RESPONSIBILITY, WELL-BEING, INFORMATION, AND THE DESIGN OF DISTRIBUTIVE POLICIES

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ABSTRACT

The model developed in this paper admits a systematic discussion of the normative rationale behind the use of two distributive instruments: negative income taxation, creating an unconditional basic income, on the one hand and wage subsidies on the other hand.

The model integrates two opposite conceptions of personal responsibility (whether or not we are responsible for our propensity to work in the labour market) into a single framework. Thus we can compare these conceptions systematically, and define conditions for practical convergence between the policies they indicate. This framework also illustrates how optimal taxation theory may proceed when utilities are considered ordinal and interpersonally not comparable. This requires the definition of an objective notion of individual well-being. I incorporate "time for non-market activity" in the definition of well-being. The model shows how alternative choices with regard to the inclusion and weighing of "time for non-market activity" in the Rawlsian basket of primary goods affect the prescription of policies. More generally, it shows how alternative conceptions of well-being affect the posttransfer reward scheme the government proposes.

The model is used to illustrate the idea, defended by Fleurbaey et al., that responsibility-sensitive egalitarian justice imposes a principle of natural reward. Given the simplifying assumptions of the model, I will establish, in the second-best regimes and excluding corner solutions, for each conception of responsibility and set of instruments, a one-to-one correspondence between principles of reward, on the one hand, and conceptions of individual well-being on the other hand. Hence, given these assumptions and conditions, there is a unique definition of well-being which yields a neutral principle of reward, i.e. there is a unique "neutral" official conception of the

The model is then used to study the "egalitarian earnings subsidy scheme" proposed by White (1999) and to assess a related discussion between White (1997) and Van Parijs (1997) on basic income and the principle of reciprocity. According to White the principle of reciprocity implies the use of wage subsidies and the rejection of basic income. The model shows that basic income and a wage subsidy can be complementary instruments. However, under certain conditions, a neutral principle of reward demands that earned income taxation only be used to fund wage subsidies, so that a basic income has to be funded (possibly together with other expenditures) by a capital income tax on available "personal dividends".

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INTRODUCTION

With regard to employment policy and welfare reform, there is a large degree of consensus among policy makers and scholars that taxes and benefits must not lead to a situation in which poor individuals (or their families) face very high marginal tax rates when they take up a job or when their hours of work increase. Benefit systems that are too selective, are beset by "inactivity traps", discouraging labour market participation by low-skilled workers.

In academic research various proposals, related to "basic income" or "negative income taxation", are put forward to remedy such inactivity traps. Obviously, other approaches to the incentive problem for low wage earners are possible, such as (i) topping up low skilled workers' purchasing power by selective tax credits, or (ii) increasing their net pay by lowering personal social security contributions for low wage earners, or (iii) supporting sufficiently high minimum wages for low skilled workers by selectively subsidizing employers. These alternative instruments reflect not only technical differences, but more fundamental differences in approach. Therefore, it is useful first to assess alternative instruments from a normative vantage point, that is, by examining the *conceptions of distributive justice* underpinning their use, without reference to the particular problems created by tax and benefit systems in economies beset with involuntary unemployment. In this paper I present a model that admits a systematic discussion of the normative rationale behind the use of two instruments (which are not mutually exclusive): negative income taxation, creating an unconditional basic income, on the one hand and wage subsidies on the other hand.

The model integrates two opposite conceptions of personal responsibility (whether or not we are responsible for our propensity to work in the labour market) into a single mathematical framework. Thus we can compare these conceptions systematically, and define conditions for practical convergence between the policies they indicate. This framework also illustrates how optimal taxation theory may proceed when utilities are considered ordinal and interpersonally not comparable. This requires the definition of an objective[1] notion of individual well-being (which I call "advantage"), except in one special case.

[1] In what follows I use "objective" and "interpersonally comparable" interchangeably. Obviously, when advantage is defined in a purely objective way, violations of the Pareto principle are possible (a situation may be judged better whereas every agent is worse-off from his personal point of view). The use of such an objective notion of well-being requires more justification, but I cannot pursue this problem here. Note also that the objective definition of advantage, which I will propose, depends upon a judgement by the government, and is in that sense "subjective".

I incorporate "time for non-market activity" in the definition of advantage. With a view to Rawlsian justice, this improves upon Rawls's definition of social primary goods. The model shows how alternative choices with regard to the inclusion and weighing of "time for non- Rawlsian basket of primary goods affect the prescription of policies. More generally, it shows how alternative conceptions of well-being affect the posttransfer reward scheme (or, the "incentive policy") the government proposes.

The model also allows the comparison of two regimes *qua* information, availability of instruments, and redistributive efficiency: (1) income taxation; (2) income taxation and wage subsidies. The income tax scheme proposed in this paper can take the form of a negative income tax, thus creating an unconditional universal basic income.

I will use the model to illustrate the idea, defended by Fleurbaey *et al.*, that responsibility-sensitive egalitarian justice imposes a principle of natural reward (see the references in footnote 5). In their approach, the fundamental objective of a responsibility-sensitive egalitarian government is to look for allocation rules which *fully* compensate for the influence of differentials in non-responsible characteristics over the agents' advantage, and let differentials in responsible characteristics *fully* operate[2]. This argument owes its appeal to a certain idea of neutrality vis-à-vis preferences, akin to the liberal ideal of "neutrality of [3]. In fact, I do not think that a responsibility-sensitive government *must* respect this idea of neutrality (see Vandenbroucke, 1999, pp. 40-41). Yet it provides a useful benchmark for my discussion of basic income versus wage subsidies (Sections 14 and 15).

The model presents a very simple world, in which the action of an egalitarian government is in fact *completely determined* by answering three questions:

1) what is its conception of personal responsibility?
2) what is its conception of the individual well-being of its citizens?
3) which information can it use (hence, which instruments are feasible)?

The simplicity of the world under review is due both to assumptions concerning the economic environment and to assumptions concerning the government's approach to distributive justice. Within the framework of these specific assumptions, I will establish, in the second-best regimes and excluding corner solutions, for each conception of

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[2] This is the strictest principle of natural reward. One can specify various axioms specifying the idea of natural reward.

[3] See Rawls, 1993, p. 193 for a definition of "neutrality of aim".

responsibility and set of instruments, a one-to-one correspondence between principles of reward, on the one hand, and conceptions of individual well-being (advantage) on the other hand. Hence, given these assumptions and conditions, there is a unique definition of advantage which yields a neutral principle of reward, i.e. there is a unique "neutral" official conception of the citizens' individual well-being.

I will then use the model to study the "egalitarian earnings subsidy scheme" (ESS) proposed by White (1999). With the model we can prove that White's ESS is the result of an optimisation exercise, given certain assumptions. The model allows the specification of the conditions under which the optimal solution is equality. On the basis of this result, we can assess a related discussion between White (1997) and Van Parijs (1997) on basic income and the principle of reciprocity. According to White the principle of reciprocity implies the use of wage subsidies and the rejection of basic income. The model shows that basic income and a wage subsidy can be complementary instruments. However, under certain conditions, a neutral principle of reward demands that earned income taxation only be used to fund wage subsidies, so that a basic income has to be funded (possibly together with other expenditures) by a capital income tax on available "personal dividends".

The model also demonstrates that there is a systematic trade-off between the level of a basic income and the rate of wage subsidies, when one moves from a Rawlsian conception of personal responsibility to a conception which holds people responsible for their propensity to work, *and* when conceptions of advantage shift.

1. ASSUMPTIONS CONCERNING THE ECONOMIC ENVIRONMENT

Each individual in the population $\boldsymbol{P}$ is characterized by a vector

$$(w, p, e) \in [w_L, 1] \times [p_L, \infty] \times [e_L, 1]$$

with $w_L, p_L, e_L \geq 0$

Individuals have a range of skills with which various levels of market reward are associated. A citizen's economic productivity w is what he can earn per unit of paid labour in the marketplace, by putting his best rewarded skills to use. I assume citizens always choose the kind of work that best rewards their skills. So, when there are neither taxes nor subsidies, a citizen (*w*, ., .), whose working time on the labour market is *L*, earns *wL*. We can define a metric of productivity such that $w = 1$ for the most productive individual. An individual's productivity is his human capital, his "internal endowment".

Individuals have also external endowments, such as houses, land, capital invested in the economy... The economic value a citizen's assets represent to him can be expressed as an equivalent flow of income. I take it that *on average* assets yield an income, which need not be reinvested in order to maintain the value of these assets, and which can be redistributed, without any economic side-effect. I call this the "*per capita* dividend", $\bar{p}$, and construe it as an average of individually owned and unequally distributed personal dividends *p*. This assumption is highly abstract, and no doubt unreal, but I need it to adjudicate in the philosophical debate on basic income (Sections 14 and 15).

Individuals divide their time between paid labour, *L*, and activity outside the labour market (e.g. eating, organizing their household, caring for children and other people, sleeping and resting, leisure...). The factor *e* characterizes each individual's preference ordering over income and time for non-market activity. Individual utility functions are ordinal and non-comparable. The preference ordering of a citizen (.,., *e*) over income and work can be represented by any strictly monotonically increasing transformation $\phi(U_e)$ with

(1)
$$U_e(Y, L) = Y - \frac{L^2}{2eL_o}$$

whereby *Y* is net disposable income, and the parameter L_o sets a standard for the maximal working time that might be chosen. Since both *w* and *e* have a maximum value of 1, L_o is the working time the most productive and crazy workaholic would choose if he were to maximize his utility. (Maximizing the expression in (1) over *L*, when $w = 1$ ($\Rightarrow Y = L$) and $e = 1$, requires $L = L_o$) I postulate that this also is the maximum working time that is humanly possible.

The trade-off between income and time for non-market activity that leaves an individual indifferent (i.e. the marginal rate of substitution on an indifference curve for a given level $\bar{U}$) is given by:

(2) $$\left.\frac{\partial Y}{\partial\left(L_o - L\right)}\right|_{\overline{U}} = -\frac{L}{eL_o}$$

If *e* is small, the individual values time for non-market activity highly: she is prepared to forgo much income to buy time for non-market activity.

In $\mathbf{P}$ the preference factors *e* and the productivity levels *w* are independently distributed with average values $\overline{e}$ and $\overline{w}$, and variance s_e^2 and s_w^2.

Concerning the distribution of the personal dividend *p*, the only data relevant to the model are the minimum p_L and the average dividend $\overline{p}$. We assume:

$$\forall\left(w, p, e\right) \in \mathbf{P}:\ w = w_L \Rightarrow p = p_L$$

implying that productivity *w* and dividend *p* are *not* independently distributed.

The population can be partitioned into "productivity types" and "preference

T_{w*}, the set of citizens having the same level of productivity *w**, is a "type":

$$T_{w*} = \left\{\left(w, p, e\right) \in \mathbf{P} \,\middle|\, w = w^*\right\}$$

I call P_{e*}, the set of citizens having the same preferences *e**, a "tranche":

$$P_{e*} = \left\{\left(w, p, e\right) \in \mathbf{P} \,\middle|\, e = e^*\right\}$$

I assume that *w*, *p* and *e* are continuously distributed over an infinite number of citizens.

2. ASSUMPTIONS CONCERNING THE GOVERNMENT'S POLICY STANCE

Recall that my aim is to focus on three dimensions of an egalitarian government's stance: (i) its conception of personal responsibility; (ii) its conception of well-being; (iii) the information which it can use. I simplify, first, by defining an egalitarian government as one that gives *absolute* priority to the position of the worst-off. With regard to the first dimension, I want to distinguish two branches of egalitarian justice:

> "RAWLS" holds people responsible neither for their productivity, nor for their preferences over income and time for non-market activity;
>
> "RESPO" holds people responsible for their preferences over income and time for non-market activity, but not for their productivity.

In this ultra-simple world, both the "RAWLS" and "RESPO" branches of egalitarian justice (RAWLS and RESPO for short) consider people's possession of external assets as a circumstance for which they are not responsible (say, because it results from a history of gifts and bequests which they could not influence).

With regard to the second dimension, well-being, I postulated in Section 1 that utility levels are interpersonally incomparable. This assumption implies that both RAWLS and RESPO must hold people responsible for their level of *utility*, although RAWLS does not hold people responsible for their *preference ordering*. Thus, RAWLS reflects John Rawls's theory of justice. Rawls thinks that people are responsible for their level of happiness, but his mainstream exposition rules out responsibility for "work effort"[4].

Obviously, a government cannot pursue egalitarian justice without some objective notion of well-being, which I call "advantage". Below I propose a continuum of conceptions of advantage, depending upon the government's conception of the "burden of paid work". A significant simplification of the model obtains because the continuum of conceptions of advantage depends on one parameter, and because of an "impartial" aggregation method of individual levels of advantage, which has a utilitarian flavour, as I will explain in the following sections.

Finally, the government's information about individual citizens determines which instruments it can use to pursue its objectives. I presuppose that the government's *planning*

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[4] Rawls rejects "distribution according to effort" (1971, p. 312). Since Rawls holds people in general responsible for their ends and goals, his position with regard to effort reveals a deep tension within his system, as explained by Cohen, 1989, pp. 912-916. But I will stick to his mainstream exposition.

agency has perfect statistical information on economic behaviour. As for the *transfer authority*, I will compare two regimes:

> Regime T: the transfer authority has information on gross earnings and dividend income of individual citizens, and can only apply an earned income tax and a capital income tax;
>
> Regime S: the transfer authority has also information on individual working time, and can also apply a wage subsidy.

Regime T and S allow second-best solutions. One can imagine a third regime, F, in which the transfer authority has also information about the preference orderings of the individual citizens, and can apply lump sum transfers. This first-best solution is not developed here (see Vandenbroucke, 1999, Section 3.16).

3. AXIOMATIC APPROACH: TWO PRINCIPLES FOR THE EGALITARIAN GOVERNMENT

So far, I suggested a descriptive account of an egalitarian government's objectives and means of intervention. Alternatively, we can formulate *axiomatically* the principles an egalitarian policy should satisfy. To be able to design policies, two general principles have to be specified:[5]

a) a principle of reward, that is, a scheme assigning differential reward to choices people make under their own responsibility;

b) a principle of compensation, according to which equality of advantage should prevail wherever responsibility is absent.

One can formulate various axioms specifying the principle of compensation, and various axioms specifying the principle of natural reward, and order them according to their strength. It has been shown by Fleurbaey *et al.* that it is in general impossible to reconcile the strongest axioms of natural reward and compensation with each other. Hence, in order to implement them, one has to weaken one or the other of the principles, or both.

I will not apply a comprehensive axiomatic test to the allocation rules I propose in this paper. I will check their performance with regard to the following axioms:

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[5] This idea has been developed in Fleurbaey (1995a, 1995b, 1998); Bossert and Fleurbaey (1996); Bossert, Fleurbaey and Van de gaer (1996); Fleurbaey and Maniquet (1996a, 1996b).

a) one specification of a principle of natural reward:

"If all individuals are identical with regard to the traits for which the government holds them *not* responsible, there must be no difference between the pre- and the posttransfer distribution of resources in society".

Let us call this axiom "No Redistribution for Uniform Non-Responsible traits" (NRUNR). For example, in the RESPO branch of egalitarian justice productivity and external assets are "non-responsible traits"; hence, in the RESPO case, NRUNR demands that there be no redistribution when all individuals have the same level of productivity and the same external endowments.

b) five distinct specifications of principles of compensation, which can be stated as follows:

b1) Solidarity:

"If the profile of people's non-responsible traits changes, then *either* no agent's situation improves, *or* no agent's situation deteriorates"(Fleurbaey, 1998, p. 214).

Solidarity and an axiom of anonymity together entail the following axiom of equality:

b2) "If two individuals are identical with regard to traits for which the government holds them responsible, they should have the same advantage".

Let us call this axiom "Equal Advantage for Equal Responsibility" (EAER). It means that the consequences of any differentials in traits for which people are *not* held responsible should be fully compensated.

In RESPO, people's preferences over income and time for non-market activity are deemed their personal responsibility. Then EAER means that two people who have the same preferences, but different productivity and/or external endowments, should end up with the same advantage.

If we cannot obtain equality, a maximin version of axiom (b2) may be appropriate:

b3) "If a group of individuals are identical with regard to traits for which the government holds them responsible, the level of advantage of the individual with the lowest advantage in that group should be as high as possible."

I call this axiom "Maximin Advantage for Equal Responsibility" (MAER).

It is possible that we can only satisfy EAER or MAER for *some* levels of the responsible traits, but not for *all* levels of responsible traits. In that case we have to formulate EAER and MAER for "*reference responsible traits*". For example, let us assume that we are concerned with testing a RESPO policy. Recall that preferences are fully described by one single variable "e". Consider a reference preference ordering, characterized by $\hat{e}$. We can apply the following criterion to a RESPO policy:

b4) "If two individuals have the same *reference* preference ordering over income and time for non-market activity, characterized by $\hat{e}$, then they should have the same advantage"[6].

Let us call this "EAER$\hat{e}$": "Equal Advantage for Equal reference Responsibility
This can again be weakened to:

b5) "If a group of individuals all have the same *reference* preference ordering over income and time for non-market activity, characterized by $\hat{e}$, then the level of advantage of the individual with the lowest advantage in that group should be as high as possible."

MAER$\hat{e}$": "Maximin Advantage for Equal Reference responsibility $\hat{e}$".

The second-best allocation rules I illustrate with the model can satisfy MAER$\hat{e}$. Some can satisfy EAER for a limited domain of economic environments.

I will show that, given the assumptions of the model (notably the shape of the functions, the fact that the continuum of "official" conceptions of individual advantage depends on *one* parameter *g*, and the way individual advantage is aggregated for collective choice) the second-best allocation rules only satisfy NRUNR for one specific conception of advantage, which we may then call the "neutral conception of advantage". Or, to put the same conclusion in other words, once the government has chosen between RAWLS and RESPO, MAER$\hat{e}$ and NRUNR together *fully* determine the way it should operate with the available second-best instruments, and thus, fully determine the underlying conception of advantage.

[6] Fleurbaey *et al*. call this "conditional egalitarianism".

4. THE GOVERNMENT'S SECOND-BEST INSTRUMENTS

In the second-best scenarios the government intervenes with four instruments:

Instrument 1: *earned income taxation* with a flat rate t and a constant term B: for a citizen whose working time is L and productivity is w, the amount of earned income tax due is equal to $twL - B$. If $B > 0$, we have a universal and unconditional basic income (a negative income tax).

Instrument 2: a flat rate *capital income tax* c on the personal dividend. Since I ruled out disincentive effects on the level of p, the capital income tax c plays only a trivial role in the optimisation of the model. But it puts the interpretation of the results in a proper perspective, especially with regard to the discussion on basic income versus wage subsidies (Section 15).

Instrument 3: a universal *subsidy* s, proportional to the time each individual spends in paid work: a citizen who works L receives sL in subsidies. This instrument can only be used in regime S.

In regime S a citizen with productivity w and personal dividend p, and who chooses to work L, has a net disposable income:

$$Y = B + [(1-t)w + s]L + (1- c)p \tag{3}$$

Instrument 4: Finally, and importantly, the governments supports education with public spending on education, the *per capita* level of which is equal to E.

Each policy scenario can be represented by a vector (t,s,c,E), and, given the balanced budget constraint, the constant term of the tax function B can be calculated as a function B(t,s,c,E), as I will show below. The model allows the calculation of optimal policy scenarios (t,s,c), given E and the characteristics of the population. Clearly, to build a complete model of redistributive policies, spending on education E should be endogenous too. Education has an impact both on the average productivity level $\overline{w}$, on the minimum w_L and on the variance s_w^2. Moreover, education normally also influences the distribution of e. Since RAWLS policy makers have a purely deterministic view of human nature, the impact of education on e must be a policy variable for them. But RESPO policy makers need not deny that education influences the distribution of *e*, even when they hold people responsible for their level of *e*. In this second branch of policy scenarios an adequate level and distribution of resources for education is one of the essential "circumstances of choice", i.e. one of the background conditions which allow a government to consider the individual preference factors *e* indeed as a matter of individual "choice". Hence, the government's choice of the level and distribution of educational spending interacts with the choice of the other policy variables *t*, *s*, *c*, directly, because spending requires revenue, and indirectly, via *E*'s impact on the characteristics of the population and/or the "circumstances of choice". However, since the impact of education policy on all these variables is complex, I will not try to model it in an endogenous way. I simply suppose that E represents some adequate level of *per capita* public spending on education. It is important to have this variable included in the presentation of the model, in order not to neglect the necessity of government revenue for other purposes than wage subsidies or basic income.

5. CONSTRAINTS ON INSTRUMENTS

The government is confronted with two essential constraints: a balanced budget constraint and a labour-supply constraint. Apart from these I impose a limit on taxation: $t \leq 1$.

5.1. The balanced budget constraint

Spending on education and subsidies must be covered by current revenue. If $L(w,p,e;\, t,s,c)$ is the labour supply response of an individual (w,p,e), given a policy scenario (t,s,c), the most general expression of the balanced budget constraint is:

$$E + \int_{w_L}^{1}\int_{e_L}^{1}\int_{p_L}^{\infty} f_{wpe}(w,p,e)\, sL(w,e,p;t,s,c)\,dp\, de\, dw$$

(4)

$$= \int_{w_L}^{1}\int_{e_L}^{1}\int_{p_L}^{\infty} f_{wpe}(w,p,e)\left[twL(w,e,p;t,s,c,) - B + cp\right]dp\, de\, dw$$

whereby $f_{wpe}(w,p,e)$ is the density function of the joint distribution of *w*, *p* and *e* over the population. This expression can be simplified considerably, as I will now show.

The utility function of a citizen (*w*,*p*,*e*), whose working time is *L*, can be any strictly monotonically increasing transformation $\phi\left(U_e\left(w, p, L\right)\right)$ with

$$(5) \qquad U_e\left(w, p, L\right) = B + \left(1-c\right)p + \left[w\left(1-t\right)+s\right]L - \frac{L^2}{2eL_o}$$

Individual utility maximization yields the following expression for the labour supply response:

$$(6) \qquad L\left(w, e; t, s\right) = eL_o\left[w\left(1-t\right)+s\right]$$

To simplify expression (4), we can then make use of the following properties. Obviously, for any function *g*(*w*,*e*):

$$(7) \qquad \int_{w_L}^{1}\int_{e_L}^{1}\int_{p_L}^{\infty} f_{wpe}\left(w, p, e\right)g\left(w, e\right)dp\, de\, dw = \int_{w_L}^{1}\int_{e_L}^{1} f_{we}\left(w, e\right)g\left(w, e\right)de\, dw$$

whereby $f_{we}\left(w,e\right)$ is the density function of the joint distribution of *w* and *e* over the population. Then, for every function *g*(w,*e*) that is separable into $g_1\left(w\right)g_2\left(e\right)$, the independence of the distributions of *w* and *e* allows us to write:

$$(8) \qquad \int_{w_L}^{1}\int_{e_L}^{1} f_{we}\left(w, e\right)g\left(w, e\right)de\, dw = \int_{w_L}^{1} f_w\left(w\right)g_1\left(w\right)dw \int_{e_L}^{1} f_e\left(e\right)g_2\left(e\right)de$$

whereby $f_w(w)$ is the density function of the distribution of *w* over the population and $f_e(e)$ is the density function of the distribution of *e* over the population. Both the independence of the distributions, and the separability of the labour supply function (and the expressions which are derived from it) are thus important features of the model. Using these properties, together with equation (6), we can derive the following expression for *B* from the budget constraint (4):

$$(9) \qquad B\left(t, s, c, E\right) = \bar{e}L_o\left[t\left(1-t\right)\left(s_w^2 + \bar{w}^2\right) + \left(2t-1\right)\bar{w}s - s^2\right] + c\bar{p} - E$$

In the equations that follow, the term $s_w^2 + \overline{w}^2$ (equal to the average of w^2) often occurs. Note the following property, which underpins some of the results:

$$w \in [0,1] \Rightarrow \overline{w} \geq \int_{w_L}^{1} f_w(w) w^2 dw = s_w^2 + \overline{w}^2$$

5.2. The labour supply constraints

Apart from $t \leq 1$, I do not impose any constraint on the instruments. In principle, t may be either positive (income taxation) or negative (an income supplement, proportional to pre-tax earnings); s may be either positive (a wage subsidy, proportional to hours worked), or negative (a flat tax on hours worked), and, more importantly, B may be either positive (an unconditional basic income, integrated into the tax schedule) or negative (a poll tax to raise money for education, wage subsidies...).

However, the labour supply response constrains the range of the instruments: disincentives to work can never be so high, that some people respond with "negative labour"; incentives to work can never be so important, that some individuals work more than L_o, which I postulated to be the maximum working time that is humanly possible (see p. 4). In other words, the labour supply function (6) entails boundaries:

(10a) $$\forall s, \forall t \leq 1, \forall e, w \in [0,1] : 0 \leq L(w, e; t, s)$$

which I call the "lower bound"; and

(10b) $$\forall s, \forall t \leq 1, \forall e, w \in [0,1] : L(w, e; t, s) \leq L_o$$

which I call the "upper bound".

Obviously, given the behavioural assumptions in our model, these constraints boil down to:

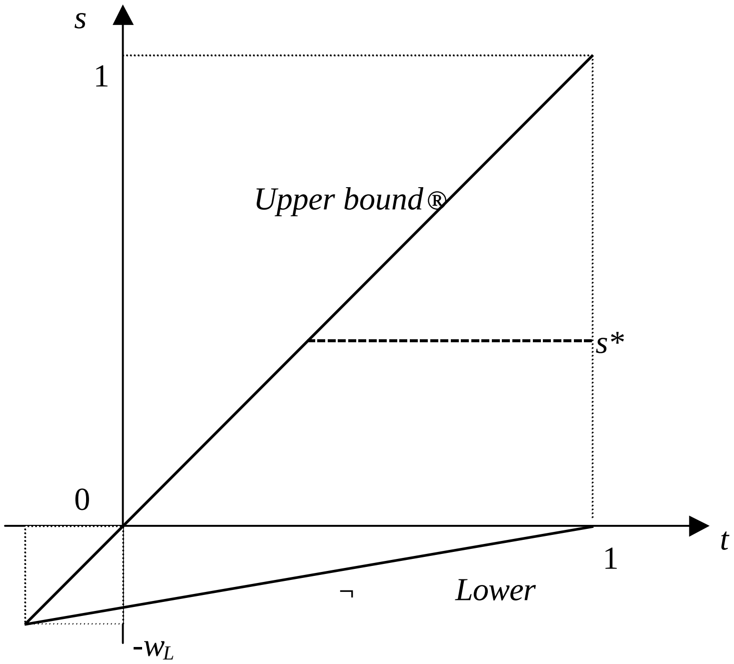
(11a) $$s \geq -w_L + w_L t$$

(11b) $$s \leq t$$

Equation (11a) implies that the total posttransfer "wage" - i.e. the sum of the subsidy rate and the net wage - of the lowest productivity type must never be negative. Together with the constraint that t £ 1, these constraints define the set of policy scenarios over which the government searches the optimal solution, as is illustrated in Figure 1[7].

FIGURE 1

Figuur 1:



One could of course add other constraints. The dashed line in Figure 1 constrains the policy scenarios to policies with $s \leq s^*$ (say, the government pays a limited wage subsidy, which benefits low-paid workers relatively more than other workers, but which is universal *qua* technique, to avoid training disincentives).

6. DEFINING INDIVIDUAL ADVANTAGE

The government cannot define and optimize its policy without an objective notion of advantage, allowing interpersonal comparison. Note that the ordinal nature of utility

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[7] All the examples, in this and in the following graphs, suppose $w_L = 0.2$, $\overline{w} = 0.44$, $s_w^2 = 0.1344$.

functions does not imply that it is *in all cases* impossible to define and optimize policies without objective notion of well-being. In Section 7 I show there exists a case in which one can proceed without objective notion of advantage. But this is the exception rather than the rule.

Suppose the government values the advantage of individuals as follows:

(12)
$$A(Y, L) = Y - \frac{L^2}{d}$$

The government takes it that income always yields advantage. It considers paid labour as a burden. More precisely, the government thinks that, when one does not take into account the monetary reward, paid work is *on balance* a burden for people. Work may be a mixed blessing: paid work brings some benefits (“participating in economic society”, “developing human capital”, “structuring one’s life”...) and some burdens (“having less time for the family”, “less leisure”, etc.). The balance between non-monetary benefits and burdens, as the government perceives it, determines the factor δ. The extent to which the government thinks extra work has to be compensated by extra income, in order to keep a person’s advantage unchanged, for a given level of advantage $\overline{A}$, is given by:

(13)
$$\left.\frac{\partial Y}{\partial L}\right|_{\overline{A}} = \frac{2L}{d}$$

In other words, the government conceives of a legitimate trade-off between income and time for other activity, which is given by:

(14)
$$\left.\frac{\partial Y}{\partial (L_o - L)}\right|_{\overline{A}} = -\frac{2L}{d}$$

I use the expression “legitimate” here with reference to an official notion of individual well-being, not with reference to some deep notion of “desert”. The definition of advantage implies “public indifference” between specified combinations of working time and income; we will see how the definition of advantage impacts on the posttransfer reward for working time.

To simplify the model, it is convenient to use elements of the citizen’s utility functions. If we define $g = d / 2L_0$, equation (12) can be rewritten:

(15) $$A(Y,L) = Y - \frac{L^2}{2gL_o}$$

The parameter *g* characterizes the government's policy stance with regard to its conception of individual well-being: *g* increases when the "burden"attached to working in the labour market decreases in the government's conception of individual well-being. If g $\rightarrow \infty$ we measure advantage only in terms of income. This would follow, for instance, from the traditional presentation of Rawlsian justice, which measures advantage in terms of primary goods, such as income and wealth. The model I propose allows the inclusion of leisure in the set of Rawlsian primary goods. (The neglect of leisure - or, more generally, time for non-market activity - is a well-known problem in Rawlsian justice, first highlighted by Musgrave, 1974).

Let Â(*w,p,e;t,s,c*) be the advantage of a citizen (*w,p,e*) who maximizes his individual utility, given a policy scenario (*t,s,c*). Using equations (5) and (6) we can write this as:

(16) $$\hat{A}(w, p, e; t, s, c) = B + (1-c)p + \left(e - \frac{e^2}{2g}\right) L_o [w(1-t) + s]^2$$

Note the (deliberate) similarity with the indirect utility function V_e (which is again ordinal and non-comparable):

(17) $$V_e(w, p; t, s, c) = B + (1-c)p + \frac{eL_o}{2}[w(1-t) + s]^2$$

Our definition of advantage has the following features:

First, since $t \leq 1$, if $g \geq ½$ then Â is non-decreasing in *w*, for all *e*, since

$$g \geq \frac{1}{2} \Rightarrow \forall e \in [0,1]: e - \frac{e^2}{2g} \geq 0$$

Hence, the government will never "pity" someone who is more talented than someone who is less talented because the former works harder than the latter.

Second, it is not the case that the government thinks someone is worse-off in comparison with someone else, because his *e*-factor is lower. Â is non-decreasing in *e* only if $g \geq e$. There is indeed no reason why advantage should increase with *e*.

Hence, if we take $g \geq ½$, *within every preference tranche* the worst-off will always be members of the productivity type T_{w_L}. However, it is difficult to predict who will be considered the worst-off over the whole population. Two cases should be distinguished: the worst-off individual will be either a citizen characterized by (w_L, p_L, e_L) or it will be a citizen characterized by $(w_L, p_L, 1)$, depending on the value of *g*. Indeed,

$$\arg \min_e \left(e - \frac{e^2}{2g} \right) = e_L \text{ or 1 since the expression is concave in } e.$$

7. DEFINING POLICY OBJECTIVES

7.1. RAWLS

If people are not held responsible for their level of *e*, extreme inequality aversion can be expressed as follows:

$$\max_{tsc} \min_{wpe} \hat{A}(w, p, e; t, s, c) \tag{18}$$

Given that $\hat{A}$ is non-decreasing in *w*, we may write this as:

$$\max_{tsc} \min_{e} \hat{A}(w_L, p_L, e; t, s, c) \tag{19}$$

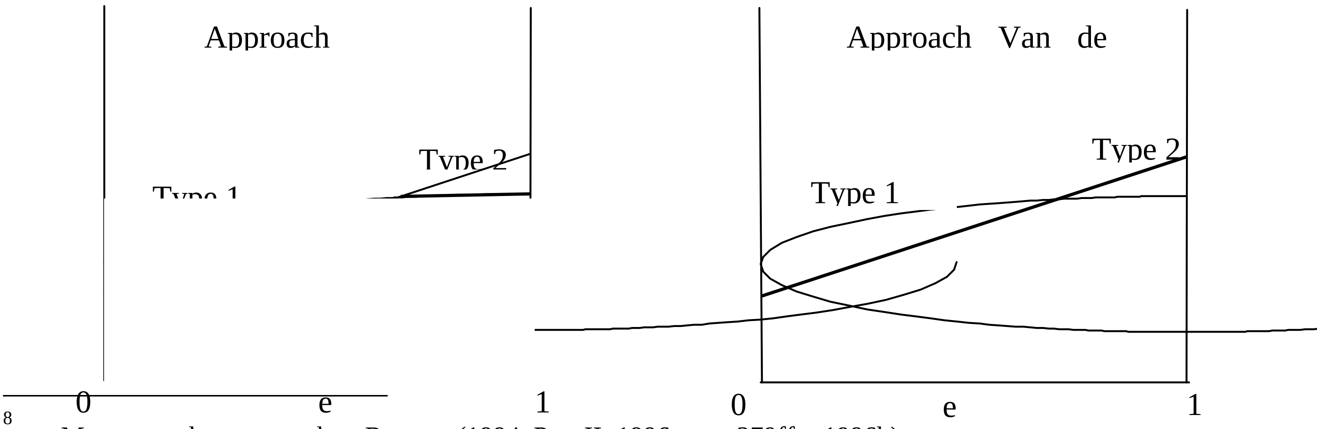
In the traditional Rawlsian view, which excludes leisure from the definition of advantage, the minimal advantage is always assigned to citizens (w_L, p_L, e_L) since $g \to \infty$: the government deems the most “lazy” low-skilled people worst-off. If one drops this assumption, one cannot exclude the possibility that the government considers those citizens worst-off who have lowest productivity, but are most keen on working, i.e. the citizens $(w_L, p_L, 1)$. RAWLS never considers citizens with an intermediate level of *e* worst-off.

7.2. RESPO

RESPO holds people responsible for their level of *e*. A first implementation method has been developed by Roemer[8]. Ideally, what the responsibility-sensitive egalitarian would like to do is choose that scenario *(t, s, c)* that equalizes (more precisely, maximins) advantage across productivity types for each tranche of preferences. Obviously, this cannot be done: a continuum of maximizations cannot be simultaneously performed. In the problem at hand Roemer would propose to choose that scenario *(t, s, c)* which maximizes a weighted average of the minimum advantages across types, where the weight assigned to a given preference tranche is its frequency in the entire population. Roemer states his position as follows: when looking at a preference tranche, it is Rawlsian; among tranches, it is utilitarian, in giving equal consideration to each tranche.

An alternative method is developed by Van de gaer, Martinez and Schokkaert. They argue that, when applying maximin, one should make *the "worst" option set* with which an agent is confronted as good as possible, *qua* option set. The difference in approach between Roemer and Van de gaer is illustrated for a world with two productivity types in Figure 2. (Assume that the preference factors *e* are uniformly distributed over the population.) Roemer looks in fact for the lower contour of the option sets, or, to put it in yet another way, his approach is based on the area of intersection of the option sets for each type; Van de gaer looks for the smallest option set which is open to one and the same person[9].

Figuur 2:



[8] My approach owes much to Roemer (1994, Part II; 1996a, pp. 279ff. ; 1996b).

[9] My exposition of Van de gaer's methodology is based on Bossert, Fleurbaey and Van de gaer (1996) and Van de gaer, Martinez and Schokkaert (1998).

In the framework of my model, Roemer’s approach would entail the following RESPO-objective:

(20) $$\max_{tsc} \int_{e_L}^{1} f_e(w, p, e) \min_{wp} \hat{A}(w, p, e; t, s, c) de$$

Van de gaer’s approach, applied to my model, implies the following RESPO-objective:

(21) $$\max_{tsc} \min_{wp} \int_{e_L}^{1} f_e(w, p, e) \hat{A}(w, p, e; t, s, c) de$$

However, given my assumption with regard to *g*, the choice set of a person belonging to the lowest productivity type T_{wL} is both the smallest choice set, *and* defines the lower contour of all choice sets: if *g* ≥ ½, the frontiers of choice sets cannot cross (as they do in Figure 2). Hence, both approaches boil down to:

(22) $$\max_{tsc} \int_{e_L}^{1} f_e(w, p, e) \hat{A}(w_L, p_L, e; t, s, c) de$$

7.3. Integrating RAWLS and RESPO in one formula

I define two functions which make it possible to use the same general formula for Rawlsian and responsibility-sensitive justice.

For the objective RAWLS:

(23) $$a^{RA}(g) = \frac{1}{\bar{e}} \left(\min_{e} \left\{ e - \frac{e^2}{2g} \right\} \right)$$

For the objective RESPO:

(24) $$a^{RE}(g) = \frac{1}{\bar{e}} \int_{e_L}^{1} f_e(e) \left(e - \frac{e^2}{2g} \right) de = 1 - \frac{s_e^2 + \bar{e}^2}{2\bar{e}g}$$

Note the following properties:

i) $g \geq \frac{1}{2} \Rightarrow a^{RA}(g) \in [x,1]; a^{RE}(g) \in \left[1-\frac{s_e^{2}+\bar{e}^{2}}{\bar{e}},1\right] \subseteq [0,1]$ with $x = \frac{e_L - e_L^2}{\bar{e}}$ when RAWLS pities the lazy, and ξ = 0 when RAWLS pities the workaholic.

and, crucially:

ii) $\forall g : s_e^2 > 0 \Rightarrow a^{RA}(g) < a^{RE}(g); s_e^2 = 0 \Rightarrow a^{RA}(g) = a^{RE}(g)$

Now, using equations (16), (19) and (22), we can write both the RAWLS and the RESPO objective as:

(25) $$\max_{tsc}\left\{B + a\,\bar{e}L_o\left[w_L(1-t)+s\right]^2 + (1-c)p_L\right\}$$

whereby I use “*a*” as a short-cut, either for $a^{RA}(g)$ when we are describing a RAWLS policy, or for $a^{RE}(g)$ when we are describing a RESPO policy.

The parameter *a* captures the overall *policy stance* of the government with regard to responsibility *and* well-being. For the interpretation of the results which follow, it is important to emphasise that, given a distribution of *e*, an increase in *a* can mean one of two things. Either it follows from a transition from the RAWLS objective to the RESPO objective, given a certain conception of advantage, defined by a value *g*. Or it follows from an increase in *g*, given either the RAWLS objective, or the RESPO objective.

Equation (25) also shows that one can consider *both* the RAWLS objective and the RESPO objective as the application of a compensation ê axiom for a certain *reference preference ordering*. The objective in (25) is identical to:

(25’) $$\max_{tsc} V_{\hat{e}}(w_L, p_L; t, s, c)$$

whereby $V_{\hat{e}}$ = the indirect utility function associated with $U_{\hat{e}}$ and $\hat{e} = 2a\,\bar{e}$. (One should note, though, that the correspondence between RAWLS and RESPO and maximin advantage for a reference preference ordering depends on the shape of the functions used in this model, and is not a general fact.)

The programme summarized in (25') implies that we apply the chosen compensation axiom for the reference preference ordering which can be represented by $U_{\hat{e}}$. If we were to *start* from a programme as formulated in (25') (cf. Fleurbaey's "conditional egalitarianism"), we would not need an objective notion of advantage: we can then proceed on the basis of ordinal information only, picking some $\hat{e}$ and maximizing $V_{\hat{e}}$. However, we need an interpersonally comparable notion of advantage if we want to start from the Roemer-Van de gaer programmes (eq. 22) and establish their link with the programme in (25'), as I did here. Starting from the Roemer-Van de gaer programmes, there is only one exception to the requirement of interpersonal comparability: if $w_L = 0$, ordinal information suffices for optimization in regime T.

The alternative presentation of the policy objectives in (25') thus underscores the crucial role, in regime T, of the assumption concerning the productivity of the worst-off. If $w_L = 0$, in regime T one and the same optimal policy will satisfy the compensation axiom for *all* possible reference preference orderings. Two consequences follow. First, the policy analysis can proceed with ordinal notions of well-being. The government can use the shape of the citizens' preference orderings (which it is supposed to know) to search for the optimal policy; and if it did, nevertheless, define and use some objective notion of advantage, as presented in equation (15), its choice of g would be irrelevant. Secondly, whatever our choice of objective (RAWLS or RESPO), when $w_L = 0$, the optimal policy will be the same.

Given that spending on education E is exogenous we can reduce expression (25) to the following objective:

(26) $$\max_{tsc}\left\{\overline{e}L_oQ(t,s)+c\overline{p}-(1-c)p_L\right\}$$

with

$$Q(t,s)=2\left(\overline{w}-aw_L\right)st+\left(s_w^2+\overline{w}^2-2aw_L^2\right)t-\left(s_w^2+\overline{w}^2-aw_L^2\right)t^2-\left(\overline{w}-2aw_L\right)s-(1-a)s^2$$

With regard to the capital income tax, optimal policy obviously requires

$$c = 1 \text{ if } p_L < \overline{p}$$

And we can pick whatever value we want for c when $p_L = \overline{p}$. But in both cases, the policy problem reduces to:

(27) $$\max_{t\,s} Q(t,s)$$

8. SECOND-BEST APPROACH: GENERAL SOLUTION

Q(*t*,*s*) is concave in *s* (for given *t*) and in *t* (for given *s*). Hence we can define a function *T*(*s*) for the unique optimal value of *t*, given *s*; and a function *S*(*t*), for the unique optimal value of *s* given *t*:

(28) $$T(s)=\frac{\overline{w}-\alpha w_L}{\sigma_w^2+\overline{w}^2-\alpha w_L^2}s+\frac{1}{2}-\frac{\alpha w_L^2}{2\left(\sigma_w^2+\overline{w}^2-\alpha w_L^2\right)}$$

(29) $$S(t)=\frac{\overline{w}-\alpha w_L}{1-\alpha}t-\frac{\overline{w}-2\alpha w_L}{2(1-\alpha)}$$

The Appendix provides a graphical analysis of the optimisation exercise on the basis of these equations.

The general solution of the model can be sketched as follows. If we substitute *S*(*t*) for *s* in the objective function Q (eq. 26-27), multiply by (1-α) and delete constant terms, we obtain a new maximization program:

(30) $$\max_t \left[W+\alpha w_L\left(\overline{w}-w_L\right)\right]t-Wt^2$$

with

$$W=(1-\alpha)\sigma_w^2-\alpha\left(\overline{w}-w_L\right)^2$$

Since $t \geq 1$, we have the following results:

i) If $W < 0$, then equation (30) is convex in *t*, and optimal $t = 1$

ii) If $W = 0$, then optimal $t = 1$, since the coefficient of *t* is positive (except when $\alpha w_L\left(\overline{w}-w_L\right) = 0$; then all combinations of $t \in [0,1]$ and *S*(*t*) are equivalent)

iii) If 0 < W < $a w_L \left(\overline{w} - w_L\right)$ then equation (30) is concave in *t*, but the optimal *t* is larger than 1; hence, optimal *t* = 1.

iv) If W ≥ $a w_L \left(\overline{w} - w_L\right)$ then optimal *t* is:

(31) $$t = \frac{1}{2} + \frac{a w_L \left(\overline{w} - w_L\right)}{2(1-a)s_w^2 - 2a\left(\overline{w} - w_L\right)^2} \geq \frac{1}{2}$$

and *s* = *S*(*t*). In order to satisfy the labour supply constraint (11b) it must be verified that *s* £ *t* holds for the optimal value of *t*. It can be shown that this is the case: when *S*(*t*) > *t*, the optimal value for (*s*,*t*) is (1,1) (see the graphical analysis in the Appendix).

Special cases

When an additional constraint on the subsidy is introduced (*s* ≤ *s**), the solution obviously is the same as stated in (31), except when the constraint *s** bites. Then we have:

(32) $$t = T\left(s^*\right) = \frac{\overline{w} - a w_L}{s_w^2 + \overline{w}^2 - a w_L^2} s^* + \frac{1}{2} - \frac{a w_L^2}{2\left(s_w^2 + \overline{w}^2 - a w_L^2\right)}$$ (cf. eq. 28 for *T(s)*)

and $$s = s^*$$

In regime T the subsidy instrument is *not* used: we set *s** = 0, and equation (32) reduces to:

(33) $$t = T(0) = \frac{1}{2} - \frac{a w_L^2}{2\left(s_w^2 + \overline{w}^2 - a w_L^2\right)} \leq \frac{1}{2}$$

With w_L = 0, optimal *t* = ½ in regime T. This is but one instance of a more general result, which holds in regime T, for whatever distribution of *w*, *e*, and whatever value of *g*. i.e. whatever metric of advantage we choose. Suppose the elasticity of the labour supply function is not 1, as is postulated in equation (6), but we have a similar labour supply function (with no income effect on labour supply and constant elasticity) with elasticity $\in$. Then optimal *t* in regime T is *always* equal to:

$$(34) \qquad t = \frac{1}{1+\in} \text{ (when } w_L = 0\text{).}$$

This result can be verified by changing the labour supply function in equation (6), and adjusting the calculation of the budget constraint (equation 9) accordingly. Maximizing the objective function in equation (25) over *t* boils down to maximizing *B* (equation 9 adjusted) over *t*, and this gives the result in (34). Throughout the rest of this paper I will always assume $\in = 1$.

9. TRACING THE OPTIMAL POLICY SCENARIOS FOR α INCREASING TO 1

9.1. Optimal policy track in regime S

We can describe how the optimal policy scenario changes when the policy parameter a increases from its lower bound (always ≥ 0, as explained in Section 7) to 1. Let $s(a)$ and $t(a)$ be the optimal values for *s* and *t* for a given level of a. If no constraint on the instruments bites, the following result obtains (excluding the case where $s_w^2 = 0$)[10].

[10] Solving equations (28) and (29) simultaneously to define *s*(α) and *t*(α) yields expressions of the form *s*(α) = *v*(α)/Δ(α) and *t*(α) = *r*(α)/Δ(α), when Δ(α) = 0. Then one can calculate (eliminating Δ²(α) in both derivatives):

$$\frac{\frac{ds(a)}{da}}{\frac{dt(a)}{da}} = \frac{\frac{dv(a)}{da}\Delta(a) - v(a)\frac{d\Delta(a)}{da}}{\frac{dr(a)}{da}\Delta(a) - r(a)\frac{d\Delta(a)}{da}} = \frac{s_w^2 + \overline{w}^2 - w_L\overline{w}}{\overline{w} - w_L}$$

given that Δ(α) ≠ 0, excludes, inter alea, the uniform distribution, which means $\overline{w} > w_L$.

Hence, given the assumptions of the model, optimal *s* and optimal *t* follow a straight line when α increases. This result yields the coefficient for *t* (α) in equation (35). The constant in (35) is derived from the fact that *t*(0) = ½ and *s*(0) = 0.

The determinant of the system Δ(α) = 4[(1-α) s_w^2 - α$\left(\overline{w} - w_L\right)^2$. If Δ(α) = 0, either there is no solution for (*t*,*s*), and the optimal policy is determined on the boundaries of the permissible set (the lines T and S are parallel), or we have a uniform distribution, T and S forming one and the same line, its slope depending on the value of α. In the latter case there is no single policy track, but for every choice of α a linear combination of *s* and *t*. The analysis in this section excludes the case where $s_w^E = 0$.

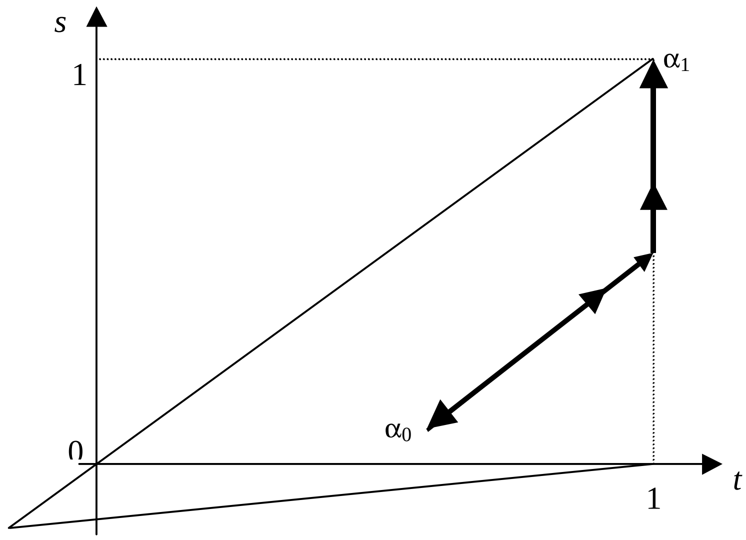
(35) $$s(a) = -\frac{s_w^2 + \overline{w}^2 - w_L w}{2(\overline{w} - w_L)} + \frac{s_w^2 + \overline{w}^2 - w_L \overline{w}}{\overline{w} - w_L} t(a) \text{ for } 1 \leq 1$$

Since S(*t*), i.e. the optimal *s*, given *t*, always increases with *a*, S(1) further increases with *a* when *t* has reached its constraint *t* £ 1. This movement stops when we have reached the corner solution (1,1). The trace of the optimal policy scenarios is depicted in Figure 3A (where I presume that *a* can start from a value a_o)[11]. I will call this the *optimal policy track*. The slope of the first segment, as calculated in equation (35), is always smaller than or equal to 1, but larger than $\overline{w}$. Hence, we can write:

(35') $$s(a) = \frac{(2t(a) - 1)(\overline{w} + q)}{2} \text{ with } \theta > 0$$

FIGURE 3A

Figuur 3a:



[11] The optimal policy track will only rarely start with α = 0. The lower bound of α is given on page 20. For instance, when both *w* and *e* are uniformly distributed over the whole interval [0,1], the requirement *g* ≥ ½ implies $\alpha^{RE}(g) \geq 1/3$. In this particular case we are, moreover, always in the vertical segment of the policy track, where *t* = 1 (this can be verified with condition (iv) at equation 30).

income”.

9.2. Optimal policy track with additional constraint on the wage subsidy, and regime T

When an additional constraint s £ $s*$ is introduced, and it bites, the movement of $t(a)$ reverses, and t decreases with a. The same holds when we are in regime T (s = 0). This is illustrated in Figures 3B and 3C.

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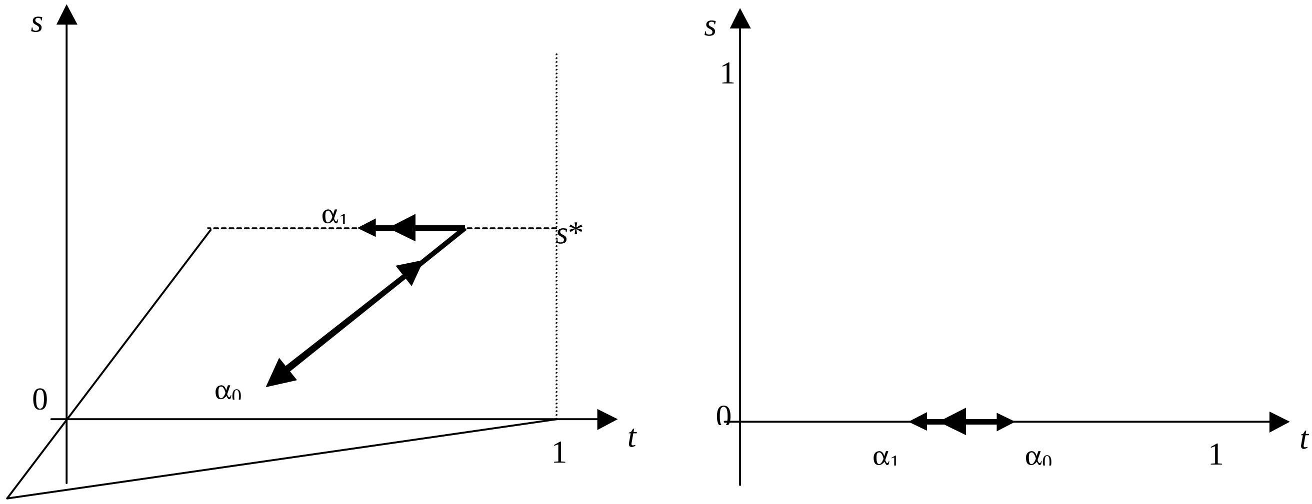
[12] Given that $s'_e > 0$; if $s'_e = 0$ the transition from RAWLS to RESPO does not involve a change in α.

FIGURES 3B – 3C

Figuren 3B-3C



9.3. The impact of policy and pre-tax inequality on the optimal tax rate in regime T

It is possible to rewrite equation (33), which gives the optimal tax rate when no subsidy is used (regime T), as a simple expression of the *policy parameter* a on the one hand, and the *pre-tax inequality* (the economic environment) on the other hand.

Let us define a factor J that *de*creases with two measures of inequality: (i) the productivity of the worst-off divided by average productivity, and (ii) the coefficient of variation of the productivity levels:

(36) $$J = \frac{(w_L / \overline{w})^2}{s_w^2 / \overline{w}^2 + 1}$$

Then equation (33) can be written:[13]

[13] Using the same definition of J we can write equation (32) as

(32') $t = T(s^*) = \dfrac{0.5 - aJ - aJ' s^* + (\overline{w} s^*)/(s_w^2 + \overline{w}^2)}{1 - aJ}$ with J' = $\dfrac{J}{w_L}$.

(33’) $$t = \frac{0.5 - aJ}{1 - aJ}$$

If we define the “Laffer” turning point as the tax rate which maximizes government revenue, it is equal to ½. In regime T the optimal tax rate shifts from the Laffer point towards zero, when aJ increases, that is, when “inequality” (as measured by J) *de*creases, and/or when a increases. Given a distribution of e, the coefficient a increases when the government shifts from RAWLS to RESPO[14], or when its conception of advantage changes[15]. In other words:

(i) a government that considers people responsible for their preferences concerning “time for non-market activity” will propose a lower tax rate than a government that does not hold people responsible for their preferences;

(ii) the optimal tax rate decreases (and the *net* reward for working *in*creases) when the burden of working in the official conception of people’s individual advantage *de*creases. If the government thinks that the well-being of the worst-off is enhanced by working more and earning more money, it will stimulate them to do so.

10. PRINCIPLES OF COMPENSATION; CONDITIONS FOR EQUALITY

Consider again the statement of the policy objectives in equations (25) and (25’). It will by now be clear that, in the second-best constellation of instruments, both RAWLS and RESPO satisfy MAER$\hat{e}$ (Maximin Advantage for Equal reference Responsibility $\hat{e}$), i.e. a maximin compensation axiom which operates for a certain reference preference ordering characterized by $\hat{e}$. The axiom MAER, i.e. maximin compensation for *all* preference orderings, can only be satisfied when $w_L = 0$.

---

14 Excluding the case where $s_e^2 = 0$.

15 The distribution of e also influences $\alpha^{RE}(g)$, and, thus, optimal t. For instance, $\alpha^{RE}(g)$ increases when the variance of e decreases, with a given minimum and average e.

Obviously, when the maximin program implies equality, with t = 1, we can satisfy the stronger axiom EAER$\hat{e}$, and, automatically, also EAER. However, equality only obtains when[16]

$$(1-a)s_w^2 \leq a\overline{w}(\overline{w}-w_L)$$

11. PRINCIPLES OF REWARD: CONDITIONS FOR NEUTRALITY

Recall our specification of a principle of natural reward, the axiom of neutrality, NRUNR:

> "If all individuals are identical with regard to the traits for which the government holds them *not* responsible, there will be no difference between the pre- and the posttransfer distribution of resources in society".

Resources are money and time for non-market activity. Note, first, that when all individuals have the same personal dividend p, and the same level of productivity $w = \overline{w}$, there is no difference between the pre- and posttransfer resources of each individual when $s = t\overline{w}$. This is the practical condition of neutrality for both RAWLS and RESPO. But RAWLS and RESPO have a different conception of what the non-responsible traits are, hence the axiom means different things to them.

For RAWLS the axiom NRUNR means:

$$[w_L = \overline{w} \wedge e_L = \overline{e} \wedge p_L = \overline{p}] \Rightarrow t = \frac{s}{\overline{w}}$$

For RESPO the axiom NRUNR means:

$$[w_L = \overline{w} \wedge p_L = \overline{p}] \Rightarrow t = \frac{s}{\overline{w}}$$

---

[16] One can see this by inspecting the conditions (i-iv) at equation (30). Condition (iv) can be written: $a\overline{w}(\overline{w}-w_L) \leq (1-a)s_w^2$.

It is easy to show that neutrality requires a = ½: when $w_L = \overline{w}$, equation (29) can only be reconciled with the neutrality condition $t\overline{w} = s$ when a = ½.

From the definitions of the a-functions, one can then derive:

$$a^{RA}(g) = \frac{1}{2} \Leftrightarrow g = \overline{e}$$

$$a^{RE}(g) = \frac{1}{2} \Leftrightarrow g = \frac{s_e^2 + \overline{e}^2}{\overline{e}} \geq \overline{e}$$

The mainstream interpretation of Rawlsian justice, which defines advantage only in terms of money income and wealth, presupposes that g $\rightarrow \infty$. This is an extremely biassed conception of advantage.

Note that the optimization of the model requires g ³ ½, as explained earlier. Otherwise we are in difficulty with regard to the identification of the worst-off. Hence, the model presented can only simulate a neutral government, for RESPO, when

$$\frac{s_e^2 + \overline{e}^2}{\overline{e}} \geq \frac{1}{2}.$$

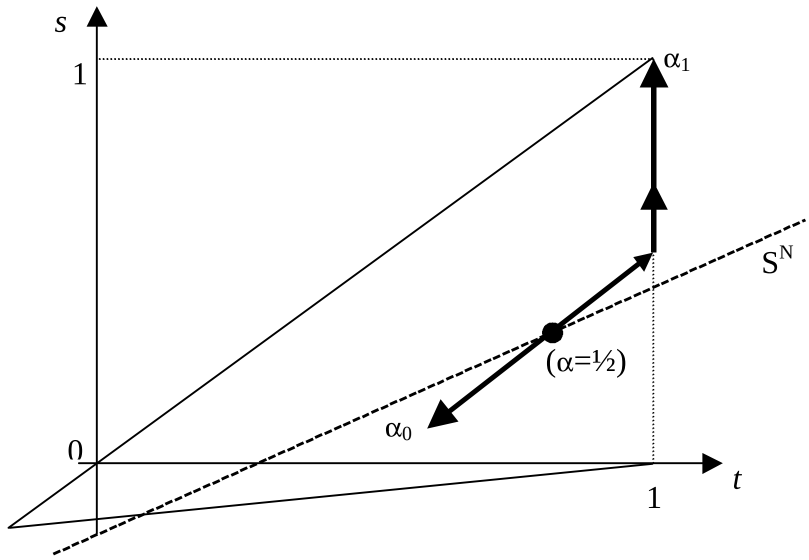
It is possible to draw a line S^N describing “neutral optimal choices for *s* given *t*”, by setting α = ½ in equation (29). This gives:

(37) $$S^N(t) = (2\overline{w} - w_L)t - (\overline{w} - w_L)$$

In Figure 4 we show how the neutral optimal policy is the unique intersection of S^N with the optimal policy track. Figure 4 is based on Figure 3A. When *s* is constrained, but *t* is unconstrained, a similar illustration can be made by defining T^N, setting α = ½ in equation (28), and drawing the line T^N in Figures 3B and 3C.

FIGURE 4

Figuur 4



12. CONDITIONS FOR CONVERGENCE BETWEEN RAWLS AND RESPO

Superficially, one can consider RAWLS more "egalitarian", in that the tax rate is, in the constrained case, with no subsidy or a limited subsidy, always higher with RAWLS than with RESPO. RAWLS holds people responsible for fewer factors than does RESPO, hence RAWLS redistributes more. However, I write "superficially", because the comparison in terms of egalitarianism is misleading. RAWLS and RESPO have a different conception of what equality implies; they apply a compensation principle to different "reference preference orderings", as I explained earlier. Nonetheless, it is interesting to examine under what conditions RAWLS and RESPO might converge in terms of practical policy prescriptions. The model allows us to make this comparison in a systematic way.

Given a certain conception of *g*, the impact of choosing RAWLS versus RESPO depends (i) on the difference between $\alpha^{RA}(g)$ and $\alpha^{RE}(g)$, and (ii) on the impact of α on the optimal (*t*,*s*):

i) The difference between $\alpha^{RA}(g)$ and $\alpha^{RE}(g)$ depends on the distribution of *e* in a complex way, which I cannot fully analyse. Yet, a limiting case if fairly evident: when $e_L = \bar{e}$, the choice between RAWLS and RESPO is irrelevant. Also, for given e_L and $\bar{e}$, the difference between $\alpha^{RA}(g)$ and $\alpha^{RE}(g)$ decreases when the variance of *e* increases.

ii) With regard to the impact of α on the optimal (*t*,*s*), the answer is straightforward in Regime T, as inspection of equation (33') reveals. The impact of α depends on the factor *J* which we defined in equation (36). *J* is inversely related to a compound measure of inequality in productivity. When *J* decreases (when inequality *in*creases) the choice between RAWLS and RESPO becomes less relevant. In a limiting case, when $J = 0$ ($w_L = 0$), there is no distinction between RAWLS and RESPO.

When *J* decreases, for a given distribution of *e*, we can say that the inequality in those factors for which people are not held responsible *in*creases relative to the (constant) inequality in factors for which people are held responsible. In that case RESPO and RAWLS converge. To put it somewhat bluntly: if the government applies only one instrument, income taxation, and it believes that it acts in a world wherein people are in an increasingly unequal position with regard to the market value of their innate talent, the debate between RAWLS and RESPO becomes less important[17]. (A similar analysis can be applied to Regime S, with a constrained subsidy ($s \leq s^*$), as equation (32') in footnote 14 indicates. Note that the impact of the choice between RAWLS and RESPO then also depends on s^*.)

13. BASIC INCOME?

If *B* is positive, we have a universal basic income (see the expression for net disposable income in equation 3). We can now show that *B always decreases* with α.

Figure 5 shows the shape of the iso-B curves, i.e. those combinations of *t* and *s* which yield the same level of B, for given *E* and $\bar{p}$. From equation (9) we can derive a function *BT*(*s*) for the optimal (i.e. B-maximizing) value of *t* given *s*, and a function *BS*(*t*) for the optimal value of *s* given *t*. *B* increases with *t* when:

(38) $$t < BT(s) = \frac{1}{2} + \frac{\bar{w}}{\sigma_w^2 + \bar{w}^2}\, s$$

B decreases with *s* when

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[17] Cf. Roemer, 1998, p. 41.

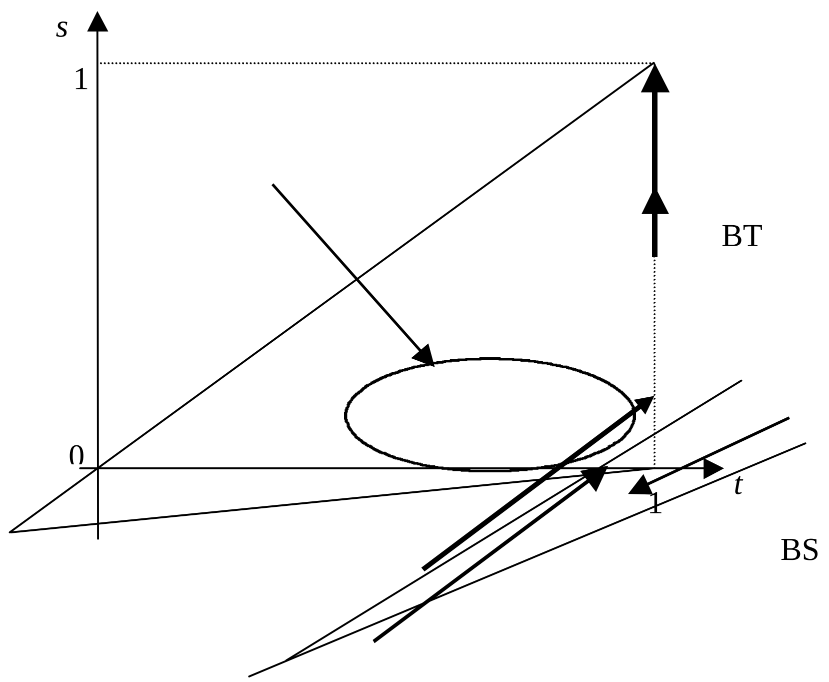
(39)
$$s > BS(t) = \frac{(2t-1)\overline{w}}{2}$$

Condition (39) always holds on or on the left of the optimal policy track, given equation (35'), except at the starting point when t = ½ (for α = 0).

The conditions (38) and (39) define the lines BT and BS in Figure 5. *B* always reaches its maximum level when t = ½ and s = 0.

(When I use, below, the expression "slope of BT", I refer to BT expressed with s as the dependent variable; the slope of BT, so defined, is equal to $\left(s_w^2 + \overline{w}^2\right)/\overline{w}$. Obviously it is always the case that slope BT > slope BS, except when we have $s_w^2 = 0$.

FIGURE 5



It is clear from Figure 5 that, with ***a*** increasing, the optimal policy track always leads to lower levels of *B*. The slope of the iso-B curve is equal to:

(40)
$$\left.\frac{ds}{dt}\right|_{\overline{B}} = \frac{(1-2t)\left(s_w^2 + \overline{w}^2\right) + 2\overline{w}s}{(1-2t)\overline{w} + 2s}$$

When t = ½, the slope of the iso-B curve is equal to $\overline{w}$, for every s. The slope of the iso-B curves then declines until it reaches 0 at the crossing with the line BT. The optimal policy track is always in that region, where the slope of the iso-B curve declines from $\overline{w}$ to 0, because optimal $t \geq$ ½ and the optimal policy track is on the left of (or equal to) the line BT, since:

$$\textit{slope optimal policy track} = \frac{s_w^2 + \overline{w}^2 - w_L \overline{w}}{\overline{w} - w_L} \geq \frac{s_w^2 + \overline{w}^2}{\overline{w}} = \textit{slope BT}$$

As the slope of the optimal policy track is larger than $\overline{w}$ (see equation 35' for the slope of the track in the unconstrained area; in the constrained area the track is vertical), B always decreases when the optimal policies go from (t,s) = (½, 0) to (t,s) = (1,1).

This result also holds when the model operates with an additional constraint on s, of the form $s \leq s^*$. Any departure from the optimal policy track, because of an additional constraint s^*, is a departure to the left in the region on the left of the line BT; hence it decreases B. Formally, since it is always the case that $T(s^*) < BT(s^*)$, B decreases when $T(s^*)$ decreases with constant s^*.

Note though that it is not the case that *loosening* the constraint s^* (i.e. increasing s^*, for instance by introducing the possibility of a subsidy, when that possibility did not exist before) always reduces B. Loosening the constraint on s, means that we travel along the line T, defined by $T(s)$, with s increasing. It is possible, for some constellations of the population (large w_L in comparison to $\overline{w}$), and for large a, that the slope of T is smaller than the slope of the iso-B curve. I do not know whether the theoretical possibility of such constellations is very relevant.

Three conclusions can be drawn:

1) Given a set of instruments and constraints, there is an irreducible conflict between the level of the subsidy s and the level of B.

2) For a given conception of advantage (given g), and given set of instruments and constraints, RESPO yields lower B than RAWLS[18].

3) Both RESPO and RAWLS demand lower B when g increases, for a given set of instruments and constraints.

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[18] Excluding the case where $s_e^2 = 0$.

The conclusion (1) is important with respect to the operational value of the "real freedom inclusion rule", discussed by van der Veen (1997, 1998) in the context of the broader debate on basic income. Van Parijs (1995) defines "real freedom" as the ability to do what one *might want* to do (independent from what one actually wants to do). Van der Veen (1997, 1998) suggests an ordering of option sets on the basis of this concept (instead of an ordering on the basis of people's actual preferences): "*a person's real freedom is said to improve from one regime to another if and only if his choice set unambiguously expands, which is to say that some combinations of income and leisure are added, and none are deleted in the process. If someone's choice sets in two regimes contain non-overlapping income-leisure combinations, it then follows that the extent of his real freedom in these regimes cannot be compared.*" (1997, p 276-277). This section shows that, if two instruments are available (t and s), then there is an irreducible conflict between the level of s and the level of B, when the metric of advantage changes, or when one moves from RAWLS to RESPO. It is easy to show that this makes any pair of alternative option sets (defined by t, B and s), corresponding to alternative optimal policies, *always* incomparable on the basis of the real freedom metric. Consequently, it has no operational value for choosing between RAWLS and RESPO, or for choosing between alternative definitions of advantage[19].

[19] See Sugden (1996) for another discussion of "real freedom" as a metric, with similar conclusions.

14. STATE NEUTRALITY AND BASIC INCOME

Would a neutral government propose an unconditional basic income $B > 0$, when it can use a subsidy without constraints (i.e. constraints other than the balanced budget constraint and the labour supply constraints)?

14.1. Cases whereby equality obtains

Given $t = 1$ and $a = \frac{1}{2}$, equation (29) reduces to

(29') $$S(1) = \overline{w}$$

and equation (9) reduces to

(9') $$B = \overline{e}L_o\left[s\left(\overline{w} - s\right)\right] + \overline{p} - E = \overline{p} - E$$

Assume that we are in regime S, that is, the transfer authority can assess both people's gross earnings and their individual labour time *L*. Then, a neutral government that can obtain equality by intervening with taxes and subsidies, will only cash out a positive basic income if there is a positive residual left after having funded the necessary expenditures for education by the revenue generated by the capital income tax on personal dividends. If the capital income tax does not generate sufficient revenue to cover spending on education, the government will impose a uniform negative poll tax *B* on each citizen. In other words, a neutral government that can achieve equality (as its optimal policy), will use earned income taxation only to fund wage subsidies.

From the equality condition in Section 10 we can deduce that a neutral government can achieve equality when (using $\alpha = ½$ in the condition for equality)

$$s_w^2 \leq \overline{w}\left(\overline{w} - w_L\right)$$

One should note that this conclusion holds both for a "neutral RAWLS government" and for a "neutral RESPO government". However, as I indicated earlier, neutrality requires a different metric of advantage for RESPO and RAWLS (different values of *g*, see Section 11). In other words, the choice between RESPO and RAWLS does not determine whether or not an unconditional basic income is indicated as "optimal policy"; it is the interaction of the choice between RESPO and RAWLS on the one hand, and the conception of advantage on the other hand, that determines whether or not an optimal policy makes use of basic income (when the distribution of productivity characteristics is such that optimal policy means equality).

14.2. Cases whereby t < 1

Using equations (29) and (31) and rewriting equation (9) in terms of $\overline{w}, w_L, s_w^2$ one can show, with some calculations:[20]

$$\left[a = \frac{1}{2} \wedge t < 1\right] \Rightarrow \left[s < \overline{w} \wedge B > \overline{p} - E\right]$$

When the optimal tax rate is smaller than one, a neutral government may grant a basic income to every citizen ($B > 0$), even when the capital income tax does not generate sufficient revenue to cover spending on education. In other words, it can use part of its income tax revenue to fund a basic income. However, one should note that $B > \overline{p} - E$ does not *guarantee* $B > 0$: it is also possible that *B* is a uniform poll tax ($B < 0$); then the difference with the case of equality ($t = 1$) is that spending on education is not only funded by the capital income tax and the poll tax, but also by income taxation.

Again, this conclusion holds both for a RAWLS and RESPO government.

[20] The calculations use the following property of the model: in the unconstrained case, t < 1 implies, for $\alpha = ½$, that $\overline{w}\left(\overline{w} - w_L\right) < s_w^2$; the latter condition can be rewritten $s_w^2\left(\overline{w} - w_L\right)^2 - w_L\left(\overline{w} - w_L\right) > 0$; this also implies $s_w^2 - \left(\overline{w} - w_L\right)^2 > 0$.

” (White, 1999, p. 612). In another contribution White (1997) criticises Van Parijs’s argument for basic income on the basis of “reciprocity”. The model developed in this paper can shed more light on White’s scheme and his discussion with Van Parijs.

First, White’s ESS can be seen as the result of a straightforward optimisation exercise by a neutral egalitarian planner - whether it is a neutral RAWLS planner or a neutral RESPO planner - with sufficient information about a society in which there is no dividend to be redistributed (all $p = 0$), and no education policy E. More precisely, it is the result of optimisation if the distribution of the population’s productivity characteristics w is such that optimisation yields equality (for the equality condition when the government is neutral, see Section 14.1). White captures the ESS scheme by the following function:

(41) $$Y_i = (1 + s_i)W_i H_i$$

where Y_i is the level of after-tax income of individual i, W_i is the individual’s wage in whatever job he/she happens to be working, H_i is hours worked by the individual, and s_i is the subsidy rate applied to each dollar that individual i earns. White proposes the following formula for s_i:

(42) $$s_i = \frac{(T^* - T_i)}{T_i}$$

where “*T^* stands for the average maximum reasonable earnings potential over, say, a full working year, and T_i stands for the individual’s own maximum reasonable earnings* *potential over this same period. Where $T^* > T_i$, s_i will thus be positive; and where $T^* < T_i$, s_i will be negative (i.e. the individual will face an earnings tax)*".

White's "s_i " is a compound measure of linear taxation and linear work subsidy divided by productivity, as I defined them :

(43) $$White's\ s_i = -t + \frac{s}{w} \text{ in my approach}$$

Now, Section 14.1 shows that, when all dividends are zero, when equality obtains and $E = 0$, then, *for neutral choice of g*, White's result is vindicated: first, optimal B is zero, and second, the subsidy s is equal to the average productivity of the population, which is by assumption the average "maximum earning power" (see my definition of w in Section 1). One can compare this optimal result with White's egalitarian earnings subsidy scheme; it matches his proposal exactly. (To see this, set $t = 1$, $s = \overline{w}$, in equation 43 and compare the result with White's proposal and equation 42, given that, by definition, $w = T_i$ and $\overline{w} = T^*$.)

As White says, the need for incentives - given self-interested behaviour - does not, then, defeat the strictly egalitarian result of the scheme. The idea of *reciprocity* (no paid work, no subsidy) is thus vindicated, without appeal to deeper philosophical foundations than those presumed in in the maximin rule and in the axiom of neutrality. For instance, my analysis does not rely on the choice between RAWLS and RESPO, nor on the fact of "social cooperation" in production, which would justify reciprocity (the latter is the argument for reciprocity in White, 1997). (Recall, though, that neutrality requires different values of g in the conception of advantage, for RAWLS and RESPO. For a *given* value of g, RESPO yields lower B than RAWLS, as explained in Section 13.)

However, White's results are incomplete, since he *a priori* postulates B to be zero. White (1997) rejects the idea that external assets (apart from some exceptions) can be used to fund an unconditional basic income on philosophical grounds, pointing to the fact that making productive use of external assets requires social cooperation. Therefore, he does not take external assets into consideration. Van Parijs's (1997) reply to this argument is convincing. Hence I think one cannot *postulate* B to be zero, as White (forthc.) implicitly does.

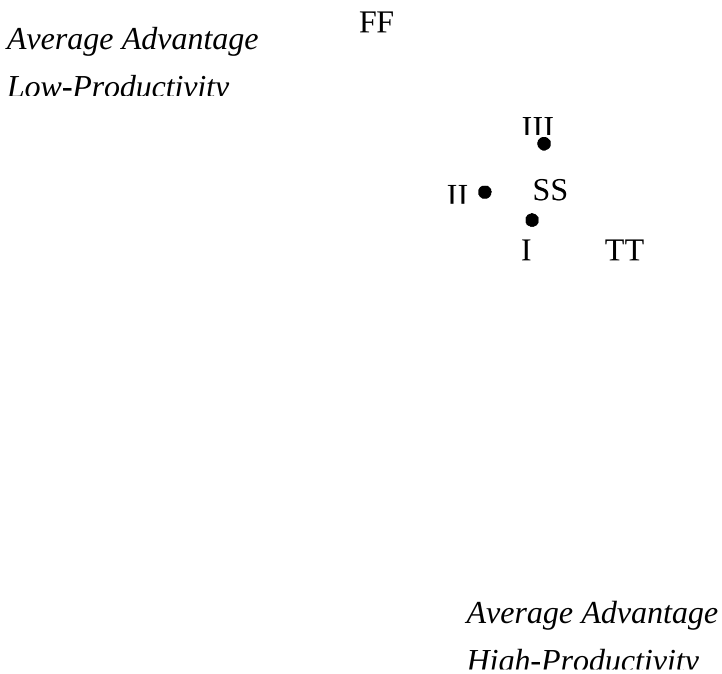
If follows from the model that White's basic assumption that $B = 0$ is not justified, when the dividends p are non-zero and unequally distributed, *unless* (a) one would *a priori* accept

White's philosophical argument, or (b) one would accept a violation of the neutrality principle by a government redistributing on the basis of a very large *g*, that is, a highly "productivist" government. In other words, when the government *can* redistribute a dividend, universal wage subsidies and an unconditional basic income can be complementary principles without violating neutrality. If equality can be achieved as an optimal policy, neutrality demands that wage subsidies be funded by earned income taxation only, and that earned income taxation only be used for wage subsidies. In that case a positive basic income can be funded - if the budget constraint permits it, given the need for other expenditures - on the basis of a dividend, if that is available in society, and the basic income can be unconditional.

The ideal of basic income raises issues of identification (does such a dividend exist?) and intergenerational justice (what part of the "gross" dividend has to be reinvested in the interest of future generations?). One might say, stretching the meaning of words, that White's idea of "reciprocity" reenters by the back door: we should not be allowed to take away from future generations what was given to us by previous generations.

16. COMPARISON OF EFFICIENCY

Figure 6 draws three "advantage possibility frontiers", for a society with two productivity types (type one, which is 40% of the population has productivity 1; type 2 has productivity 0.2; no personal dividends; no spending on education). On the X-axis we have the average advantage of the high-productivity type (a weighted average over all preference tranches). On the Y-axis we have the weighted average advantage of the low-productivity type. The curves depict the highest level of average advantage the low-productivity type can attain, given the level of average advantage the high-productivity type can attain. In the full information regime F, which makes lump sum taxation possible, the advantage possibility frontier is a straight line (see Vandenbroucke, 1999, Section 3.16).


FF
Average Advantage
Low-Productivity
III
II
SS
I
TT
Average Advantage
High-Productivity

CONCLUSIONS

The model presented in this paper integrates two opposite conceptions of personal responsibility into a unified mathematical framework. Thus we can compare them systematically, and define conditions for practical convergence between the policies they indicate. This framework also illustrates how optimal taxation theory may proceed when utilities are considered ordinal and interpersonally not comparable. This requires the definition of an objective notion of individual well-being (which I call "advantage"), except in one special case[21]. I incorporate "time for non-market activity" in the definition of advantage. The model shows how alternative choices with regard to the weight of "time for non-market activity" affect the prescription of policies. More generally, it shows how alternative definitions of well-being affect the posttransfer reward scheme (or, in other words, the "incentive policy") the government proposes.

The model illustrates the idea of a "neutral principle of reward". Moreover, given the assumptions of the model (notably the shape of the functions, the fact that the continuum of "official" conceptions of individual advantage depends on *one* parameter *g*, and the way individual advantage is aggregated for collective choice), a one-to-one correspondence between reward schemes and conceptions of advantage obtains in the second-best regimes T and S, and a neutral principle of reward imposes a *unique* "neutral" definition of advantage[22].

The model also demonstrates that there is a systematic trade-off between the level of a basic income and the rate of wage subsidies, when one moves from a Rawlsian conception of personal responsibility to a conception which holds people responsible for their propensity to work, *and* when conceptions of advantage shift. Given a certain conception of advantage, and given a set of available instruments, RESPO always requires a lower value of *B* than RAWLS. However, the choice between RESPO and RAWLS does not determine whether or not an unconditional basic income is indicated as "optimal policy". To understand the normative issues at play, it is useful to examine the special "pure" case when the distribution of productivity characteristics is such that optimal policy means equality and

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[21] Assuming that the worst-off have zero productivity, in the tax-only regime T, constitutes the special case. The model shows how crucial this assumption (which one finds often in examples in the literature) is: the zero-productivity assumption concerning the worst-off allows the calculation of policies without objective notion of well-being (in regime T), which also eliminates the link between definitions of advantage and principles of reward. Moreover, the optimal policy is then independent of the characteristics of the population.

[22] Excluding corner solutions.

when spending on education is matched by the capital tax revenue. In that “pure” case it is the interaction of the choice between RESPO and RAWLS on the one hand, and the conception of advantage (the choice of g) on the other hand, that determines whether or not an optimal policy makes use of basic income.

Thus the model can be used to shed some light on the discussion between principles of reciprocity (as entertained by White) and basic income. It proves that White’s “egalitarian earnings subsidy scheme” - in which a system of wage subsidies embodies a principle of reciprocity - is the result of a straightforward optimisation exercise, given certain assumptions. However, this result does not defeat the case for basic income. More generally, the model shows that basic income and a wage subsidy can be complementary instruments. However, under certain conditions, a neutral principle of reward demands that earned income taxation only be used to fund wage subsidies, so that a basic income has to be funded (possibly together with other expenditures) by a capital income tax on available “dividends” in society, that is, sources of income not directly linked to labour.

APPENDIX: graphical analysis of the second-best approach with two instruments:

The nature of the optimisation exercise can best be illustrated graphically, starting from equations (28) and (29):

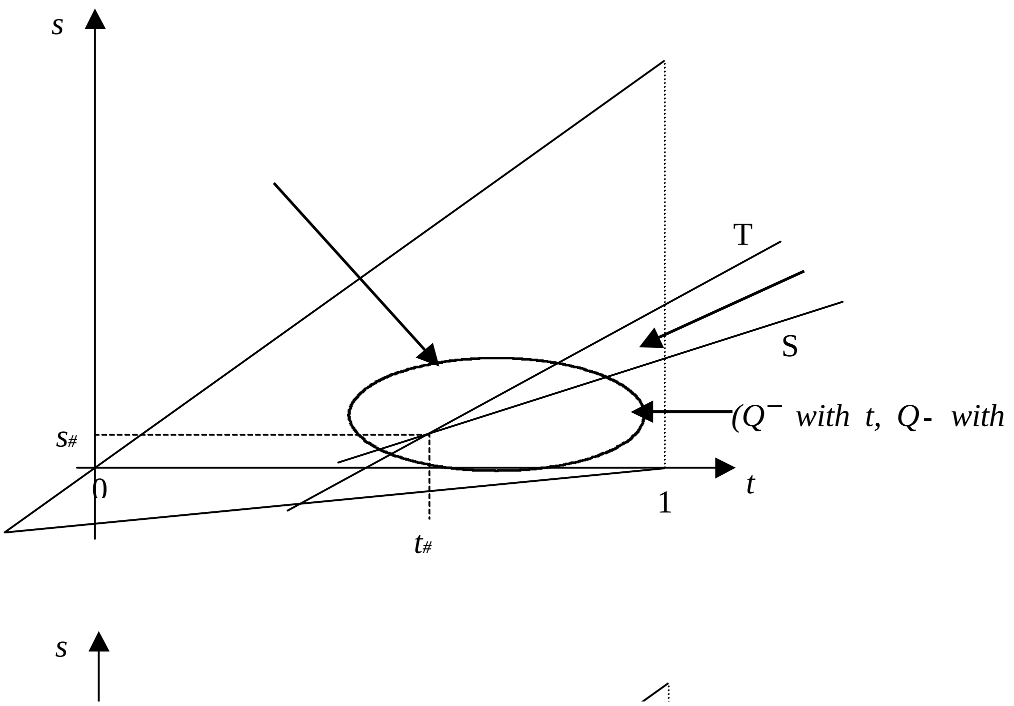
(28) $$T(s)=\frac{\overline{w}-aw_L}{s_w^2+\overline{w}^2-aw_L^2}s+\frac{1}{2}-\frac{aw_L^2}{2\left(s_w^2+\overline{w}^2-aw_L^2\right)}$$

(29) $$S(t)=\frac{\overline{w}-aw_L}{1-a}t-\frac{\overline{w}-2aw_L}{2(1-a)}$$

For a given *s*, the value of the objective function *Q* increases with *t*, when $t < T(s)$ and *Q* decreases with *t*, when $t > T(s)$. For a given *t*, the value of the objective function *Q* increases with *s*, when $s < S(t)$ and *Q* decreases with *s*, when $s > S(t)$.

Figure 7 shows $T(s)$ and $S(t)$ for a population with $\overline{w}$ = 0; w_L = 0.2; s_w^2 = 0.1344. In Figure 7A the lines T and S are calculated with *a* = 0.25; in Figure 7B the lines T and S are calculated with *a* = 0.5. The iso-Q curve marks combinations of *t* and *s* which keep *Q* on a constant level.

FIGURE 7A & 7B

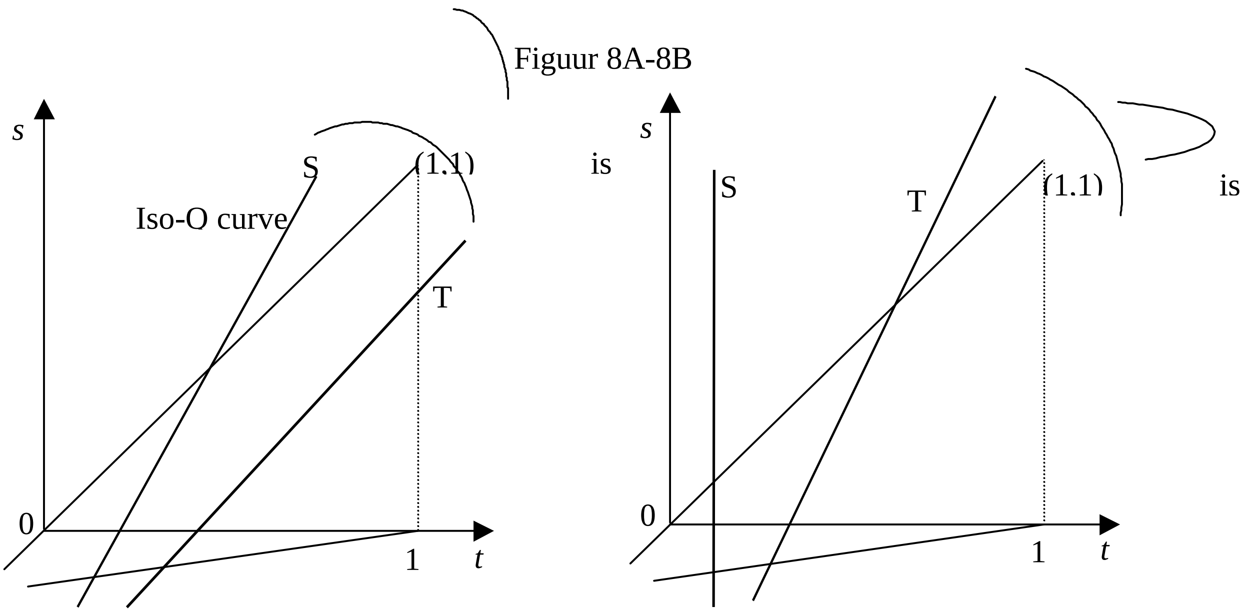


When the optimal solution is not constrained by the limits on *t*, $s\left(-w_L + w_L t \le s \le t \le 1\right)$, cf. Section 5) then the intersection of the lines T and S defines the optimal policy (*t*, s).

Clearly, the line S shifts very rapidly upwards and to the left when α increases. The line T also shifts upwards when *a* increases, but more slowly. However, it is possible that T crosses the "upper bound" defined by the labour supply constraints (equation 11b), namely when the following condition is satisfied: $s_w^2 + \overline{w}^2 - 2\overline{w} + 2aw_L > 0$.

Figure 8 illustrates what happens when the constraints on the instruments bite, again in two cases (*a* = 0.85 in Figure 8A; and $a \rightarrow 1$ in Figure 8B, for a different set of population variables). Note that the iso-Q curves have now a different shape.

FIGURE 8A & 8B



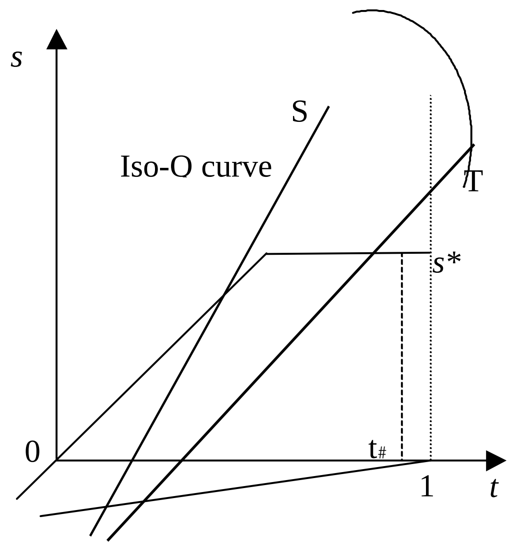
Note that even when T crosses the upper bound, the optimal solution is the corner solution (*t*,*s*) = (1,1). Since the slope of the iso-Q curve is smaller than the slope of the upper bound (which is equal to 1), the highest iso-Q curve is reached at the corner. The slope of the iso-Q curve increases from 0, where T intersects the upper bound, to a value given by the following expression:

(A1) $$\left.\frac{ds}{dt}\right|_{\overline{Q}} = \frac{s_w^2 + \overline{w}^2 - 2\left(\overline{w} - aw_L\right)}{\overline{w} + 2\left(1 - a\right)} \; at\left(t, s\right) = \left(1,1\right)$$

The value given by this expression is positive when T crosses the upper bound, but it can be verified that it always ≤ 1, since $s_w^2 + \overline{w}^2 \leq \overline{w}$.

The fact that the corner solution is the optimal solution when both S and T cross the upper bound, depends of course on the slope of the upper bound. If an additional constraint is set on the level of the subsidy *s*, it is possible that the corner solution is sub-optimal. This is illustrated in Figure 9 for *s* = *s**.

FIGURE 9



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CONVERSION OF FIGURES:

NEW VERSION	THESIS
FIG 1	fig 3.1 and part of fig 3.2 (dashed line to s^*)
FIG 2	fig 3.3.
FIG 3A	fig 3.7. but with α starting from α_o instead of starting from 0
FIG 3B	fig 3.8
FIG 3C	fig 3.9
FIG 4	fig 3.10
FIG 5	fig 3.11
FIG 6	fig 3.12
FIG 7A	fig 3.4A
FIG 7B	fig 3.4B
FIG 8A	fig 3.5A
FIG 8B	fig 3.5B
FIG 9	fig 3.6