CES Working Paper Series

THE GENEALOGY OF MODERN THEORETICAL PUBLIC ECONOMICS: FROM FIRST BEST TO SECOND BEST

Roger Guesnerie

Working Paper No. 76

1994

Center for Economic Studies
University of Munich
Schackstr. 4
80539 Munich
Germany
Telephone & Telefax:
++49-89-2180-3112

I am grateful to Gary Fields and C. Blackorby for discussions on the subject of this paper. Related lectures were given last academic year in Munich and Paris. I am grateful to participants, and particulary to E. Malinvaud, H. W. Sinn for their suggestions. Finally, I thank P. A. Chappori and M. O. Yanelle for deciphering and commenting a preliminary draft of this paper.

CES Working Paper No. 76
December 1994

THE GENEALOGY OF MODERN THEORETICAL PUBLIC ECONOMICS: FROM FIRST BEST TO SECOND BEST

Abstract

The development of second best modelling in the seventies has shaped modern theoretical public economics. The paper discusses some key changes in the economists' conceptions. The first two sections examine the efficiency-equity dilemma. The study of non convexities has shown that counterintuitive "efficiency enhancing" income redistribution might occur. The introduction of asymmetric information has shed doubts on virtues of lump-sum compensation. The last sections focus on the intricate geometry of second best optimisation and the ambiguous value of the signals provided by the price system outside a first best world.

Keywords: public economics, non convexities, second best, asymetric information, shadow prices

Roger Guesnerie
DELTA - Département et Laboratoire
d'Économie Théorique et Appliquée
ENS - École Normale Supérieure
48, Boulevard Jourdan
F-75014 Paris
France

my work. The standard excuse is that you know better your own work. I am afraid that I have no better one. Second, the choice of themes reflects my own intellectual history. Pushed at the limit, the sections may be viewed as the steps of an intellectual psycoanalysis in which the patient attempts to discern the most significant and traumatic shocks in the development of his (intellectual) personality. The starting point is here an education exposed, through the direct or indirect influence of Allais, Boiteux, Malinvaud, Kolm... to the teachings of the French School of "ingénieurs economistes", which promoted a variant of the first best tradition. Naturally, what I find paradoxical, surprising or traumatic may appear less paradoxical, surprising to those exposed to other variants of the first best tradition.

Three more remarks are in order.

First the fairly broad perspective adopted here hopefully fits the spirit of the EEA A. lectures. It may also reflect the fact that my recent work consists of a book (A contribution to the pure theory of taxation, Guesnerie (1994) - now properly advertised) rather than of articles.

Second, throughout the paper, the argument will be illustrated from the same simple model appropriately modified. This will have the advantage of providing a connecting thread to this lecture. This will have the inconvenience of switching of risk from the Charibdus of exessive generality to the Scylla of excessive technicality.

Third, each section will be preceded by the statement of some "vérité première" (something intermediate between a basic truth, veritat indiscutibile, grund wahreit, verdad de pugno) that will be discussed and sometimes refuted. The first two "vérités premières" concern the efficiency - equity dilemna and lead us to examine the problem of "Non convexities and Efficienty Enhancing Income Redistribution" (Section 1) and "Asymetric information and the lost virtues of lump sum compensation" (Section 2). The titles of the last two sections "Intricate geometry and the difficulties of optimisation" (Section 3) and "Second best social values and the ambiguity of price signals" speak of themselves.

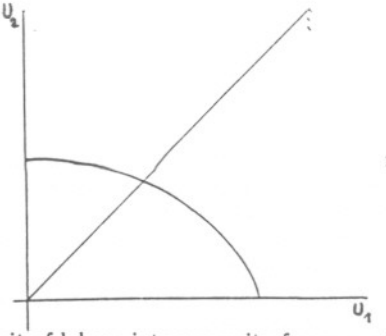


Diagram 1

allows to transform one unit of labour into one unit of consumption good. If I consider, following Mirrlees (1974) that θ is an individual productivity parameter that transforms effective labour into efficient labour - labour of the model - then differences in preferences as a function of θ reflect partly or totally differences in skills[2]. Taking the case when θ can take two values θ_1 , the low skill θ_2, the high skill, $\theta_1 \leq \theta_2$, then I can vizualize the utility frontier (or Pareto frontier) of the economy as on Diagram 1. The horizontal and vertical axes are associated respectively with the low skilled and high skilled levels of utilities, respectively U_1 and U_2 .

The shape of the frontier is intuitively justified[3], in the productivity interpretation of θ just alluded to, by the fact that putting high skill workers at a low utility level - by confiscating their (high) endowment of (efficient) labour and distributing the whole production to the low skilled agents - is most effective in giving the low skilled workers a high utility (and "more effective" than the converse operation is for the high skilled workers, when the low skilled worker are put at a low utility level).

The simplistic economy just sketched allows a sharp illustration of different possible conceptions of the role of the economist as a policy adviser. Probably everybody

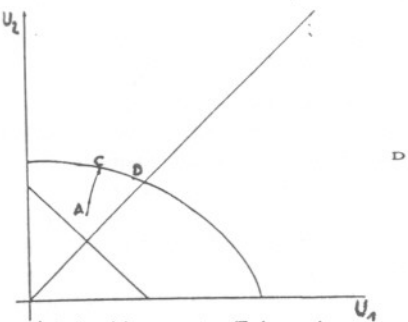


Diagram 2

would agree that the economist should promote efficiency i.e. recommend policies that would bring the system form the economic state (associated with) A to the economic state B. Differences occur on what is going next.

[2]For example, if as in Mirrlees (1974), households have the same "basic" preferences over the bundle consumption - effective labour represented by a utility function $U(C, l)$, they have different preferences over the bundle consumption, efficient labor i.e. $V(C, L, \theta) = U(C, \frac{L}{\theta})$ since efficient labour equals effective labour multiplied by productivity.

[3]It is rigorously justified, in the case sketched in footnote 1 where utility across agent are indeed comparable - by Mirrlees (1974). See also Guesnerie (1980).

The first polar conception to be introduced may be called the open (uncommited) view. Within such a view, the policy recommendation does not reduce to the description of the policy measures that bring from A to B but has to be acompanied of a comprehensive assesment of the income transfer policies allowing to achieve any point of the Pareto frontier.

In order to be more explicit on the distributional problem, let us proceed as follows. Consider a given Pareto optimum (associated with some given point on the Pareto frontier) and compute using the prices that "support" the optimum , the value of the bundle of each type of households. The value of the bundle equals the sum of the value of the consumption good, and of the value of leasure. Sum accross households the values of individual bundles and call the sum "national income"[4]. Now the value of an individual bundle over the value of national income is the individual's share of "national income".

Diagram 3 a [5]visualizes the mapping which associates to each point of the Pareto frontier of our economy the shares of national income of low skilled and high skilled agents. Let us call this mapping the Negishi mapping[6]. To make things short,

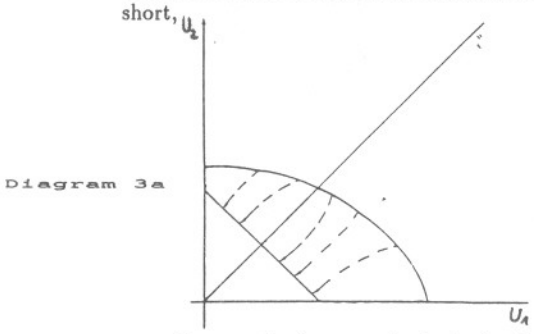


Diagram 3a

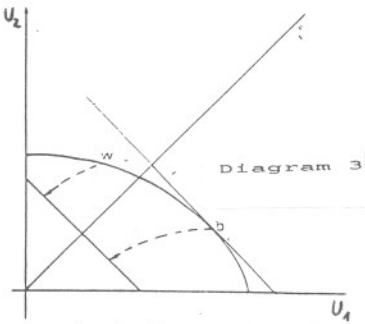


Diagram 3b

according to the "uncommited view", the economist should transmit to the policy-maker, together with "efficiency" recommendations, information on (something that closely relate to) the Negishi mapping.

An opposite polar conception of the role of the economist will be termed the "commited view" : the policy advice should concern not only efficiency but also in an unambigous way equity. In particular, the economist should make recommandations, grounded in ethics, on the choice of a point on the utility frontier. Diagram 3b visualizes the utilitarian choice (maximation of a Benthamite social

[4]This conforms standard pratice, except for the valuation of leasure...

[5]It is only for the sake of simplicity that the diagram suggests that this mapping is one to one. As it is well known this is not generally true.

[6]The idea of associating some income distribution information to any a Pareto optimum is due to Negishi (1960). The mapping used here is not the only one can be called the Negishi mapping.

welfare fonction) together with the income distribution that allows decentralisation (The picture confirms the qualitative features stressed above).

Finally, let us come to what I am tempted to call the Cesaeran-like view of the economist's intervention : here the job essentialy consists in recommending the change from A to B. Such a single minded focus on efficiency can be justified by the Caesaean prerogatives of the political instances. "Leave to Caesar what belong to Caesar". Efficiency is in the economist's realm. Value judgment on income redistribution are in the realm of "politics" i.e., of the "Government"[7]. Adherence to such a view is sometimes justified by pragmatism, so that one will also refer to it as the pragmatic view.

Naturally, the above descriptions refer to three polar and somewhat caricatural views. Distinctions will usually be less sharp. For example an adept of the so called Caeseran view, who has read the modern general equilibrium literature, would probably admit that the policy advice has to cope with the multiplicity problem - the fact that several equilibria may exist for the same income distribution - whenever it appears. Also each of us may find merits to each view and let one or the other prevail according to the type problems he is thinking of.

However, it is customary that real life policy recommendations stick at least implicitely to the so-called Caesarean - like view. The main emphasis is put on efficiency of policies and little if anything is said on the way they affect the distribution of welfare[8] . To mention an example of recent hot debates, I have found intensive discussion on the efficiency gains of trade liberalization but little on their distributional effects[9]. In a similar way, the introduction of one volume of a recent I.E.A. conference stresses that income redistribution is usually given little attention in the reform programs for Eastern Europe (D. Bös [1993]).

Whatever maybe the actual practice of economists, the point I want to stress here is that the logical coherency of the view on separation of efficiency and equity associated with the Caesarean view crucially relies upon the fact that any income distribution - in my short story above any point of the simplex of R^2 - can be associated with efficiency. The existence of what I am now calling Efficiency - Enhancing income redistribution (Pareto Improving income redistribution would be technically sharper but less suggestive) is a major conceptual challenge. If some income distribution are "inefficient", how can it be outside the scope of the analysis to look at income redistribution ? In order to give to Caesar what belongs to Caesar, one has to know what belongs to Caesar !

[7]The justification has to be distinguished from the one according to which the economist has some views about income redistribution but does not insist on letting them prevail (this would rather be a Pontius Pilatus view) or from the one according to which the economist is not competent on the problem.

[8]This pratice is often explicitely acknowledged and advocated in cost-benefit analysis. The so-called potential Pareto Criterion is a good example of such a conscious pratice.

[9]In this field, the question of whether the appropriate lump sum transfers, are internally balanced (Dixit - Normam (1982)) may make the problem more acute than in others.

2.2. "Efficiency enhancing" income redistribution.

"Efficiency Enhancing" income redistribution is hence a conceptual breach in the standard "Caesarean" conception of the separation between efficiency and equity issues. Such a breach has been open by the examination of non convex economies (see Guesnerie [1975]), in a first best context. In such a context, the phenomenom is not related to non-convexity perse, but to certain discontinuities that certain types of non-convexity introduce.

In order to give some intuition on the nature of the problem just evoked, let us first come back to our simple economy and replace the constant returns to scale technology by one that displays increasing returns to scale. Production takes place with a fixed cost - but that has to be paid is unskilled labor - and a marginal cost (smaller than before) - that consists of skilled or unskilled labour weighted by the productivity parameter. The reader will convince himself that the Pareto frontier of the new economy may have the shape suggested by diagram 4 a[10].

Diagram 4a

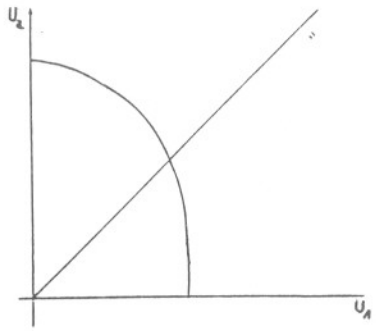
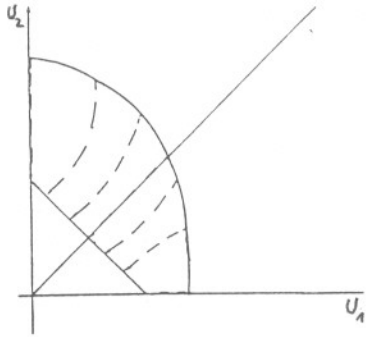


Diagram 4b



Also diagram 4 b visualizes an income redistribution mapping that has qualitative properties similar to those occuring in a convex economy. However, its interpretation is slightly different : to every Pareto optimum is associated an income distribution that allows to decentralize it,but here decentralization only obtains when the non-convex firm sells at marginal cost [11]. Although the conditions for efficiency have different implications for the organization of production

[10]Clearly in this economy, the maximal utility level that can be given to high skilled agents can be "high", particularly if marginal cost is low when the maximal utility level of low - skilled agents will be "small", particularly if the fixed cost is high.

[11]In particular, marginal cost pricing will involve a deficit. On marginal cost pricing equilibria, see for example Beato [1982], Cornet [1988].

- marginal cost pricing - the argument for the separation of efficiency and equity issues if fairly similar here : in particular no income distribution can be ruled out as being "bad".

Let us now complicate the economy by assuming that it can use either the initial constant returns to scale technology or the fixed cost technology. What happens for the income mapping in the new economy ? A possible answer is provided by diagram 5 which obtains from the superposition of diagram 3b and 4b.

Diagram 5a

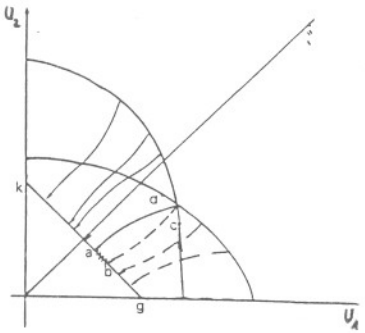
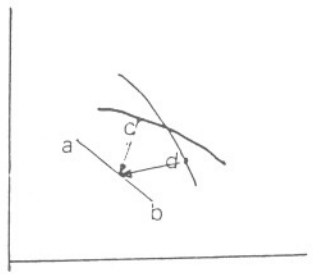


Diagram 5b



The choice of the first best Pareto optimum either involves the use of the convex technology together with an income distribution over KA or the choice of the non-convex one together with an income distribution in the range BG. An income distribution over A B either generates a Walras equilibrium in which in the convex technology is used (with D on the utility frontier) but which is Pareto dominated by an allocation that is obtainable through the use of the non convex technology or generate a marginal cost pricing equilibrism in which the non convex technology is used (with image C on the utility frontier) but which is Pareto dominated by an allocation obtainable through the use of the convex technology. In both cases, an income change (increasing M. 2's share in the first case and M. 1's share in the second case) is socially desirable and "enhance efficiency"[12]

[12]What is presented here is not a closed example but a bold interpretation in the present context, of my initial example(Guesnerie (1975)). Further analysis of the phenomenom is given in Brown-Heal [1978], Beato- Mas Colell [1983], (1985), Quinzii [1988]

3. Asymmetric information and the lost virtues of lump sum compensation

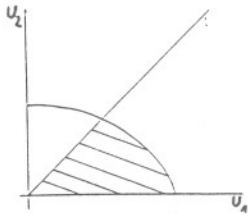
"Cuando el agente tiene mas informacion que el principal sobre ciertos aspectos importantes para la relacion, solo la revelara si ello va en su interés" D. Perez-Castrillo, I. Macho 1994 "Introduccion a la economia de la informacion" p.114.

3.1. Incentive compatibility and second best taxation :

Modern ideas about information have challenged not the usefulness of lump sum compensation but its feasibility. Income transfers stressed by the standard neo classical tradition - the first best tradition - have to depend on variables the values of which are hidden to the policy-maker. It may be one hidden action, for example an unverifiable amount of effort which determines the probabilistic features of the random outcome of an investment. It may be hidden knowledge, if for example some of the individual characteristics on which transfers should be based are not publicy known and are the agent's private information. For example, the lump sum transfers allowing the decentralization of the first best Pareto optima of the model of the previous section have to be indexed on the productivity parameters . If the latter hidden - and the cost of verification is high enough - then the Planner's action must be based on the information that the consumers will accept to reveal : in other words, it must rely upon what incentives theory calls incentive compatible mechanisms.

The fact that incentive compatibility actually restricts the Planner's possibilities is obvious from the previous model where, as suggested above, differences of preferences are interpreted as productivity differences. If the planner observes (efficient) labour and consumption (but not productivity), a high productivity agent can always mimick a low productivity agent and be better off than him. Hence incentive compatibility certainly restricts utility vectors (u_1, u_2) to lie above the first bissectrix[13].

Diagram 6



[13]As suggested by diagram 3b, the Benthamite social optimum involves such a "large" redistribution that the "low productivity agent becomes better off than the high productivity one (in the case stressed in footnote where such a comparison makes sense). Clearly such an optimum is incentive compatible.

Incentive compatible mechanisms are complex theoretical objects. In some sense, tax systems can often be viewed as simple, "real world", versions of such mechanisms (see J. Mirlees (1972), P. Hammond [1979], R. Guesnerie [1981]). Before introducing a tax system in the model of previous section, let complicate slightly its structure by introducing a public good : the model has now three goods, labor, consumption good and public good. In this new framework, let us describe an economic organisation à la Diamond-Mirrlees (1971), where the public good is financed by taxes.

Producers, on the one hand and consumers, on the other hand, are faced with two different price systems, the production price system p and the consumption price system π. Here, we can normalize price systems, without loss of generality[14], by taking labor as the numeraire so that both its production price and its consumption price equal one; hence p and π will designate not vectors but (positive) numbers, respectively the production and consumption price of the consumption good and T=$\pi - p$, the difference, is a specific tax.

The competitive supply of the production sector (assumed to be private) is denoted $\eta(p) = (\eta_1(p), \eta_2(p))$ where $\eta_1(p)$(resp $\eta_2(p)$) is the net output in labour (resp consumption good) supplied by the producers when they face the prices (1,p) for labour and consumption good.[15]

The net trade demanded by a consumer of characteristic θ is a vector $d(\pi, \theta) = [d_1(\pi, \theta), d_2(\pi, \theta)]$

$with(d_1(\pi, \theta) + \pi d_2(\pi, \theta)] = 0$, individual budget balance). In this formalization the pure profit of the private firms does not appear in the determinants of demand : indeed it is implicitly assumed to be taxed away. Also, preferences are assumed to be separable between private and public goods.

Two final ingredients of the model are in order : first, we assume that there are "many" agents, so that aggregate demand obtains by integration of individual demands over the set of characteristics denoted Θ ; second, the public good is produced from labor only with a constant returns to scale technology that transforms one unit of labour into one unit of public good.

We are now in a position to define a tax equilibrium as a triplet (p, π, y'_o) with T=$\pi - p$) such that

$$d_1(\pi) = \eta_1(p) - y'_o$$
$$d_2(\pi) = \eta_2(p)$$

[14]In this model of linear taxation, whether we tax labour or the consumption good is unimportant. Hence, the model can be viewed as a model of "linear income tax". In the corresponding interpretation, the tax base (labour income) is the standard tax base of the optimum taxation literature. Whether this modelling option is appropriate for the theory of taxation is debatable (see Kolm(1970) Maskin(1980)).

[15]Note that we give up here the assumption of constant returns to scale of the beginning of section 2. This is not essential for the following.

with $d_i(\pi) = \int_{\Theta} d_i(\pi, \theta) d\mu(\theta)$

or in a more compact form

$$(3)\ d(\pi) = \eta(y'_o, p)$$

At this stage, the following straightforward remark may be made : since the choices of all agents are made within the same budget set i.e $\{(x_1, x_2) \mid x_1 + \pi x_2 \leq 0\}$, the private consumption bundle $d_i(\pi, \theta)$ of M. θ is preferred by him to any consumption bundle $d_i(\pi, \theta')\forall\theta' \neq \theta$. Using this remark, together with the fact that the households sector has "many" agents, the reader is invited to check why and in which sense the taxation scheme under consideration here is incentive compatible. A deeper question is wether such tax schemes are efficient" incentive compatible devices. This is a more difficult question[16] on which only two introductory points will be raised.

First, the tax system can be significantly improved by allowing an income transfer R that would be uniform across agents, so that incentive-compatibility would not be affected. The equilibrium equation would become (forgetting about the public good and with obvious notation).

$$(4)\ d(\pi, R) \stackrel{def}{=} \int d_i(\pi, R, \theta) d_\mu(\theta) = \eta(y'_o, p)$$

Second let us consider in the new model an equilibrium $\bar{p}, \bar{\pi}, \bar{R}$ with $\bar{T}=\bar{\pi} - \bar{p}$. The tax equilibrium with $\bar{T}$ is Pareto dominated by a first best Pareto optimum : why is it not the case that the price and income changes that, according to the second welfare theorem, would generate the improvement to first best are not achievable ?

The interested reader will find both an answer to the question and the intuition of the answer when consulting Hammond [1979], Guesnerie [1981], [1984][17].

[16] For an in-depth analysis of this problem that cannot be reproduced here the reader should consult Hammond P. [1979],Guesnerie R. [1981], Roberts K. [1984], Dierker E, Haller H. [1991], Mas-Collel A, Vives X. [1992] among others.

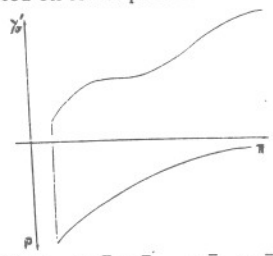
[17] Roughly speaking the argument is the following : because of incentive compatibility, the choice set of agents in the revelation game designed for implementing the move should be the same across agents (see Hurwicz [1979], Hammond [1979], Guesnerie [1981] ; because the outcome is Pareto optimal, then the choice set should have locally the same supporting line. But these local supporting lines have to be global either because the set of agents' characteristics is connected - as in Champsaur-Laroque [1981] or because the consumption good is tradable on side markets (Guesnerie [1981]).

3.2. Efficiency, equity and income transfers in a second best context :

The present version of our simple model is amenable to a simple geometric representation. This representation follows the convention set up by Monge, the founder of a scientific field, called descriptive geometry[18].

Descriptive geometry obtains two dimensional representation of 3 dimensional objects (curves, surfaces, volumes) by projecting them on two orthogonal hyperplanes, that are put into correspondence on the same two dimensional sheet of the paper. Here, the set of equilibria is a curve in R^3,whose projection on the vertical plane is represented on the upper part of diagram 7, and whose projection on the horizontal plane is represented on lower part of the same diagram.

Diagram 7



On this diagram, a current tax equilibrium is $\bar{p},\bar{\pi},\bar{y}_o$and $\bar{T}=\bar{\pi}\cdot\bar{P}$ is visualized. The reader is invited to mentally reconstruct the one-dimensional set of tax equilibria in the 3 dimensional space.

The difficulty of separating efficiency and equity issues was the subject of the previous section 2. Here, the difficulty is exacerbated as the following diagram suggests : the "move" of the set of tax equilibria from AA' to BB', in an unambigous sense, improves efficiency : However if the consumption sector consists of the two types of agents whose indifference curves are sketched here, changing taxes so that their consumption prices switches here $\underline{\pi}$ to $\underline{\underline{\pi}}$ would reduce the welfare of both agents.

Diagram 8a

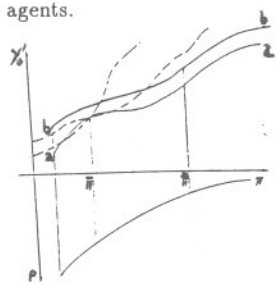
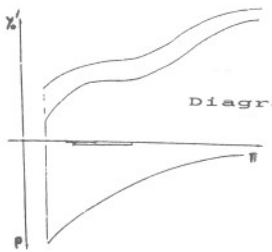


Diagram 8b



[18]Monge, also the founder of a well known French institution, Ecole Polytechnique, 200 years ago.Concerning descriptive geometry, we use it only here as a representation device, when it was used as a tool, for example for assessing the intersection of three dimensional bodies.

Here the pragmatic economist of previous section cannot content himself with recommending the so called efficiency change. He must, in addition and to the least, provide information on the set of second best Pareto optimal equilibria (taxes) in both the initial situation and the final situation.

Income transfer policies more complex than the uniform lump sum transfer policy evoked above, can be incoporated into the model ; but they have to be based upon observable characteristics. For example,let us take one observable characteristic with two values, let us say upper and lower bar. Distinguishing between agent upper bar and lower bar, leads to rewriting the market clearing equation as

$$(5)\ \int_{\Theta} \bar{d}_2\,(\pi,\theta)d\,\bar{\mu}\,(\theta) + \int \underline{d}_{-2}\,(\pi,\theta), d\,\underline{\mu}\,(\theta) = \eta(y'_o,p)$$

Where $\bar{d}_2$(resp $\bar{d}_2$) denotes the demand coming from the agents upper bar (resp lower bar) and where $d\bar{\mu}\,(\theta)$ (resp $d_{\underline{\mu}}(\theta)$) denotes the probability measure that governs the distribution of θ conditional on upper bar (resp lower bar).

An income transfer policy that would transfer ΔI units of income from agents upper bar to agents lower bar would be feasible if and only if (with straight forward notation).

$$(6)\ \int_{\Theta} \bar{d}_2\,(\pi,-\Delta I,\theta)d\,\bar{\mu}\,(\theta) + \int_{\Theta} \underline{d}_2\,(\pi,\Delta I,\theta)d\,\underline{\mu}\,(\theta) = \eta(y'_o,p)$$

or, for short :

$$(6')\ \bar{d}\,(\pi,-\Delta I) + \underline{d}\,(\pi,\Delta I) = \eta(y'_o,p)$$

The analysis of the just defined income transfer policy is easy in the limit case where the policy does not modify the market clearing equation i.e. where, for some small $\Delta I > 0$,

$$(7)\ \bar{d}\,(\pi,-\Delta I) + \underline{d}\,(\pi,\Delta I) = \bar{d}\,(\pi,0) + \underline{d}\,(\pi,0)$$

Then, the (approximate) effect of the policicy on social welfare is

$$(8)\ \int_{\Theta} -\lambda(\theta)d\,\bar{u}\,(\theta) + \int_{\Theta} \lambda(\theta)d\,\bar{\mu}\,(\theta),$$

where $\lambda(\theta)$ is the marginal social value of income going to agent θ.

Formula (8) makes clear that the effectiveness of the policy depends upon the correlation between the observable characteristics (upper bar, lower bar) and the unobservable characteristics : the policy is not effective when they are uncorrelated and would act as a lump sum transfer if they were perfectly correlated.

Turning to the case where the special equality (7) does not hold any longer the examination of hte conditions for an enhancing income tranfer policy can still be made. It is easy to check that, to the first order, the amount ressources "released" by the policy is $\Delta S = \Gamma(-\partial_R \underline{d} + \partial_R \bar{d})\Delta I$ when $\partial_R d$ denotes the marginal propensity to consume. It is positive if $\partial_R \bar{d}$ is greater than $\partial_R \underline{d}$ and $T > 0$. This surplus can be used for producing ΔS units of the public good. Consumers lower bar will clearly favour the change. If consumers upper bar like enough the public good they will also be better off. This is a second best instance of efficiency enhancing redistribution whose mechanics is fairly simple : the income change increases enough tax receipts to generate a public good increase that compensates the "losing" consumer.

The idea can indeed be systemalized in order to provide an example of an economy in which the transfer $\Delta I = 0$ is never associated with a second best Pareto optimum[19].

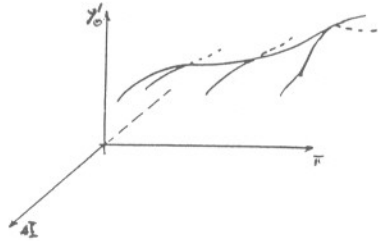


Diagram 9

Diagram 9 rightly suggest that the existence of Pareto improving income redistribution occurs here as part of a more general phenomenom : in the extended

[19]Take for generating d, two groups of consumers with Cobb Douglas utility functions, as in Guesnerie [1994] chapter 2 example, - control for the range of π (and p) which can be candidates for being second best Pareto optima of the model restricted to $\Delta I = 0$, and choose them such that $\Gamma(\partial_R \underline{d} - \partial_R \bar{d} > 1 - \mu)$ over corresponding range of π. But then, if the marginal willigness to pay of both consumers is greater than none of these tax equilibra are - second best Pareto optima when ΔI is allowed to vary. If they were, they would have to satisfy necessary condition for second best Pareto optimality in the unrestricted models which are violated.

In order to provide a complete example of an economy in which the transfer $\Delta I = 0$ is never associated with the second best Pareto optima, the following construct is likely to be conclusive.

model of equation (6) the set of $(\pi, \Delta I, y'_o)$ that can be associated with a second best Pareto optimum may be extremely complex : Hence distributions matters more than in a convex first best model, not because there is more scope for redistribution - there is less in the sense suggested by diagram - but because distributional policies - that act though taxes, income transfers - cannot be in principle separated from allocational policies.

Two final remarks are worthwile.

First, when comparing efficiency enhancing income transfers policies in the first best context of section 2 and in the second best context of the present section, the similarities that exist - and in particular the fact that non convexities are almost always present in the second best model - (see next section) - must not hide a significant theoretical difference. In section 2, the income changes that were Pareto improving were necessarily finite changes, here, they may be infinitesimal changes ; the phenomenom was in some sense global, here it is local.

Second, although the most economically policy significant examples of the phenomenom have been given outside the field of public economics stricto sensu (endogenous, growth Shleifer..[ ] or education externalities Durlauf []) it seems difficult to dismiss it as a theoretical curiosum in standard second best models.

Indeed the strong conditions found by Dierker [1989], for ruling it out in a model in which a public firm is subject to a budgetary constraint à la Boiteux, provide further confirmations of the theoretical generality of efficiency enhancing income redistribution policies in a second best world. In our present state of understanding, (and in my opinion) those who believe that the phenomenom is pratically irrelevant should be given the burden of the proof.

4. Intricate geometry and the difficulties of optimisation :

"The literature... is a plethora of first order conditions" P. Hammond, Oxford Economic papers 1992, p.15.

The ideal Arrow-Debreu world is a convex world. The theoretical intuition developed from the examination of elegant convex structures may be somewhat inappropriate when it has to face the analytical complexities that appear outside the ideal first best convex model.

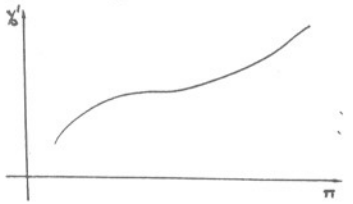
In a second best model, the previous section has already made clear that the feasible set on which the welfare analysis takes place may display a complicated geometry. To analyse more in depth the nature of the difficulty, a sample of different complications will be presented and illustrated within the framework of the simple model of this paper. Such analytical complications threatens the success of the optimisation process. In the first two cases, the result of an optimisation attempt may be "dubious" or "misleading". In this third case, optimisation may be in some sense "dangerous".

4.1. "Dubious" or "Misleading" optimisation :

Lets us first come back on the fact that the second best optimisation problem is no longer a convex problem. Three different aspects of the questions may be stressed, using the geometric representation of the set equilibria of the taxation model associated with equation (3) of previous section.Neither the feasible set - the set of tax equilibria visualized on the diagram 10 a) nor the preference of agents - I mean the indirect preferences over the space (π, y'_o) - are (normally) convex (Diagram 10 b). A fortiori the reduced form of the taxation (social) choice problem which obtains when one associates the agents' utilities as a function of the points of feasible set - here utilities as a function of π which parametrizes the feasible set - is not convex.(*Diagram*11)

The consequence of non convexities for the optimisation problem is pretty clear : necessary conditions for social welfare optimality are no longer sufficient. The significance of the problem can be better assessed in our simple taxation model by reminding that, in this model, it has been shown (Guesnerie -Jerison [1991])

Diagram 10a



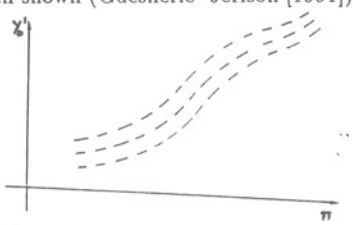
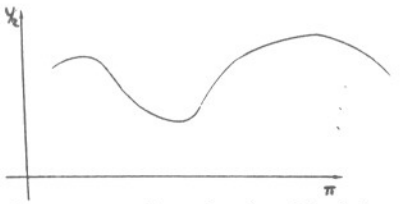


Diagram 10b

Diagram 11a



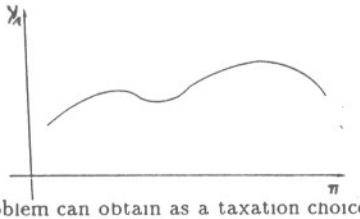


Diagram 11b

that any one-dimensional social choice problem can obtain as a taxation choice problem of a well behaved economy (well behaved meaning with convex technologies and a downward sloping aggregate demand curve). In other words, taking any muple of utility profiles over the relevant range of π - a subset of R_+ - one can find an m-agents economy such that the indirect utility functions of the m-agents over this subset coincide with the given profiles. One consequence of this fact is that even is the well behaved version of our simple taxation model, the number of local optima - for an a priori given social welfare function - is not a priori bounded ! This is a case where optimisation may be called dubious.

A particulary embarassing non convex configuration occurs when the feasible set is non connected - i.e it consists of several pieces that have no connections between them. This happens when the simple tax model is complicated to allow

for utility functions that are nolonger additively separable between private and public goods. Diagram 12 displays an example of Fuchs - Guesnerie [1983] in which the set of tax equilibria has two connected components.

The existence of the upper part of the set of tax equilibria in the space (π, y'_o) is explained by synergies between the level of public goods and the labour supply (with the non separable utility functions, the public good "stimulates" labour supply). However an algorithm of gradual tax reform - of a kind frequently considered in tax problems[20]- would not leave the connected component where its starts from and might arrive a point such as A - which is straightforwardly

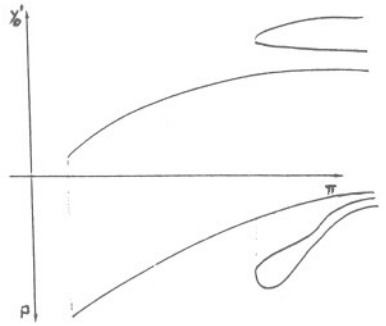


Diagram 12

Pareto dominated by B or C. Even if A were the true second best optimum restricted to the corresponding connected component, it would still be socially unsatisfactory. Optimisation would be misleading.

4.2. "Dangerous" optimisation :

The phenomenon we are now analyzing results from the existence of a certain type of discontinuities in the feasible set. To let it appear, the taxation model has to be amended in such a way that the private good is produced by a monopolist instead of a competitive firm. For a given tax T on the consumption good, a monopolist with constant marginal cost b, solves the problem : Max $(\pi - b)$ $d(\pi) - Td(\pi)$. As shown in Guesnerie Laffont [1978], the following may happen : for low values of T up to T_o, the monopolist produces low amounts of the private good up to $d(\pi^A)$,for T greater than T_o, the monopolist produces low amount of the private good(above $d(\pi^B)$; but it never produces in the intermediate range. (diagram 13 provides a graphical and hopefully intuitive "proof" of this fact).

Diagram 13

[20]see Guesnerie (1977), Dixit (1979), Diewert (1979), Weymark (1981) etc...

The consequences for the set of tax equilibria are roughly suggested by Diagram 14. Assuming that the profit of the monopolist are taxed away, then the set of tax equilibria is a subset of the set of tax equilibria of the competitive taxation model : its discontinuity between A and B corresponds to a switch in production for the tax rate T_o.

Diagram 13

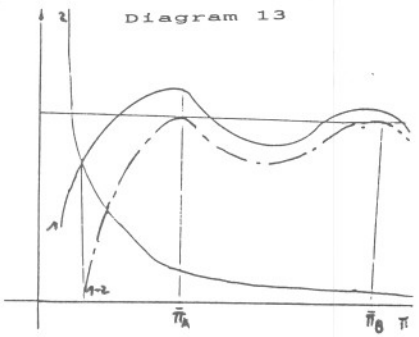
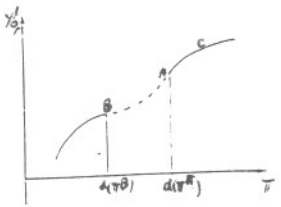


Diagram 14



The discontinuity has a major consequence for optimisation : it will "often" occur ("often" is voluntary vague and has to be understood across social welfare functions, problems etc...) that the social welfare optimum selects A or B rather than a point like C on the continuous part of the feasible set. This fact which is easy to understand intuitively from the diagram has however a crucial corollary[21] : assume that the social optimum is B : it obtains for the tax T_o when the monopolist is indifferent between choosing the production $d(\pi^A)$ or $d(\pi^b)$. Then a small mistake in the choice of the tax $(T_o - \varepsilon)$ will lead to the tax equilibrium A, and will generate a drop in social welfare. This is a case of dangerous optimisation, a phenomenom which is likely to recur in every model in which, for whatever reason, some of agents in the economy react in a discontinous way to the controls. In such models, the endogenous selection by the optimisation process of points in which reactions become discontinous is non pathological.

The complex geometry of the optimisation problems, that was successively associated with dubious, misleading and dangerous optimisation, is may be one reason for the success of the "reform" approach to taxation and policy assesments.

The reform approach (Feldstein [1976], Guesnerie [1977] puts emphasis on small changes of the system and aims at a local rather than global welfare analysis;

[21] Another corollary is that the "first order approach" - in which the equations describing the monopolist's behaviour are the first order conditions of his maximisation problem- is not valid. This is the point emphasised by Mirrlees (1975) whose analysis was taking place in a moral hasard context. Guesnerie-Laffont 's (independant) findings stressed the "danger" aspects just evoked.

Even if the linkage of a large number of small desirable changes generates a tax reform algorithm that may converge to a second best optimum (Fogelman, Guesnerie, Quinzii [1978]), the emphasis of reform is on small changes of the system rather that on the large change of optimisation. This more modest view of policy assessments has however to face the difficulties of analysing general equilibrium interactions. The division of labour between "Bureaus" à la Musgrave (that would be respectively in charge of allocation, distribution and stabilisation), would require - as analyzed in Guesnerie (1994) - complex exchange of information that reflect in another way the connections between the equity and efficiency issues.

5. Second best social values and the ambiguity of price signals

"Si les prix des fournitures... sont égaux au coût de revient..., la solution la moins coûteuse pour (lui) est également la moins coûteuse pour la collectivité" M. Boiteux, 1956, Revue Française de l'énergie.

5.1. Prices and social values :

The quotation from M. Boiteux provides a particulary sharp and eloquent statement of one article of faith of the classical tradition of public economics. The market prices provide signals to the agents that are appropriate estimates of "social costs" - or social values - and that provide the appropriate valuation of inputs or outputs in private cost benefit analysis. Later, in the text Boiteux recognizes that his precept - indeed an advocate for marginal cost pricing in the public sector- holds true only if it is accepted in all sectors of the economy i.e. if marginal cost pricing is universally in operation. Clearly Boiteux is aware that he refers to a first best precept whose ultimate justifications has to be found in (some version of) the second welfare theorem. He is also aware that, because for example, of monopoly power in other sectors, the precept can only be approximately valid. Second best modelling has raised greater doubts, that question even the approximate validity of the Boiteux sentence.

In a second best world, social optimisation will pick up a second best optimum, for example one that will maximise some social welfare function. Second best optimisation takes into account the technological and scarcity contraints - which are the only concern of first best optimisation - but also other contraints - i.e. those which in the present model arise from basic informational asymetries. At the second best optimum, as well as in a first best one, Lagrange multipliers can be associated with the scarcity contraints. As well as in the first best problem, these Lagrange multipliers provide shadow prices that give the right "social" valuation of an exogenous manna of extra endowments - or of the endogenous manna that a "public" investiment creates [22]. Hence, the Lagrange multipliers associated with all commodities can be viewed as "social opportunity costs" or " social values of commodities". But contrarily to what happens in first best optimisation, these social opportunity costs do no coincide[23] any longer, at least in general, with market prices.

In the taxation model of section 3, the situation is somewhat less clear cut. Two sets of prices emerge at the optimum ; the consumption price system and

[22] In such a case, the manna will have negative components.

[23] Coincidence is here understood up to a proportionality coefficient

the production price system. Clearly, both cannot reflect social opportunity costs : However here one of them - the production price system - provides the appropriate shadow prices. This property echoes in the present model what Diamond-Mirrlees, who discovered it, have called production efficiency. But this property crucially relies upon the fact that consumption and production prices can be entirely and costlessly disconnected. In the present simple taxation model, this means that the tax on the consumption good is not a priori limited. In the general version of the model, it requires that any amount of tax or subsidy - can be levied on any good... When constraints on taxes and subsidies bind at the optimum, the social values of commodities cease to coincide with production prices. As argued in Guesnerie [1979], the existence of discrepancies between prices emerging from markets - independantly of whether one or several price systems may be viewed as candidates - and social values, is a general phenomenom as soon as one leaves the first best world[24]. This view has confirmation to leave the domains of public economics strito sensu, let us quote the findings of Greenwald-Stiglitz [1985] who studied markets in which transactions have to face moral hazard problems or the welfare analysis of incomplete markets (Geanakoplos - Polemarchakis [1986]).

5.2. Theoretical and practical consequences :

In a second best world, prices provides ambiguous signals. This has a number of important theoretical implications. Let us stress three of them.

1 - In the first best tradition discrepancies between price signals and market prices have to be reduced as much as possible - possibly along the lines suggested by the large literature on distorsion - reducing price changes (see. f.e. Dixit [1975]). Second best is not only the realm of irreducible distorsions as argued by Lipsey-Lancaster [1986] but also the realm of optimal distorsions. In our taxation model the discrepancy between one set of market prices, the consumption prices, and the income social shadow prices is created rather than destroyed by optimal policy intervention.

Note ironically that the failure of the price systems to signal social values does not enter well the traditional categories of government failures and market failures (it is in some sense a market failure that derives from a Government failure - failure to redistribute income in a lump sum way and may be to impose high enough taxes and subsidies).

2 - The extent of the discrepancy between prices and values is clearly variable across problems. Discrepancies should reflect the conditions of external trade : a "small" country facing world prices should use them for valuating traded goods

[24] Production efficiency in Diamond-Mirrlees [1971] model or C.C. efficiency in models of the type considered by Guesnerie [1975] are noticeable exceptions.

and mobile factors (Little-Mirrlees [1969])[25]; also, along the lines of an argument with classical or Sraffian flavour (Diamond-Mirrlees [1971], , Guesnerie [1994]), they should reflect the technological conditions of production.

Existing numerical calculations, such as those of Heady.-Mitra (1982), suggest that the order of magnitude of discrepancies may be significant.

3 - At a second best optimum, Boiteux's assertion is negated : A subset (or all) private agents make consumption or production decisions which, although the cheapest or the more profitable for them, given the set of prices signals which they face, is not cheapest or the more profitable for the society. The words "for the society" here refer to the agregation of individual objectives that is implicit or explicit in the optimisation process. For example at the optimum of the taxation model, if $T^*>0$ i.e. if the optimal tax on the consumption good is positive, everybody consumes "too less" of the good. A policy of forced consumption that would impose upon to buy and consume one more unit, would be socially desirable. (Guesnerie- Roberts (1984)

The "detection" of the biases between social costs and prices provides indications on the social biases of private choices (for example in the taxation model of the biases of consumption and labour decisions) and may suggest additional - when compared to the set of policy tools which are considered in the initial optimisation program - intervention (for example in the taxation model, the quota policy just evoked). Indeed, the knowledge of social values of commodities provide the appropriate information for assessing "piecemeal policies" that act at the margin of the second best optimum.

It should be stressed that successful government intervention through such piecemal policies indeed relies on the detection of the biases between the private signals and social values and not on the fact that the Government "knows more" about some features of the situation than the private agents do : in fact, in the taxation model although the Government has no access to the private information of individual households, he still "knows" that they make "socially wrong" calculations.

The recognition of the role of social values for the assesment of piecemal policies that act at the margin of an (at least partially) optimized situation offers the basis for a theoretical resolution of the "contradiction" of second best modelling. The "so-called contradiction can be described as follows : as argued in the introduction, second best owes its intellectual appeal to the fact that it allows a general equilibrium assesment of public policies. However, the incorporation of too detailed policies within a general equilibrium framework often leads to opaque conclusions. An operational and still theoretically acceptable substitute for the full optimisation would be to separate, let us say structural policies - those whose optimization would allow to provide a crude reference for social opportunity costs

[25] But note that prices that themselves emerge from the interaction of a large number of small countries might be far away from the right world "shadow prices".

-from piecemeal policies - those that are assessed using the preceding opportunity costs. Naturally much remains to be done to coinsider that the above so called contradiction is satisfactoryly resolved !

The just sketched methodology has however been used for a theoretical assessment of a few number of "real world" policies. Let us quote two :

First, the method has shed light on the merits of quotas policies (redistribution in kind, rationing), in the case where they are not plagued by black markets (Guesnerie - Roberts (1984)). It has shown, within a variant of the taxation model considered here where skilled and unskilled workers are employed in two different sectors, that minimum wage legislations may be, at least when parameters take the appropriate values, socially beneficial (and even Pareto - improving) (Guesnerie - Roberts (1987)).

Second, Cost Benefit analysis is an important practical subject where all the theoretical issues just evoked creep in. Indeed, the comprehensive synthesis on the subject by Dréze-Stern [1987], in the Handbook of Public Economics, fully faces the theoretical and practical uncertainties on the choice of appropriate social opportunity costs, either in a reform or with an optimisation perspective.

6. Conclusion :

"Il pleut des vérités premiéres"
My various attempts at a better recognition or identification of the most basic conceptual breaches between the first best and the second best constructs have to come to end. Before coming to the conlusion, it should be acknowledged that the points evoked in the lecture may have a somewhat different status. As an example, I have little evidence to bring now to suggest that the non-connectedness of the set of feasible states is more than a theoretical curiosity. On the contrary, I believe that the phenomenon called "dangerous optimisation" has very general scope.

Now the conclusions will make two additional points. First, after the genealogy of second best, more recent chapters of the development of knowledge will be briefly evoked. Second, a final perspective on the general message of the paper will be provided.

Recent advances of knowledge provides new ingredients for the development of the hypothetical second best culture which this text attempts to promote. In this respect, a few chapters might be added to the present text.

The first one could be entitled "Limited commitment and the losses due to time inconsistencies". The macroeconomic literature has stressed the phenomenom of time inconsistencies generated by the inability of Government to commit to policies. This limited ability to commitment is a more general phenomenom

which affects not only the so called Government - and at a more basic level the political process of democratic societies - but which also undermines the contractual relationship of private agents, of sovereign states etc... In many public economics problems, such a limited ability indeed introduces a true second best constraint - as basic as asymetric information is -and which should modelled as such[26].

Another chapter should aim at assessing the modifications of our understanding of competition generated by the introduction of the adverse selection and moral hazard effects in the analysis of the interactions between private firms. It might be called "Competitive policies faced with modern theories of contracting" mimicking (the title of) my survey on "The Arrow-Debreu paradigm faced with modern theories of contracting".(Guesnerie(1992))

The analysis of "private versus social insurance" or "expectational coordination failures" would respectively concern one established subject - insurance - and a novel one ,the (hypothetical) future success of which would revive the hope of reintegrating the Musgravian branch of "stabilization" into the mainstreams of public economics.

Finally, it goes without saying that a good understanding of" bureaucratic or political failures" is part of a theoretical public economics culture (should it still be called second best ?) that would be comprehensive[27].

Let us come back again on the content of the paper. Most of it relies an existing (and more or less well known material) that is put in a chosen perspective. With its own argument and perspective, the message however echoes the messages of other colleagues faced with the same challenge of commenting modern developments of theoretical public economics. (I have in mind in particular the two pieces of P. Hammond "Theoretical progress in public economic : A provocative assesment" and the Innis lecture of C. Blackkorby "Economic Policy in a second best environment"). My renewed emphasis on the interactions between efficiency and equity issues, the intricacies of optimisation and the role of price signals may be justified by the (too) slow progresses of second best teachings within the profession. To take a few examples, such teachings have been very slowly digested by general equilibriums theorists : studying incomplete markets, they partly reinvented the problematic of second best taxation rather than importing it as it would have been possible. In a simular way the normative analysis of contractual relationships has sometimes played with ideas that appeared before in the second best literature). Even within public economics, a number of studies either take little distance with the techniques of second best optimization or seem to give up theory when switching to facts.

[26]See P. Hammond (1993) for work in such a direction.

[27]For references on the subject, the reader may consult

The present message is hopefully clearcut and conceptually sound. The clarity of the conceptual aspects - and of their implications for our theoretical "culture" - should finally be contrasted with the uncertainties concerning some of their substantive implications.
For example, what has been called the ambiguity of price signals in section 5 is well established but has little obvious substantive implications - which shadows prices should we use ? -

The situation is still more striking when considering the efficiency-equity dilemna : in a second best world, the economist has no well grounded theoretical argument, that can justify disinterest for distributional issues. Distribution is in some sense "conceptually" more important than in a first best context. This does not imply, and my opinion may be at variance with those of my two colleagues quoted above, that redistribution is a more substantive issue in a second best context. It is, in some sense, even the contrary since less redistribution is possible in second best world when compared to first best.[28]

A clear conceptual message may have unclear substantive implications. This is hardly a paradox. This means that theory must not only provide clear ideas on the world - the set of which we called culture - but also firm references to practitioners - the set of such references might be called a doctrine. Using the suggested terminology, one can conclude that the development of an elaborate second best culture and of a sound second best doctrine is a joint challenge.

[28]Indeed, Sah (1983) has (convincingly) argued that simple linear tax systems perform little redistribution.

BIBLIOGRAPHY

Atkinson, A. (1993), "The Journal of Public Economics at 21 years and 50 volumes: a personal view", Journal of Public Economics Master Index 1-7 North Holland.

Atkinson, A. and J. Stiglitz (1980), Lectures in Public Economics, Mac Graw Hill.

Beato, P. (1982), "The Existence of Marginal Cost pricing with Increasing Returns", Quaterly Journal of Economics, 97, 669-689.

Beato, P, A. Mas-Colell (1983), "Gestion au Coût Marginal et Efficacité de la Production Agrégée: un Exemple", Annales de l'Insee, 51, 39-45.

Beato, P, A. Mas-Colell (1985), "On Marginal Cost Pricing with Given Tax Subsidy Rules", Journal of Economic Theory, 37, 356-365.

Blackorby, C. (1990), "Economic Policy in a Second Best Environment", Innis Lecture, Canadian Journal of Economics, 748-71.

Bôs, D. (1993), "Introduction: Challenges for Public Economists", in Economics in a Changing World - Proceedings of the Tenth World Congress of IEA - Volume 3 - edited by D. Bös, St. Martin's Press.

Brown, and G. Heal (1979), "Equity, Efficiency and Increasing Returns", Review of Economic Studies, 46, 571-585.

Cornet, B. (1988), "General Equilibrium Theory and Increasing Returns: Presentation", Journal of Mathematical Economics, 17, 103-118.

Diamond, P.A and J. Mirrlees (1971), "Optimal Taxation and Public Production", American Economic Review 61, 8-27, 261-78.

Diamond, P.A. and J. Mirrlees (1976), "Private Constant Returns and Public Shadow Prices", Review of Economic Studies, 43, 41.7.

Dierker, E. (1986), "When does Marginal Cost pricing Lead to

Pareto Efficiency", Zeitschrift fur Nationalökonomie, 5, 41-66.

Dierker, E. (1991), " The Optimality of Boiteux-Ramsey Pricing", Econometrica, 59 (1), 99-122.

Dierker, E. and H. Haller (1990), "Tax Systems and Direct Mechanisms in Large Finite Economics", Journal of Economics, 52(2),99-116.

Diekert, W.E. (1979), "Optimal Tax Perturbations", Journal of Public Economics, 10, 139-77.

Dixit, A.K. (1975), "Welfare Effects of Tax and Price Changes", Journal of Public Economics, 4, 103-23.

Dixit, A.K. (1979), "Price Changes and Optimum Taxation in a Many-Consumer Economy", Journal of Public Economics, 11, 143-57.

Dreze, J.H. (1994), "40 Years of Public Economics, a Personal Perspective", mimo CORE.

Dreze, J.P. and N. Stern (1987), "The Theory of Cost Benefit Analysis", The Handbook in Public Economics, North Holland.

Dupuit, J. (1844), "De l'Utilité des Travaux Publics", Annales des Ponts et Chaussées.

Geanakoplos, J. and H. Polemarchakis (1986), "Existence, Regularity and Constrained Suboptimality of Competitive Allocations when Markets are Incomplete", edited by W. Heller, R. Starr and D. Starret, Essays in honour of K. Arrow, Cambridge University Press.

Greenwald, B. and J. Stiglitz (1986), "Exterralities in Economics with Imperfect Informations and Incomplete Markets", Quarterly Journal of Economics, May 229-264.

Guesnerie, R. (1975a), "Pareto Optimality in non Convex Economics" Econometrica, 43-1, 1-29.

Guesnerie, R. (1975b), "Production of the Public Sector and Taxation in a Simple Second-Best Model", Journal of Economic Theory, 10, 127-56.

Guesnerie, R. (1977), "On the Direction of Tax Reform", Journal of Public Economics, 7, 179-202.

Guesnerie, R. (1979b), "General Statements on Second Best Pareto Optimality", Journal of Mathematical Economics, 6, 169-94.

Guesnerie, R. (1980), Modèles de l'Economie Publique, Monographies du Séminaire d'Econométrie, Editions du CNRS, Paris.

Guesnerie, R. (1981a), "On Taxation and Incentives : Further Reflections on the Limits to Redistribution" to appear in Contribution to the Theory of Taxation, Chapter I.

Guesnerie, R. (1981b), "La gratuité outil de politique économique?", Canadian Economic Review, 14, 232-60.

Guesnerie, R. (1989), "Hidden Actions Moral Hazard and Contracts Theory", The New Palgrave Dictionary of Money and Finance, edited by J. Eatwell, M. Mulgate and P.Newman, Basingstoke: Mac Millan.

Guesnerie, R. (1990), "The Arrow Debreu paradigm faced with modern theories of contracting", in Contract Economics, (L. Werin and H. Wijkander, eds).

Guesnerie, R. (1994), "A Contribution to the Pure Theory of Taxation", Cambridge University Press.

Guesnerie, R. and Laffont J.J., "Taxing Price Makers", Journal of Economics Theory, 19 (2),423-55.

Guesnerie, R. and K. Roberts (1984), "Quantity Constraints and Effective Policy Tools", Econometrica, 52, 59-86.

Guesnerie, R. and K. Roberts (1987), "Minimum Wage Legislation as a Second Best Policy", European Economic Review, 31, 490-98.

Guesnerie, R. and M. Jerison (1991), "Taxation as a Social Choice Problem, the Scope of the Laffer Argument", Journal of Public Economics, 44 (1), 37-64.

Hammond, P. (1979), "Straightforward Incentive Compatibility in Large Economics", Review of Economic Studies, 46, 263-82.

Hammond, P. (1994), "History as a Widespread Externality:

Constrained Efficiency and Remedial Policy mimeo Stanford.

Heady, C. and P. Mitra (1982), "Restricted Redistribution, Taxation, Shadow Prices and Trade Policy", Journal of Public Economics, 17, 1-2.

Hurwicz, L. (1979), "On Allocations Attainable through Nash Equilibria", Journal of Economic Theory, 21, 140-165.

Kolm, S.C. (1987), "Public Economics" in The New Palgrave: A Dictionary of Economics, J. Eatwell, M. Milgate and P. Newman (eds), London, Mac Millan.

Little, I. and J. Mirrlees (1974), " Project Appraisal and Planning for Developing Countries", Heinemann, London.

Lipsey, R. and K. Lancaster (1956), " The General Theory of Second Best", Review of Economic Studics , 24, 11-32.

Mas Colell, A. and X. Vives (1993), "Implementation in Economies with a Continuum of Agents", Review of Economics Studies, 60(3), 613-30.

Maskin, E. (1980), "On First Best Taxation", Lecomber, R. and M. Slater (eds), "Income Distribution, the Limits to Redistribution", Bristol, Scientechnica.

Mirrlees J. (1971), "An Exploration in the Theory of Optimal Income Taxation", Review of Economic Studies.

Mirrlees, J. (1976), "Optimal Tax Theory: a Synthesis Journal of Public Economics, 6, 327-358.

Negishi, T. (1960), "Welfare Economics and Existence of an Equilibrium for a Competitive Economy - Metroeconomica, Vol 12 - August-December.

Quinzii, M. (1988), "Rendements Croissants et Equilibre Général", Paris. Editions du CNRS.

Roberts, K. (1984), " The Theoretical Limits to Redistribution", Review of Economic Studies, 51, 177-95.

Sah, R. (1983), "How Much Redistribution is Possible through

Commodity Taxes", Journal of Public Economics, 20, 89-101.

Stiglitz, J. and P. Dasgupta (1971), "Differential Taxations, Public Goods and Economic Efficiency", Review of Economic Studies.

CES Working Paper Series

---

01 Richard A. Musgrave, Social Contract, Taxation and the Standing of Deadweight Loss, May 1991

02 David E. Wildasin, Income Redistribution and Migration, June 1991

03 Henning Bohn, On Testing the Sustainability of Government Deficits in a Stochastic Environment, June 1991

04 Mark Armstrong, Ray Rees and John Vickers, Optimal Regulatory Lag under Price Cap Regulation, June 1991

05 Dominique Demougin and Aloysius Siow, Careers in Ongoing Hierarchies, June 1991

06 Peter Birch Sørensen, Human Capital Investment, Government and Endogenous Growth, July 1991

07 Syed Ahsan, Tax Policy in a Model of Leisure, Savings, and Asset Behaviour, August 1991

08 Hans-Werner Sinn, Privatization in East Germany, August 1991

09 Dominique Demougin and Gerhard Illing, Regulation of Environmental Quality under Asymmetric Information, November 1991

10 Jürg Niehans, Relinking German Economics to the Main Stream: Heinrich von Stackelberg, December 1991

11 Charles H. Berry, David F. Bradford and James R. Hines, Jr., Arm's Length Pricing: Some Economic Perspectives, December 1991

12 Marc Nerlove, Assaf Razin, Efraim Sadka and Robert K. von Weizsäcker, Comprehensive Income Taxation, Investments in Human and Physical Capital, and Productivity, January 1992

13 Tapan Biswas, Efficiency and Consistency in Group Decisions, March 1992

14 Kai A. Konrad and Kjell Erik Lommerud, Relative Standing Comparisons, Risk Taking and Safety Regulations, June 1992

15 Michael Burda and Michael Funke, Trade Unions, Wages and Structural Adjustment in the New German States, June 1992

16 Dominique Demougin and Hans-Werner Sinn, Privatization, Risk-Taking and the Communist Firm, June 1992

17 John Piggott and John Whalley, Economic Impacts of Carbon Reduction Schemes: Some General Equilibrium Estimates from a Simple Global Model, June 1992

18 Yaffa Machnes and Adi Schnytzer, Why hasn't the Collective Farm Disappeared?, August 1992

19 Harris Schlesinger, Changes in Background Risk and Risk Taking Behavior, August 1992

42 John McMillan, Autonomy and Incentives in Chinese State Enterprises, August 1993

43 Murray C. Kemp and Henry Y. Wan, Jr., Lumpsum Compensation in a Context of Incomplete Markets, August 1993

44 Robert A. Hart and Thomas Moutos, Quasi-Permanent Employment and the Comparative Theory of Coalitional and Neoclassical Firms, September 1993

45 Mark Gradstein and Moshe Justman, Education, Inequality, and Growth: A Public Choice Perspective, September 1993

46 John McMillan, Why Does Japan Resist Foreign Market-Opening Pressure?, September 1993

47 Peter J. Hammond, History as a Widespread Externality in Some Arrow-Debreu Market Games, October 1993

48 Michelle J. White, The Costs of Corporate Bankruptcy: A U.S.-European Comparison, October 1993

49 Gerlinde Sinn and Hans-Werner Sinn, Participation, Capitalization and Privatization, Report on Bolivia's Current Political Privatization Debate, October 1993

50 Peter J. Hammond, Financial Distortions to the Incentives of Managers, Owners and Workers, November 1993

51 Hans-Werner Sinn, Eine neue Tarifpolitik (A New Union Policy), November 1993

52 Michael Funke, Stephen Hall and Martin Sola, Rational Bubbles During Poland's Hyperinflation: Implications and Empirical Evidence, December 1993

53 Jürgen Eichberger and Ian R. Harper, The General Equilibrium Foundations of Modern Finance Theory: An Exposition, December 1993

54 Jürgen Eichberger, Bayesian Learning in Repeated Normal Form Games, December 1993

55 Robert S. Chirinko, Non-Convexities, Labor Hoarding, Technology Shocks, and Procyclical Productivity: A Structural Econometric Approach, January 1994

56 A. Lans Bovenberg and Frederick van der Ploeg, Consequences of Environmental Tax Reform for Involuntary Unemployment and Welfare, February 1994

57 Jeremy Edwards and Michael Keen, Tax Competition and Leviathan, March 1994

58 Clive Bell and Gerhard Clemenz, The Desire for Land: Strategic Lending with Adverse Selection, April 1994

59 Ronald W. Jones and Michihiro Ohyama, Technology Choice, Overtaking and Comparative Advantage, May 1994

60 Eric L. Jones, Culture and its Relationship to Economic Change, May 1994

61 John M. Hartwick, Sustainability and Constant Consumption Paths in Open Economies with Exhaustible Resources, June 1994

62 Jürg Niehans, Adam Smith and the Welfare Cost of Optimism, June 1994