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Abstract

I consider the influence of fairness considerations on tax evasion, focussing on the case of a preference for relative income. A general graphical device is introduced and shown to be of great help in analysing the comparative statics of evasion. Using the ERC model due to Bolton and Ockenfels (2000), I demonstrate important changes relative to the Allingham-Sandmo (1972) *cum* Yitzhaki (1974) baseline. Specifically, tax evasion becomes less attractive for richer individuals as the weight of the relative income increases, and more attractive for poorer ones. This is the first sense in which we may say that tax evasion constitutes a way for individuals to keep up with the Joneses. The second way, and the main result of this paper, concerns changes in the reference income, which may themselves be due to either growth of the average income in the reference group, or to the spread of evasion itself. I prove a theorem showing that both of these changes will unambiguously increase evasion if we assume additively separable ERC preferences. This result also creates an *interdependence of tax evasion decisions*, and may give rise to a *bandwagon effect* as individuals scramble to keep pace with their peers.
JEL category: H26

1 Introduction

Tax evasion continues to be an important subject for practitioners and researchers alike. Empirical studies such as Schneider and Enste (2000) estimate that the percentage share of the shadow economy in overall GNP runs well into the double digits for OECD countries, while shares over one third can be reached in some transformation economies. Consequently, the question of how to bring some of this activity back into "official" GNP has been of some concern for cash-strapped finance ministers. On the theoretical side, a vast literature has developed based on Allingham and Sandmo's (1972) seminal contribution,[1] particular emphasis being placed on optimal policy design and on integration into the normative theory of taxation. For it is by now commonplace that the information available to the government is a crucial factor both in the theory of tax evasion and in optimal taxation theory, and that it shapes the structure of taxation.

The bulk of this literature – as most of public finance – assumes that *pecuniary gain* constitutes the chief motivational force behind tax evasion, and that it can be captured adequately by subjective *expected utility* defined over the taxpayer's *absolute* disposable income. Recently, however, some alternative approaches have been discussed, including the replacement of subjective expected utility with some variant of prospect theory (Chang 1995; Traub 1999), extensions of the utility function by including fairness considerations (Cowell 1992; Falkinger 1995) or altruism (Beckmann 2003: 111–117), and modelling tax morale explicitly (Gordon 1989; Myles and Naylor 1996).

My purpose in the present paper is to provide an additional extension to the standard model that hitherto has received scant attention, viz. *preferences for relative income*. It is true that the relative income hypothesis is well-known in economics since its inception by Duesenberry (1949), and that it has both been developed further (Frank 1997) and employed in policy applications (Lommerud 1989). However, it has very rarely been applied to tax evasion, albeit with the notable exception of Panadés (2004).

Panadés (2004) considers a model where individual utility depends on both his own disposable income and his relative position with respect to the average *declaration* of income to the taxman. Her particular area of concern is the effect of a tax rate hike on tax evasion, taking into account the externalities generated by the preferences for relative income and the multiplicity of equilibria that may ensue.

We will follow a different track. The focus here is on *reference group effects*[2] within a group about which individuals have sufficient information to

[1] For a survey, see Andreoni, Erard and Feinstein (1998). Cowell (1990) and Beckmann (2003) provide book-length treatments of tax evasion.
[2] Cf. the discussion in Beckmann (2003, chapter 3).

arrive at a guesstimate of both actual gross income and of average evasion. This *Schwerpunkt* involves using a different model, and consequently I will build our analysis on the ERC approach pioneered by Bolton and Ockenfels (2000).[3] Also, the main contention of this paper involves an increase in the average income or, alternatively, in the extent of evasion in the reference group at unchanged statutory tax rates, and says that taxpayers will use evasion as a means to "keep up with the Joneses", increasing their own evasion as a result.

I will begin by re-stating the received Allingham-Sandmo (1972) approach to tax evasion with the help of a novel graphical device (section 2), which permits a very easy interpretation of common (as well as uncommon) comparative statics results in the theory of tax evasion.[4] Section 3 introduces an ERC version of the Allingham-Sandmo model and demonstrates in which way tax evasion behaviour differs from the standard model if preferences for relative income are assumed. The main question tackled there is whether this change can help to solve the "puzzle of tax evasion" (Alm, Sanchez, and de Juan 1995), namely that empirical results concerning the prevalence of tax honesty and the amount of tax evaded do not tally well with Allingham-Sandmo predictions. In section 4, we go on to prove our main result, the "keeping-up theorem". Section 5 concludes.

2 The Allingham-Sandmo model revisited

In the standard "portfolio" model of tax evasion (Allingham and Sandmo, 1972), a rational risk-averse taxpayer must allocate an exogenous income y to risky evasion h and risk-free declaration $y - h$. Let the probability of detection be fixed at p. With a constant tax rate t and a fine s levied as a surcharge on the evaded tax (th, see Yitzhaki 1974), the taxpayer will have net income $y^g = (1-t)y + ht$ if the evasion succeeds, and $y^b = (1-t)y - sht$ if it doesn't.

It has been clear from the very beginning of tax evasion theory that there is a need to distinguish two kinds of solution to the above problem, namely the corner solution where taxpayers are *completely honest*, and an *interior* solution where some tax evasion occurs. If we purport to go beyond the standard theory in order to explain the "puzzle of tax evasion" (Alm, Sanchez and de Juan 1995: 3), namely "why people pay taxes" – i.e. to a larger degree than predicted by the Allingham-Sandmo model –, we also have to ask whether

[3]The acronym ERC stands for "equity, reciprocity, and compensation". One advantage of using this foundation is that it has received substantial empirical support. See also the book by Ockenfels (1999).
[4]Elsewhere, I have used the same technique to discuss such things as the impact of tax progression on evasion. Cf. Beckmann (2003).

1. the alternative model has more (completely) honest citizens than the standard one, *ceteris paribus*, and whether
2. the amount of income concealed in the alternative model falls short of the prediction of the standard model, all central parameters being equal.

The obvious way to find a condition for complete honesty is to check whether the first derivative of the utility function with respect to to evasion h is non-positive at $h = 0$.

$$\frac{\partial E\tilde{u}}{\partial h}_{\,|\,h=0} = (1-p) - ps > 0 \tag{1}$$

As for the interior solution, let us take a somewhat unusual route in preparation for our later argument (Beckmann 2005). First note the obvious: tax evasion basically involves means of transferring net income from the "bad" state of the world to the "good" one. In an interior optimum, the taxpayer will use this instrument up to the point where the expected benefit of doing so, $(1-p)\,u'(y^g)$, equals her expected cost, $p\,s\,u'(y^b)$ at the margin.

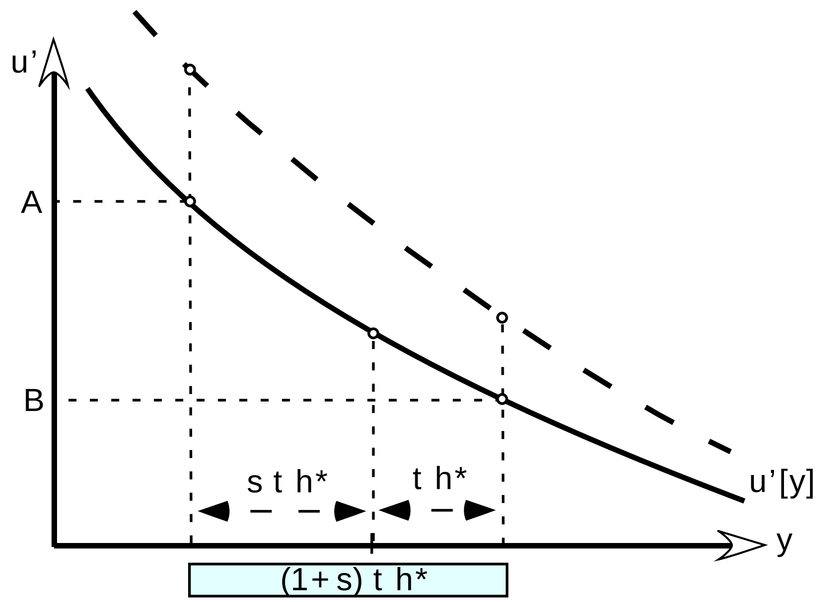

Figure 1: Illustration of the interior solution – basic model

Figure 1 depicts this situation graphically. While the solid falling curve represents the taxpayer's marginal utility of income schedule, the "rule" below the abscissa extends from the net income in the case of discovery y^b on the left to the net income with successful evasion y^g. It is of length $(1+s)\,t\,h^*$, and includes the net income with full honesty. Choosing an optimal h^* implies extending the left and right "whiskers" at a fixed rate from $y(1-t)$ until the marginal utility of income at the left end of our rule is $\frac{1-p}{ps}$ times as large as its right end counterpart. Most of the standard comparative statics of the Allingham-Sandmo model can be derived quite easily from figure 1. In fact, the following reasoning can be applied to any cross-price and income effect on evasion.

3 Tax evasion with preferences for relative income

Suppose that utility depends on some factor other than own income, for instance a fairness parameter f, which we take to be positively related to perceived fairness in exchange, that is to the relation between the individual's tax burden and the *quid pro quo* she receives from the state. Given standard assumptions, an increase in f will shift the marginal utility of income schedule upwards (as depicted by the dashed curve in fig. 1). Under which circumstances will such a shift leave the optimal h^* unaffected?

Obviously, a necessary condition for this is that the slopes of the marginal utility schedule at both ends of the original rule vary in proportion. If we want the result to hold for all incomes, we have the sufficient condition that the shift in the marginal utility schedule leaves us with the same slope everywhere, *viz.* that $\frac{u_{yf}}{u_y} = \partial\left(\frac{u_{yy}}{u_y}\right)/\partial f$ is a constant (Falkinger 1995: 66). In this case, a move towards equivalence taxation would have no effect on evasion. On the other hand, we see immediately that such a move would reduce evasion unambigously if $\frac{u_{yf}}{u_y}$ fell throughout.

While this result is fairly general, one snag is that f remains exogenous and may stand for anything from equivalence in taxation to uneasiness felt by people who receive "too much". The obvious strategy for tackling this problem would be to focus on a concrete dimension of fairness and endogenize f for this context.

In this paper, we shall deal with preferences for relative income positions, following the ERC approach by Bolton and Ockenfels (2000). According to this model, individual utility depends both on her absolute payoff y and on her relative income position $\phi = \frac{y}{n\overline{y}} - \frac{1}{n}$, where $\overline{y}$ denotes the average income and n the size of the reference group. The inclusion of ϕ leads to an interesting group size effect as we have $\lim_{n\to\infty} \phi = 0$: in an anonymous society, fairness effects due to the relative income position disappear, while they weigh more heavily, *ceteris paribus*, the smaller the relevant group.

We follow the original contribution by Bolton and Ockenfels (2000) in imposing the following assumptions on the utility function $u = u(y, \phi)$:

- Marginal utility is non-negative and non-increasing in absolute income ($u_1 \geq 0, u_{11} \leq 0$).
- The first partial of u with respect to the relative income position is positive for less than average incomes, but higher for above-average ones ($u_2(\overline{y}, 0) = 0, u_{22} < 0$). This assumption is at the very heart of the ERC model and implies that richer individuals feel qualms about receiving more than the average, while poorer ones rejoice as their relative position improves.
- u is quasi-concave and twice continously differentiable.

3.1 Tax evasion in the ERC model

In extending the standard model of tax evasion to account for ERC preferences, we immediately need to account for the hidden character of evasion. Specifically, what information do people have about the average disposable income in their reference group? If we take the ERC model beyond the experimental lab, where the availability of information is a design decision, such questions must be tackled.

We assume that individuals know the average share of income γ that members of the reference group hide from the taxman as well as the average gross income $\overline{y}$.[5] This implies that the taxpayer can compute the expected disposable income in the reference group as

$$\hat{y} = (1 - t(1 + \gamma(p\,s - 1 + p)))\overline{y} \tag{2}$$

where $t(1+\gamma(p\,s-1+p))$ is the effective tax rate with "standard" behaviour. The individual's net income position will, of course, depend on whether the planned evasion is successful.[6]

$$\phi = \begin{cases} \frac{y(1-t)+h\,t}{(1-t(1+\gamma(p\,s-1+p)))n\,\overline{y}} - \frac{1}{n} = \frac{y^g}{\hat{y}\,n} - \frac{1}{n} = \phi^g & \text{with} \quad 1-p \\ \\ \frac{y(1-t)-h\,s\,t}{(1-t(1+\gamma(p\,s-1+p)))n\,\overline{y}} - \frac{1}{n} = \frac{y^b}{\hat{y}\,n} - \frac{1}{n} = \phi^b & \text{with} \quad p \end{cases}$$

The rational taxpayer maximizes her expected utility

$$\mathrm{E}\tilde{u} = p\,u\left(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n}\right) + (1-p)\,u\left(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n}\right) \tag{3}$$

[5]The informational requirements are thus the same as in Panadés (2004), who assumes that taxpayers know the average amount of tax evasion $\overline{h}$, where patently $\overline{h} = \gamma\overline{y}$.

[6]With small n, the expected disposable income for individuals in the group may differ sufficiently from the concept of "average" to render the standard ERC utility function inapplicable. I shun from dealing with that problem here.

by the choice of h. Assuming an interior solution, the first-order condition for this problem reads

$$\frac{1-p}{p\,s} = \frac{u_1(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{\hat{y}\,n}\, u_2(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n})}{u_1(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{\hat{y}\,n}\, u_2(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n})} \tag{4}$$

while the second-order condition is

$$\begin{aligned} p\,s^2\,t^2 \left\{ u_{11}(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n}) + \frac{2}{\hat{y}n}\, u_{12}(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{(\hat{y}n)^2}\, u_{22}(y^b, \frac{y^b}{\hat{y}\,n} - \frac{1}{n}) \right\} &+ \\ (1-p)\,t^2 \left\{ u_{11}(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n}) + \frac{2}{\hat{y}n}\, u_{12}(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{(\hat{y}n)^2}\, u_{22}(y^g, \frac{y^g}{\hat{y}\,n} - \frac{1}{n}) \right\} &\leq 0 \end{aligned}$$

Note that while $u_{12} \leq 0$ is sufficient for the latter condition to hold, it is also true asymptotically as $n \to \infty$, in which case the model converges on the standard Allingham-Sandmo-Yitzhaki solution.

3.2 Comparison to the standard model

While reviewing the standard Allingham-Sandmo model in section 2, we pointed out two approaches to dealing with the "puzzle of tax evasion" (Alm, Sanchez and de Juan 1995): in an alternative model, one needs to demonstrate that an interior solution involves less tax evasion than would obtain in the standard model, all other things being equal, and / or that the new model has a larger domain over which individuals are in a corner solution with complete honesty. It turns out that the ERC model cannot help us unambiguously with either.

First note that such a comparison is very hard with a general formulation of ERC. To see this, consider a *reference individual*[7] with income $y^i = \frac{\hat{y}}{1-t}$ and compare the first-order condition for an interior solution (4)

$$\frac{1-p}{p\,s} = \frac{u_1(\hat{y} - hst, \frac{\hat{y}-hst}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{\hat{y}\,n}\, u_2(\hat{y} - hst, \frac{\hat{y}-hst}{\hat{y}\,n} - \frac{1}{n})}{u_1(\hat{y} + ht, \frac{\hat{y}+ht}{\hat{y}\,n} - \frac{1}{n}) + \frac{1}{\hat{y}\,n}\, u_2(\hat{y} + ht, \frac{\hat{y}+ht}{\hat{y}\,n} - \frac{1}{n})}$$

with its counterpart in the Allingham-Sandmo model:

$$\frac{1-p}{p\,s} = \frac{u'(\hat{y} - hst)}{u'(\hat{y} + ht)}$$

[7]Evidently, the reference individual is a person who receives the average disposable income if completely honest.

The second terms in the numerator and denominator on the right-hand side of (4) are clearly negative and positive, respectively, for the reference individual. As this individual gets more than $\hat{y}$ if the tax evasion is successful, and less if it fails, her preference for not earning more or less than the standard will induce her to reduce h. In addition, the assumption on second-order cross-partials that guarantees fulfillment of the second-order condition, $u_{12} \leq 0$, tends to work in the same direction because lower ϕs drive up the individual's marginal utility of absolute income u_1.

Lemma 1. *Assuming an interior solution, a reference individual receiving gross income* $y^i = \frac{\hat{y}}{1-t}$ *will evade less tax than in the Allingham-Sandmo model.*

Proof. Immediate from the above discussion.

Intuitively, it becomes clear that this argument extends to all taxpayers whose net income in case of successful evasion exceeds the average net income while their net income in the bad case falls short of it. On the other hand, no clear prediction seems to emerge for those whose net incomes at what might be termed the A-S-Y level of tax evasion are higher than, or lower than, $\hat{y}$. To go beyond intuition, however, the general model fails to be helpful.

Let us therefore restrict our attention to a sub-class of ERC models with additively separable preferences

$$u = v(y) + \alpha \, w(\frac{y}{n \, \overline{y}} - \frac{1}{n}) \tag{5}$$

in which the weight α represents the degree of reciprocity. Obviously, for $\alpha = 0$ this model degenerates to the standard framework in the fiscal theory of tax evasion.

With the restricted model, it is fairly easy to arrive at a sequence of conclusions. Let us write $h^*(p, s, t, y) = \arg\max \mathrm{E}\tilde{u}_{| \, \alpha=0}$ for the amount of evasion that would be optimal in the A-S-Y model, all other things being equal, while h^{**} denotes the optimal evasion in the ERC model under consideration.

Lemma 2. *Assume additively separable ERC preferences and* $-h^*st < \hat{y} - y(1-t) < h^*t$*. Then* $h^{**} < h^*$*.*

Proof. First adding $y(1-t)$, then dividing by $\hat{y}n$ and finally substracting $\frac{1}{n}$, we find $\phi^b < 0 < \phi^g$. The result then follows from the argument for lemma 1. □

Lemma 3. *Assume additively separable ERC preferences and* $0 < \phi^b < \phi^g$ *at* h^**. This implies* $h^{**} < h^*$*.*

Proof. We will use our graphical technique to address this one. Note that for given parameters t, s, p – set by the government – and for an exogenous size n of the reference group , both h and y are a function of y. We can therefore plot $v(y)$ and $w(\phi)$ in the same diagramme 3.2. Also, $\frac{1-p}{ps}$ will be fixed exogenously.

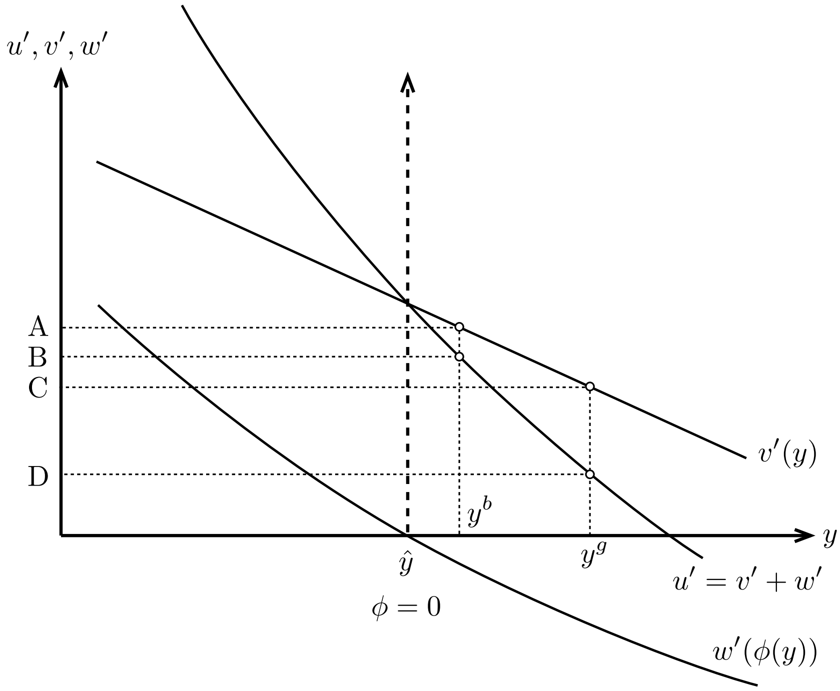

Figure 2: Proof that $0 < \phi^b < \phi^g \Rightarrow h^{**} < h^*$

As h^* is the A-S-Y solution we know that $\frac{B}{C} = \frac{1-p}{p\,s} > 1$, given $\alpha = 0$. From the ERC assumptions, we know that $\overline{AB} < \overline{CD}$. Because the numerator is larger than the denominator and also falls by a smaller absolute amount, the ratio $\frac{B}{C}$ would increase, contradicting (4), unless h^{**} were less than h^*. $\square$

Proposition 1. *(Introducing preferences for reciprocity reduces evasion for sufficiently high incomes.) Assume additively separable ERC preferences and* $y(1-t) + h^*t \geq \hat{y}$. *Then* $h^{**} < h^*$.

Proof. Enumerate all possible combinations of ϕ^b and ϕ^g:

1. $\phi^g < 0 \wedge \phi^b \geq 0$
2. $\phi^g < 0 \wedge \phi^b < 0$
3. $\phi^g \geq 0 \wedge \phi^b < 0$
4. $\phi^g \geq 0 \wedge \phi^b \geq 0$

(Note that the first combination cannot occur in our model as h, s, y are all non-negative and $0 \leq t \leq 1$.) Combinations 3 and 4 exhaust all possibilities where $\phi^g \geq 0$. By lemma 2 and 3, respectively, $h^{**} < h^*$ will hold in both, and we have $\phi^g \geq 0 \Rightarrow h^{**} < h^*$. Add $\frac{1}{n}$ and multiply by $\hat{y}n$ to get $y(1-t) + h^* t \geq \hat{y} \Rightarrow h^{**} < h^*$. □

Proposition 1 says that persons with higher incomes will unambiguously evade less tax under ERC (assuming additive separability) than in the A-S-Y benchmark. This not only includes everybody from the reference individual on up, but also a batch of persons earning (slightly) less than the average – i.e., who would receive less than $\hat{y}$ with certainty if they were completely honest. It is only for low income groups that evasion may actually increase under ERC.

The intuition behind this result remains largely unchanged: For richer individuals, there is an increasing additional disutility of being successful in evasion. Individuals with below-average incomes throughout, on the other hand, have an additional incentive to increase their incomes, *ceteris paribus*, as they are playing catch up with the reference individual. This marginal advantage, however, is now *smaller* for a successful evasion than for the worst case, which is further worsened with increased evasion. For this reason, we fail to come to clear-cut results.

Until now, we have only dealt with interior solutions. To complete our comparison of the A-S-Y and the ERC solution, we also need to consider the condition for complete honesty, that is a corner solution where individuals refrain from evading any tax at all. Proposition 2 sums up the main result regarding this question:

Proposition 2. *Assume additively separable ERC preferences and a positive expected monetary return to tax evasion – i.e., $1 - p > ps$. Then, richer individuals will become more likely to be completely honest if the weight α of the other-related component of preferences preferences is increased. For individuals with lower incomes, the converse obtains.*

Proof. Evaluate the first partial of expected utility at $h = 0$. Rearranging and simplifying yields

$$\frac{\partial \mathrm{E}\tilde{u}}{\partial h}_{|h=0} = (1 - p - p\,s) \left\{ v'(y(1-t)) + \frac{\alpha}{\hat{y}\,n}\, w' \left(\frac{y(1-t)}{\hat{y}n} - \frac{1}{n} \right) \right\} \leq 0 \quad (6)$$

as a condition for complete honesty. Deriving (6) again with respect to α, we obtain

$$\frac{\partial \mathrm{E}\tilde{u}^2}{\partial h \partial \alpha}_{|h=0} = \frac{1 - p - p\,s}{\hat{y}\,n}\, w' \left(\frac{y(1-t)}{\hat{y}n} - \frac{1}{n} \right)$$

from which the proposition is obvious. □

Note that in this section, we have considered changes in behaviour for a given pair $(y, \hat{y})$. This is clearly the way to go when comparing tax evasion in the ERC model to the A-S-Y solution. Our particular focus so far was on the "puzzle of tax evasion", commonly understood as the problem of explaining that given sizeable expected returns to evasion in monetary terms, completely honest individuals do appear to exist (and evasion in an interior solution seems empirically lower than predicted by the A-S-Y approach). While we were able to demonstrate that introducing ERC preferences into an otherwise unchanged standard tax evasion model reduces evasion (and increases the likelihood of honesty) for some, notably for "richer" individuals, these results fail to be clear-cut.

4 Keeping up with the Joneses

In the present section, we take up the question of "keeping up with the Joneses" in earnest. There are, in fact, two aspects to this question. The first – which has already, albeit briefly, come up in sub-section 3.2 – is that evasion (given positive expected returns) can be a way for poorer individuals to catch up with richer Joneses. As the average member in one's reference group gets richer, *ceteris paribus*, we may therefore expect evasion to spread. Not only do the poor use it to keep up with soaring disposable incomes, the deterrence effect on the rich *may* also dwindle.[8]

The second aspect concerns changes in others' tax evasion behaviour. As her reference group becomes less honest, an individual may be tempted to increase her own evasion to avoid falling behind the Joneses (which, again, is assuming that evasion pays in monetary terms).

Analytically, however, what we are going to do in *both* cases is to consider the tax evasion decision of a single individual with given income[9] y as the reference income $\hat{y}$ grows. For we know from the definition (2) of $\hat{y}$ that

[8]This obviously presupposes some restrictions on the change in the other moments of the distribution of incomes as well, which I have left implicit so far.

[9]The comparative statics for y, all other things being equal, can be addressed in the standard manner (see section 2, in particular fig. 1): growing richer will shift the "rule" between the individual's good-case and bad-case incomes to the right, and the ratio between the utilities at the ends of this rule remains unchanged iff

$$\frac{\partial\left(-\frac{u''}{u'}\right)}{\partial y} = -\frac{\partial\left(\frac{v''+\frac{1}{(\hat{y}n)^2}w''}{v'+\frac{1}{\hat{y}n}w'}\right)}{\partial y} = 0$$

– i.e., iff the ERC utility function exhibits "constant absolute risk aversion". In this case, the individual would be content to keep the "rule" at its former length and continue to evade the same amount as her income increases.

$$\frac{\partial \hat{y}}{\partial \overline{y}} = 1 - t(1 - \gamma(1 - p - ps)) \quad \text{and} \quad \frac{\partial \hat{y}}{\partial \gamma} = t\overline{y}(1 - p - ps) \tag{7}$$

which are both clearly non-negative as long as the expected return to evasion is non-negative, i.e. $1 - p \geq ps$. In light of this, we are able to state our central result:

Proposition 3. *"Keeping-up theorem": Assume additively separable ERC preferences and an interior solution. Then if either the average income $\overline{y}$ in the reference group or the average tax evasion γ grows, an individual with unchanged gross income y will evade more tax.*

Proof. We will use our graphical technique to prove this result (see fig. 3). As a first step, let us show that either an increase of $\overline{y}$ or of γ will shift the marginal utility schedule upwards throughout, flattening it at the same time.

1. *u_1 shifts to the right.* From (7), either change will cause the reference income $\hat{y}$ to increase. ERC assumptions include $w'(\hat{y}) = 0$ and $w'' < 0$, while $v(\bullet)$ does not depend on $\hat{y}$. Therefore, $u' = v' + w'$ will shift to the right as its root moves rightward.

2. *Flattening of u_1.* Note that the dimension of the abscissa is *absolute* income. As $\hat{y}$ increases, any change in absolute income will involve a concomitantly smaller change in *relative* income. Therefore, any movement along the abscissa will involve a smaller change in $w'(\bullet)$.

3. $\hat{y}^1 > \hat{y}^2 \Rightarrow u_1(y, \hat{y}^1) > u_1(y, \hat{y}^2)$. The marginal utility schedules before and after the reference income increase either intersect or they do not. If they do not, steps 1 and 2 of this proof are sufficient for $u_1(y, \hat{y}^1) > u_1(y, \hat{y}^2)$.

   So let us suppose they do intersect, labelling the associated gross income y^c. At this income, we would have $u'(y^c) + w'(\frac{y^c}{\hat{y}^1 n} - \frac{1}{n}) = (u'(y^c) + w'(\frac{y^c}{\hat{y}^2 n} - \frac{1}{n})$, which leads to a contradiction for $\hat{y}^1 \neq \hat{y^2}$.

   Consequently, the new marginal utility schedule runs above the old one, never intersecting it in the positive orthant.

Step 2 above means $\hat{y}^1 > \hat{y}^2 \Rightarrow -u_{11}(y, \hat{y}^1) < -u_{11}(y, \hat{y}^2)$. Combining this with step 3, we find that $-\frac{u_{11}}{u_1}$ unambiguously decreases as $\hat{y}$ increases. It follows from the discussion in section 2 that tax evasion will increase. □

Formally, growth of the reference income – whether caused by a general increase in the level of (worthwhile) evasion or an increase in average income

– will reduce the level of "absolute risk aversion".[10] It follows from standard A-S-Y arguments that more evasion ensues.

The intuition behind this result is captured in the second step above: increasing reference incomes imply that absolute changes of income are associated with smaller changes in the relative income position, which by itself tends to attenuate the effects of the ERC component. On the other hand, the rightward shift of the w' schedule tends to make evasion more attractive for poorer individuals, while reducing the fairness disincentive for richer ones. Both effects combine to generate an unambiguous positive effect on evasion.

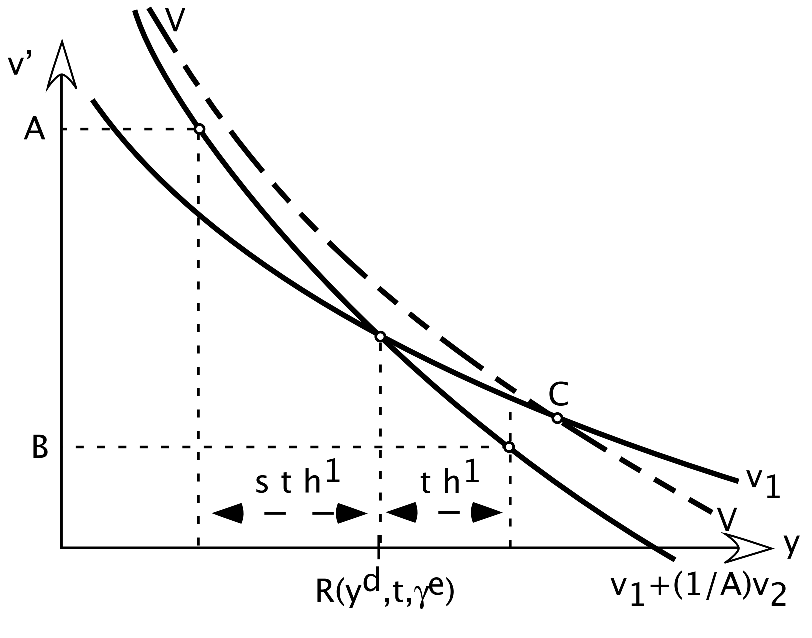

Figure 3: Proving the "keeping-up theorem"

[10]This term is employed as it has become standard usage to describe the curvature of the marginal utility of income in such a fashion. The quotation marks are here to remind us that it may not be appropriate to associate all of this curvature with risk: even in the standard case, the second thousand Euros may be less important to me than the first because I, being rational, satisfy less important wants with them than with the first. This simple claim would have to hold regardless of the degree of risk involved, and the ensuing questions concerning the separation of level and risk influences on the quality of life are far from resolved. They loom even larger if we allow non-standard preferences, such as ERC ones. However, none of the results in the text appear to depend critically on this issue.

5 Discussion and conclusion

This paper has considered the influence of fairness considerations on tax evasion, focussing on the case of a preference for relative income. A general graphical device was introduced and shown to be of great help in analysing the comparative statics of evasion. Using the ERC model due to Bolton and Ockenfels (2000), we were able to demonstrate important changes relative to the Allingham-Sandmo (1972) *cum* Yitzhaki (1974) baseline, although unambiguous results failed to emerge for general ERC preferences. Not surprisingly, this is mainly due to the possible complementarity of relative and absolute income, and restricting attention to additively separable preferences allows for a fair number of results.

Specifically, tax evasion becomes less attractive for richer individuals as the weight of the relative income increases, and more attractive for poorer ones. This is the first sense in which we may say that tax evasion constitutes a way for individuals to keep up with the Joneses. The second way, and the main result of this paper, concerns changes in the reference income, which may themselves be due to either growth of the average income in the reference group, or to the spread of evasion itself. We proved a theorem showing that both of these changes will unambiguously increase evasion if we assume additively separable ERC preferences.

This result also creates an *interdependence of tax evasion decisions*, and may give rise to a *bandwagon effect* as individuals scramble to keep pace with their peers. One natural step to take the research in this paper further would be to study the dynamics of such a process, although this endeavour would probably require replacing individual optimising with an *ad hoc* reaction function. A further next step absent from the present paper would be to test hypotheses from this paper empirically. While laboratory methods can be used – and have been used to test general ERC predictions[11] –, outside the laboratory the problem arises of how to collect the relevant data and how to identify variables (in particular, the reference income and people's information concerning average evasion) reliably. These two tasks will be left for future work.

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[11] Cf. Ockenfels (1999), Bolton and Ockenfels (2000). See also Beckmann (2003, chapter 3) for some experimental work on other-regarding preferences in an experimental context.

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