
\]  

(37)

5. Tax evasion and the size of the hidden economy

The results in sections 3 and 4 do not take account of the whole set of distributional effects from changes in $t$, $\theta$, $b$ and $p$. Owing to this, the next sections focus instead on what can be learnt from the perspective of optimal tax theory.

A) Equilibrium conditions in the two labour markets

**PROPOSITION 3** The following maximum conditions are necessary for Setup 1:

\[
\tau_\sigma = 1 \text{ if: } \Phi^u_\sigma \equiv \left[ \gamma^u G(V^n(\cdot, w^n)) - \gamma^e G(V^e(\cdot, w^e)) \right] f(\sigma) + \pi^u_\sigma S^u_\sigma \\
\geq \Psi^u_\sigma \equiv \mu [tw^n L^u_\sigma + tw^e L^e_\sigma - pb + p \theta w^e E_\sigma - \varphi(p)] f(\sigma) \tag{38}
\]

\[
\tau_\sigma = 0 \text{ if: } \Phi^e_\sigma \equiv \left[ \gamma^u G(V^n(\cdot, w^n)) - \gamma^e G(V^e(\cdot, w^e)) \right] f(\sigma) + \pi^e_\sigma S^e_\sigma \\
\geq \Psi^e_\sigma \equiv \mu [tw^n L^u_\sigma - tw^e L^e_\sigma + pb - p \theta w^e E_\sigma + \varphi(p)] f(\sigma) \tag{39}
\]

Conditions (38) and (39) characterize the optimal share in GDP of the irregular labour market as a function of the regular labour market. The interpretation is that taxpayer $\sigma$ should work in either of the two markets provided the sum of the social and private gains exceeds the net revenue gain if working in the other market.\(^3\)

An interesting situation arises when there are intervals of values of $\sigma$ where (38) and (39) are satisfied as equality, therefore indicating that society is indifferent about the particular labour market (regular or irregular) chosen by a large mass of taxpayers. This is because, in that case, small changes in $\theta$, $b$ and $p$ will customarily imply drastic variations in the relative size of each labour market.

B) Effects from technological improvements in the legal economy

**PROPOSITION 4** Suppose that technological changes lead to an increase in $w^n$. Then

\[
\frac{\partial(\Phi^u_\sigma - \Psi^u_\sigma)}{\partial w^n} > 0; \quad \frac{\partial(\Phi^e_\sigma - \Psi^e_\sigma)}{\partial w^n} < 0
\]  

(40)

Expressions (40) imply that, while inequality (38) is relaxed, inequality (39) is stricter, thus proving that any technological improvement in the regular sector reduces the size

---

\(^3\) Note that here the multipliers $\pi^u_\sigma$ and $\pi^e_\sigma$ operate where $\tau_\sigma = 0$ and $\tau_\sigma = 1$, respectively.
of the hidden sector and, therefore, the number of evaders. Anyway, Proposition 4 suggests that the size of the hidden economy is ceteris paribus inversely correlated with whatever wage gap in favour of the legal economy.

C) Quasi-linear in consumption utility function

**PROPOSITION 5** When utility is quasi-linear in consumption and the government’s preferences are utilitarian in the classical sense, so that \((\gamma^n + \gamma^e)G' = 1\), we have:

\[
\frac{\partial (\Phi^g - \Psi^g)}{\partial \theta} > 0; \quad \frac{\partial (\Phi^e - \Psi^e)}{\partial \theta} < 0; \quad \frac{\partial (\Phi^g - \Psi^g)}{\partial b} < 0 \\
\frac{\partial (\Phi^g - \Psi^g)}{\partial b} > 0; \quad \frac{\partial (\Phi^e - \Psi^e)}{\partial p} > 0; \quad \frac{\partial (\Phi^e - \Psi^e)}{\partial p} < 0
\]

(41)

(42)

Proposition 5 presents a case where enforcement tools against evasion prove to be effective for reducing the hidden economy, even when distributional concerns are taken into account.

6. An optimal tax formula

An important contribution in Sandmo (1981) was the derivation of the formula:

\[
t = A - B
\]

\[
A = \frac{\operatorname{cov}(w^L, \delta^i)}{\mu w^i \partial L^i / \partial t}_{\text{a-comp}}; \quad B = p \theta \sum N^e \frac{w^e (\partial E / \partial a)|_{\text{a-comp}} - w^e (\partial E / \partial a)(w^L - \bar{w}^L)}{w^L / \partial t}_{\text{a-comp}}
\]

where \(\delta^i\) represents the net social marginal utility of income, the bar indicates a weighted arithmetic average and summation is over \(n\) and \(e\) (e.g.: \(\Omega' = \Omega' + \Omega'\)).

In this formula, the term \(A\) describes the equity-efficiency trade-off and the term \(B\) those aspects linked to evasion, i.e. the proportion of evaders and their labour supply reactions to tax changes under income and substitution effects. If the number of evaders is small, the marginal tax rate is determined by equity and efficiency factors while the control of tax evasion is left to the penalty and audit system. If the number of evaders is large, the marginal tax rate must be corrected according to the magnitude of the term \(B\).

In our case, if integration is taken over \(n\) and \(e\) and we include in \(\tau^i\) the notation \(\tau^n = \tau^e = 1 - \tau^e\), the parallel formula to (43) is established by Proposition 6.

**PROPOSITION 6** Let \(\delta^i = \gamma^G + \mu w^i \frac{\partial L^i}{\partial a}\). Then, the marginal tax rate is given by

\[
t = A - B - C
\]

(44)
where: \[ A = \frac{\text{cov}(w^s L^\sigma_\sigma, \delta^\sigma)}{\mu w^s \partial L^\sigma_\sigma / \partial t} \]; \[ C = \int_\sigma ^\tau \tau^\sigma_\sigma \partial \left[ \partial S^\sigma_\sigma / \partial \tau \right] + \left( \partial S^\sigma_\sigma / \partial \alpha \right) w^s L^\sigma_\sigma d\sigma \]
\[ B = p \theta \partial \left[ \int_\sigma ^\tau (1-\tau^\sigma_\sigma) \sigma \left( \partial E^\sigma_\sigma / \partial \tau \right) \right] - \left( \partial E^\sigma_\sigma / \partial \alpha \right) (w^s L^\sigma_\sigma - w^s L^\sigma_\sigma) dF(\sigma) \]

\[
A) \text{ Discussion}
\]

Although our formula retains some of the basic features in (43), it also displays a term \( C \) expressing that \( t \) crucially depends on sets of taxpayers who threaten to move from one market to the other. An immediate consequence is that the findings for the two-class model about the features of an optimal tax system with tax evasion extend to a continuum of taxpayers and mobility between labour markets, provided the migration constraints only bind at isolated points. However, if the (PC) and (EX) constraints bind on a \( \sigma \) set that contains intervals, the marginal tax rate will be modified given that, on such intervals, either \( \tau^\sigma_\sigma \pi^\sigma_\sigma > 0 \) or \( (1-\tau^\sigma_\sigma) \pi^\sigma_\sigma > 0 \) (or both).

\[
B) \text{ Marginal tax rates when everybody works in the regular sector}
\]

In the absence of evaders, i.e. if \( \tau_w = 1 \) everywhere, formula (44) reduces to
\[
t = \frac{\text{cov}(w^s L^\sigma_\sigma, \delta^\sigma)}{\mu w^s \partial L^\sigma_\sigma / \partial t} - \int_\sigma ^\tau \pi^\sigma_\sigma \left[ \left( \partial S^\sigma_\sigma / \partial \tau \right) + \left( \partial S^\sigma_\sigma / \partial \alpha \right) w^s L^\sigma_\sigma \right] d\sigma
\]

This expression tells us that, whenever \( \pi^\sigma_\sigma S^\sigma_\sigma = 0 \) on some \( \sigma \) set of intervals, since then \( \pi^\sigma_\sigma > 0 \) there, \( t \) will still be affected by the presence of taxpayers threatening to work in the irregular sector. Consequently, in economies where evasion is negligible the marginal tax rate may be different than it would have been without an irregular sector.

\[
C) \text{ Is tax evasion an argument for lower marginal tax rates?}
\]

Aside from Cremer and Gahvari (1994) and a few others for special cases, the literature does not yield clear-cut evidence in favour of a lower marginal tax rate.\(^4\) Regarding formula (44), it even reinforces this conclusion since, to the effects along the intensive margin, captured by the term \( B \), we have to add those along the extensive margin, captured by the term \( C \) and its influence on the term \( B \) through the function \( \tau^\sigma_\sigma \). Sometimes their signs will coincide, sometimes their signs will differ. Much more than this cannot be said without imposing structure, as done in the next section, on the utility and social welfare functions. Precisely, this increased ambiguity in formula (44) due to the extensive margin effects may be viewed as an additional argument against the opinion that evasion justifies lower tax rates.

\(^4\) See in this respect Slemrod and Yitzhaki (2002, p. 1447).
7. An example with extreme inequality aversion

Formula (44) does not provide an explicit solution for \( t \). The aim of this section is to explore how marginal tax rates and maximum social welfare are affected by the presence of evasion. With this purpose, it will be assumed that the utility function adopts the quasi-linear form in (23) and the government has Rawlsian preferences. Since \( \gamma^n = 0 \) in this case, we may simplify the notation by making \( \gamma^n = 1 \). In addition, for tractability reasons we suppose that all individuals are working. Note that all this implies that the maximand in Setup 1 coincides with \( V^n(t, a, w^n) \), where \( w^n = \widetilde{\omega}^n \).

A) An explicit solution for the optimal tax rate

From now on, a zero superscript will indicate evaluation in the absence of an informal sector, therefore without tax evasion. In this situation, an explicit solution for \( t^0 \) is given by the (easily obtainable) formula:

\[
\frac{t^0}{(1-t^0)^2} = \int_\mathcal{E} (w-w)dF(\sigma)
\]

The counterpart of formula (46) is contained in Proposition 7.

**PROPOSITION 7** Under Rawlsian preferences and quasi-linear in consumption utility:

\[
\frac{t}{(1-t)^2} = \frac{t^0}{(1-t^0)^2} - \int_\mathcal{E} (1-\tau_\sigma)(w^\sigma E_\sigma + \varepsilon \sigma)dF(\sigma)
\]

\[
- \int_\mathcal{E} [\tau_\sigma \pi^\sigma - (1-\tau_\sigma)\pi^\sigma_e] (w^\sigma E_\sigma + \varepsilon \sigma)d\sigma
\]

By comparing expressions (46) and (47), we observe that the possibility of tax evasion makes the marginal tax rate to depend on several new factors: the number of evaders, the amount of irregular income, the wage gap and the shadow prices in each sector.

B) No mobility between labour markets (only intensive margin responses)

Provided the utility function is quasi-linear in consumption, Cremer and Gahvari (1994) characterized the class of social welfare functions that actually implies a lower tax rate under evasion. Such a characterization is defined by those social utility functions \( G(U) \) satisfying \( G'' < 0 \). The meaning is that society feels less concerned with redistribution as its members become poorer. However, as observed by Cremer and Gahvari (1994), many social welfare functions violate \( G'' < 0 \) (e.g., those satisfying \( G = U^r, \gamma < 1 \)).

To make our results comparable to those in Cremer and Gahvari (1994), suppose that migration constraints are absent, so that, as in Sandmo (1981), there is no mobility between both labour markets. Then, \( \tau_\sigma \) is fixed and formula (47) reduces to

\[
\frac{t}{(1-t)^2} = \frac{t^0}{(1-t^0)^2} - \int_\mathcal{E} (1-\tau_\sigma)(w^\sigma E_\sigma + \varepsilon \sigma)dF(\sigma)
\]

\[
\frac{t}{(1-t)^2} = \frac{t^0}{(1-t^0)^2} - \int_\mathcal{E} (1-\tau_\sigma)(w^\sigma E_\sigma + \varepsilon \sigma)dF(\sigma)
\]

\[
\frac{t}{(1-t)^2} = \frac{t^0}{(1-t^0)^2} - \int_\mathcal{E} (1-\tau_\sigma)(w^\sigma E_\sigma + \varepsilon \sigma)dF(\sigma)
\]

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Condition (48) confirms for the Rawlsian case and differences in wages in the two sectors Cremer and Gahvari’s (1994) result that the marginal tax rate is lower under tax evasion. Note in this sense that the additional integral term in the right-hand side of equation (48) reflects vis-à-vis equation (46) the aggregated efficiency cost imposed both by irregular labour and the wage gap between both labour markets. Now we shall see that, with mobility between labour markets, the solution for \( t \) and \( W \) differs significantly from that in equation (48).

C) **Overall effects (intensive and extensive margin)**

**Case** \( w^n > w^e \)

This is perhaps the most plausible situation since it means that the value of the marginal productivity of labour in the hidden sector is lower than that in the legal sector, i.e. \( w^n - w^e = \tilde{\omega}n - \tilde{\omega}e = \varepsilon \sigma > 0 \), or equivalently, \( n = \tilde{n} = \varepsilon > 0 \). Its justification lies in that production in the hidden sector is usually less capital intensive than in the legal sector. Note that this implies that tax evasion introduces a loss of efficiency, as it encourages more skilled workers to migrate to less efficient jobs.

Using conditions (28) and (29), it is clear that \( V^n(t, a, w^n) - V^e(t, \theta, a, b, p, w^e) > 0 \) everywhere. Hence, \( \tau_w = 1 \) and \( \pi^w_w = \pi^e_w = 0 \), so \( t = t^0 \) and \( a = a^0 \) by formula (47) and constraint (RC). This means that maximum welfare satisfies:

\[
V^n(t, a, w^n) = V^n(t^0, a^0, w^n) \tag{49}
\]

where \( V^n(t^0, a^0, w^n) = w^n(1-t^0) - 1 + a^0 \) and \( V^n(t, a, w^n) = w^n(1-t) - 1 + a \), by condition (26).

**Case** \( w^n < w^e \)

This possibility is not at all implausible. It corresponds to the interpretation commented in the Introduction, according to which opportunities to underreport taxable income serve as incentives for the occupational choice between wage work and self-employment. Here it makes sense to suppose that \( w^e \) corresponds to the wage rate of liberal professionals such as doctors, dentists, lawyers, architects, engineers, etc. Also, the parameter \( -b \) may be viewed in this case as a license fee to be paid for establishing as an entrepreneur or service provider. Recall in this respect that, in most countries, the government regulates the population that will work as self-employed.

If \( w^n < w^e \), then \( V^n(t, a, w^n) - V^e(t, \theta, a, b, p, w^e) = \varepsilon \sigma (1-t) - pb \) by conditions (28) and (29). Since \( \varepsilon \sigma (1-t) - pb \) is increasing in \( \sigma \), there will exist a \( \sigma^* \) such that below it \( V^n(t, a, w^n) - V^e(t, \theta, a, b, p, w^e) > 0 \), \( \tau_w = 1 \) and \( \pi^w_w = 0 \), while above it \( V^n(t, a, w^n) - V^e(t, \theta, a, b, p, w^e) < 0 \), \( \tau_w = 0 \) and \( \pi^e_w = 0 \). As a result, formula (47) reduces to

\[
\frac{t}{(1-t)^2} = \frac{t^0}{(1-t^0)^2} - \int_{\sigma^*}^{\infty} \text{w^e E}_\sigma + \varepsilon \sigma \text{d}F(\sigma) \tag{50}
\]
Whenever $w^e E_\sigma > -\sigma_\sigma$, we have $t < t^0$ since $t/(1-t)^2$ and $t^0/(1-t^0)^2$ are increasing in $t$ and $t^0$. When instead $w^e E_\sigma < -\sigma_\sigma$, equation (50) leads to $t > t^0$.

**Case** $w^n = w^e$ ($\equiv w$)

If $b < 0$, the solution coincides with that without a hidden sector, as may be checked. Therefore, maximum welfare satisfies $V^n(t,a,w) = V^n(t^0,a^0,w)$.

If instead $b = 0$, then $V^n(t,a,w) - V^e(t,\theta,a,b,p,w) = 0$, $\pi^n_\sigma \geq 0$ and $\pi^e_\sigma \geq 0$. Moreover, in the Appendix it is shown that, for a low degree of technological development\(^5\) (i.e. for a low value of $\tilde{\omega}$), the following two inequalities must hold:

\[
\int \frac{\sigma}{E_\sigma} \left( 1 - \tau_\sigma \right) w E_\sigma dF(\sigma) + \int E_\sigma \left[ \tau_\sigma \pi_\sigma^2 - (1-\tau_\sigma) \pi_\theta^2 \right] w E_\sigma d\sigma > 0
\]

\[V^n(t,a,w) > V^n(t^0,a^0,w)\]

**D) Interpretation**

If something may be learnt from the preceding analysis is that, when there is mobility between the formal and informal sectors, optimal policies are strongly influenced by differences in relative wage rates. This is so, at least, under risk neutral utility and Rawlsian preferences.

When $w^n > w^e$, marginal tax rates, lump sum grants and maximum levels of welfare coincide with those that arise without an irregular sector. As a consequence of this, tax evasion is always undesirable and there is no irregular sector at all. Anyway, since case $w^n > w^e$ is the most plausible one, solution (49) with zero tax evasion suggests that the assumption of risk neutral preferences is not realistic in models with variable labour supply, where such an assumption involves no income effects.

When $w^n < w^e$, the conclusions differ according to whether irregular income exceeds or is lower than the wage gap between the two labour markets. In the first case, our analysis confirms for the Rawlsian case and mobility of taxpayers Cremer and Gahvari’s (1994) result that the marginal tax rate is lower under evasion. In the second, our analysis contradicts the widely extended opinion that evasion justifies lower marginal tax rates.

Case $w^n = w^e$ is the most interesting since it implies that tax evasion may involve a benefit for society in terms of social welfare. Most notably, allowing some tax evasion improves the situation of low-skill workers through lowering the excess burden of taxation. To see this, recall that in the maximin case the least favoured individuals

\(^5\) Note that, by condition (26), we must always have $\pi_\sigma = \tilde{\omega} \sigma > 1$ for $1 > L^\omega > 0$ and $1 \leq t > 0$. 

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depend on the revenue extracted from productivity \( \int_{\sigma}^\infty \tilde{\omega}(\sigma - \sigma)dF(\sigma) \) of the other members of the populations. When such productivity is low and there is mobility between labour markets, the disincentive effects of taxation can be ameliorated by reducing, not only the actual tax rate \( t \), but also the expected tax rate \( p\theta \) for evaded income, provided that the fixed fine \( b \) is zero and the cost of auditing \( \varphi(\rho) \) is low. Needless to say that, in the absence of mobility of taxpayers, the result fails to hold since, as can be checked, equation (48) leads then to \( a < a^0 \) and therefore also to \( V^n(t, a, w) < V^n(t^0, a^0, w) \).

Concerning the relevance of this result, we note that it can be found out empirically under some circumstances. Thus, just recall that in many developing countries a large proportion of the working-age population, who officially earn very low salaries due to skill mismatches, circumvent the problem by seeking work outside the legal economy. Besides a lower tax burden, this provides a higher level of welfare to society as a whole.

8. Concluding comments

In principle, one would have expected a more complex model to yield fewer unambiguous results. Fortunately, this has not been the case since despite some of the previous results no longer holding, new findings have arisen for the situation when evasion constraints are binding on ability intervals. These new findings suggest to switch from the analysis just focused on the extent of non-compliance by the individual evader, to that more related to changes in the number of evaders. When this is done, four major recommendations may be derived from our results:

1. Tax authorities should monitor and enforce those groups of taxpayers for which society is indifferent about the particular labour market (regular or irregular) chosen, provided it is here where the efficiency of policies against tax evasion will be higher (Proposition 3).

2. Governments should target inspections preferably at those activities where the technological differences in favour of the legal (versus the hidden) economy are smaller (Proposition 4).

3. In addition to the number of evaders, policy-makers must take into account the number of taxpayers threatening to move to the hidden economy, when designing optimal tax-schedules (Proposition 6).

4. Politicians should not yield to the demands of certain economic groups for lower marginal tax rates, when such demands are based exclusively on the existence of an informal sector where evasion is possible (Propositions 6 and 7).

To end with, although most of the recommendations in this paper can be considered in our opinion policy-relevant, their value added ought to be ultimately understood to help create a framework within which policies against tax evasion may be discussed in a consistent manner.
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