

Liberal-Libertarian Optimal Tax Policy¹

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Abstract

This paper derives the tax system implied a combination of liberal and libertarian 'unfairness aversion' principles, together with economic efficiency. The optimal policy equalizes the gains individuals obtain from the governmental activity, relative to how they would fare in its absence. Because industrious individuals would fare well either way there will be limits to how much redistribution is recommended by the optimal policy. To illustrate this conclusion I investigate the tax system this approach would recommend for the United States. The resulting "fair-and-efficient" policies would redistribute income via the adoption of a substantial tax credit per household while keeping marginal tax rates constant.

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1 Introduction

Are 'liberal' and 'libertarian' principles of fairness compatible with each other and with standard notions of economic efficiency? If so, what kind of income tax policy would all these principles jointly recommend? In this paper I attempt to answer these questions in the context of the labor-leisure choices of an equally-skilled population belonging to an economy in which there is a (pure) public 'capital' good that enhances the productivity of labor of all individuals in society. Because people vary in their preferences towards leisure and consumption, inequality in the distribution of income arises as a consequence. The basic public policy question to answer in this economy is: how much public capital should the government provide?, and: what should be the distribution of taxation in the economy?

Economic policies in this paper are evaluated on the basis of the combined liberal and libertarian fairness principles, together with standard economic efficiency. I build on the methodology developed by Fleurbaey and Maniquet (2011), which establishes a comprehensive theory of social choice grounded on the study of differential access to resources rather than on the distribution of subjective satisfaction.

According to the liberal fairness principle ('Liberal Reward' in Section 4.3), if two individuals have the same preferences and work the same amount of time but receive different after tax pay, this is deemed unfair and a transfer can be justified from the one that receives more pay to the one that receives less.

According to the libertarian fairness principle ('Laissez Faire Reward' in Section 4.3), if two individuals are such that the first one is worse off, after taxes, than in his autarchy position (how he would fare in the absence of public provision of the capital good) and the second one is worse off, after taxes, than in her autarchy position, this is deemed unfair and a transfer can be justified from the one that is better off to the one that is worse off.

The simultaneous consideration of these liberal and libertarian notions of fairness and efficiency will lead to an ordering over social policies that puts priority on enacting Pareto efficient reforms aimed at helping the individuals treated most unfairly in society, that is, where the optimal policy seeks to equalize the benefits individuals obtain from the capital good *relative* to how these same individuals would fare absent its public provision. Because industrious individuals would fare well regardless of whether or not the capital good was publicly provided there will be natural limits to how much redistribution is recommended by the optimal policy.

To illustrate this conclusion I investigate the tax system this approach would recommend for a society reminiscent of the US economy in 2011, with about 121 million households, and preferences for consumption and labor calibrated to reproduce the pre-tax distribution of labor income for that year, as released by the US Congressional Budget Office (CBO) in November 2014.

The characteristics of the implied tax system will depend in the end on one's estimates of how much more productive government activity makes the private sector. If, for example, one estimates that the government's activity would increase 'potential output'³ by fifty percent, the optimal tax policy can be represented by a tax credit per household of about \$41 thousand dollars per year and a constant marginal tax rate of about 48 percent. On the other hand, if one estimates, for example, that potential output only increases by about a third thanks to governmental activity, the optimal tax policy can be represented as a tax credit per household of about \$21 thousand dollars per year and a constant marginal tax rate of about 24 percent.⁴ What remains constant is that, no matter what productivity gains the government activity generates, the optimal policy can be represented fairly well by a *negative income tax*, a policy with clearly conservative roots.

That these conservative policy proposals could be justified by appealing to such liberal and libertarian principles of fairness was not obvious. The need for these kinds of evaluations that combine the tools of modern economic analysis "with the notions of fairness of the common folk" has been loudly stated. For instance, Weinzierl (2012) writes that "conventional theory neglects the diverse normative criteria with which, as extensive evidence has shown, most people evaluate policy."⁵ Thanks to recent advances in the literature of fair social choice, the tools are ripe for an examination of this sort.

1.1 Related Literature

This paper belongs to the optimal taxation literature, as in Ramsey (1927), Diamond and Mirrlees (1971), and Diamond (1998), among many others. The main difference between that strand of the literature and the present paper is that they work with respect to a given social objective as represented by a social welfare function whereas here I identify what that social objective should be from first principles.

Exactly how much tax progressivity one ought to have in a modern society is a topic that has garnered renewed interest, in part due to the documented increases in market income inequalities in the last few decades. Saez (2001) and Saez and Diamond (2011), for example, derive optimal tax rates for top earners under the assumption that the social planner has intrinsic preferences for redistribution that imply that the marginal social value of the consumption of top earners is negligible. Saez and Stantcheva (2015) develop a local theory of policy reform based on the development of 'generalized social marginal welfare weights' that can directly be applied to the income changes of different individuals due to the proposed tax reforms. Mankiw (2010) suggests that progressive taxation, while necessarily limited by the 'just deserts' principle, could be justified from a libertarian angle, if it

³ Potential output is defined to be the maximum income a society of identical individuals with perfectly inelastic labor supply could attain.

⁴ In either case, the Pareto efficient amount of the public capital will be provided, according to Samuelson's rule –an amount that will vary slightly across both cases under consideration due to wealth effects.

⁵ Weinzierl 2012 p. 1, quoted in Maniquet and Fleurbaey 2015. Sheffrin 2013 makes a similar point.

can be shown that those with higher incomes benefit more from the governmental activity.

A recent and important literature aims to identify the preferences for redistribution the public has, with the hope of using this information in the formulation of social policy. That literature includes the work of Kuziemko et. al. (2015), Gaertner and Schokkaert (2012) and D'Ambrosio and Clark (2015).

This paper is closest to the work by Fleurbaey and Maniquet (2006), Maniquet (2007), Maniquet and Sprumont (2010) and Fleurbaey and Maniquet (2011, Chs. 8 and 11). There are important differences between this work and the present paper, and I shall enumerate them here in some detail. First, I work in a context in which agents have indirect preferences over public policies that are induced from the preferences the agents have over leisure and the consumption of a private good. Maniquet (2007), Maniquet and Sprumont (2010) and Fleurbaey and Maniquet (2011, Ch. 8), following a large literature on public good cost sharing, treat these preferences over the public policies (the public good level and the tax policies) as primitives in their analysis. The advantage of my formulation is that it can be extended to the study of a variety of social policies, given the consumption-leisure preferences of the agents, whereas in those papers one has to postulate preferences over the public policies for each application. Second, Fleurbaey and Maniquet (2006 and 2011, Ch. 11) explicitly consider the effect of differences in skill on the fair and efficient taxes whereas here I deliberately wish to exclude these differences in skill, precisely to see how much redistribution can be justified on the basis of differences in preferences alone. Third, I adopt a variation of the standard robustness principle of Replication (which I call Blow Up) that allows the resulting social ordering functions to be definable, as in Bergson and Samuelson, through a specific aggregator function, but with a representation of the preferences of the agents of the Wold type. The practical advantage of this adoption is that it allows a unified treatment of the ranking of allocations in exchange and production economies. A secondary advantage is that this allows the comparison of allocations via the calculation of areas below certain demand curves, as in traditional welfare analysis. Fourth, I examine the specific implications of the resulting social order on what the fair and efficient tax rates ought to look like for the contemporary United States. Despite these numerous differences, it is obvious that the intellectual debt of the present paper to the work by Fleurbaey and Maniquet is immense: this paper would have been impossible to write without their work.

2 The Setting

Consider an economy with a set N of agents that have the same skill but they differ in how they see the tradeoff between labor and leisure. All agents are endowed with one unit of time. The preference relation, R_j , of agent j over leisure, $1 - l_j$, and a consumption good, c_j , is represented by an utility function $u_j(1 - l_j, c_j)$ that is strictly increasing in both arguments, twice differentiable, and strictly quasi-concave. Let $z_j = (1 - l_j, c_j)$, $z_N = (z_j)_{j \in N}$, and $R_N = (R_j)_{j \in N}$. The corresponding

strict preference and indifference relations for agent j are denoted P_j and I_j , respectively. Let \mathcal{R} denote the set of preferences satisfying these conditions.

There is a public capital good, the level of which is denoted as g , that determines the ability of all agents to transform labor into the consumption good, independent of the labor time. This public capital good is subject to non-rivalry and non-excludability unless specified otherwise. The public capital good's cost function, $C(g)$, is assumed to be twice differentiable, strictly increasing, strictly convex and such that $C(0)=0$. Let \mathcal{C} be the set of cost functions satisfying these conditions. An economy is then a list $E = (R_N, C)$ where $R_N \in \mathcal{R}^N$ and $C \in \mathcal{C}$. Let \mathcal{E} be the set of all economies as defined above.⁶

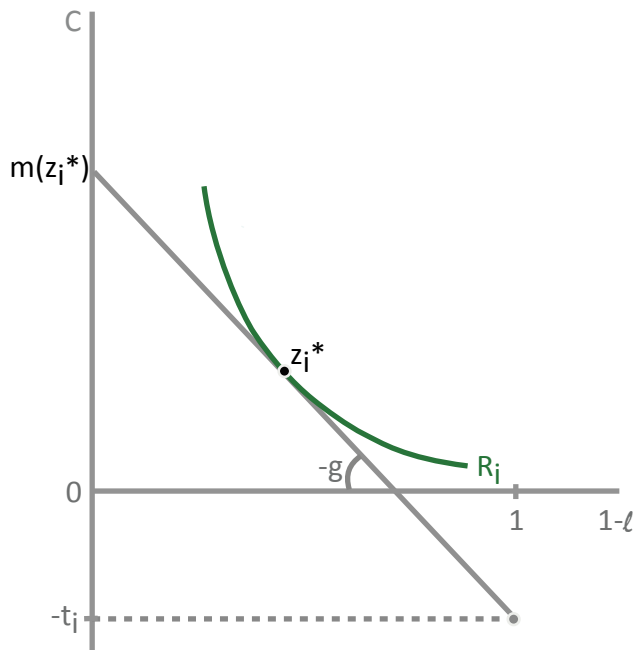


Figure 2.1. Individual i pays t_i in taxes and takes advantage of the level of public capital good provided, g .

We begin by studying a *mixed economy*, that is, a setting in which agent j pays a tax t_j (which can be negative) to finance the public good.

The decision problem for individual j can be, therefore, expressed as follows:

$$\max_{c_j, l_j} u_j(1 - l_j, c_j,)$$

subject to

⁶ This setting is based on the models developed by Fleurbaey and Maniquet 2011 in Chapters 8, 10 and 11.

$$\begin{aligned} 0 \leq c_j &\leq g \cdot l_j - t_j, \\ 0 \leq l_j &\leq 1. \end{aligned}$$

with solution represented by the pair $z_j^*(g, t_j) := (1 - l_j^*(g, t_j), c_j^*(g, t_j))$ or, more simply, by $z_j^* = (1 - l_j^*, c_j^*)$. We denote, for future reference, the cost of z_j in units of the consumption good by $m(z_j)$, that is, $m(z_j) = g \cdot (1 - l_j) + c_j$. Figure 2.1 represents such choice for individual i .

3 Social Orderings

Given economy $E \in \mathcal{E}$ and allocations $z_N, z'_N \in Z(E)$ we write $z'_N \mathbf{R}(E) z_N$ to denote that allocation z'_N is socially as least as good as z_N in economy E . The corresponding strict social preference and social indifference relations are denoted $\mathbf{P}(E)$ and $\mathbf{I}(E)$, respectively.

In the determination of which social orderings are deemed acceptable we consider principles we would want any such social orderings to satisfy. We consider three kinds of principles: those related to *efficiency* in the allocation of resources, those related to *fairness* in the allocation of those resources, and those related to the *robustness* of those orderings to small changes in the environment in which the orderings are applied.

3.1 Efficiency Principles

Efficiency is defined in the usual Paretian sense.

Strong Pareto. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if $z'_i \mathbf{R}_i z_i$ for all $i \in N$ then $z'_N \mathbf{R}(E) z_N$. If, in addition, $z'_i \mathbf{P}_i z_i$ for some $i \in N$, then $z'_N \mathbf{P}(E) z_N$.

4 Fairness

In this economy differences in consumption levels between the agents can be traced to: (1) differences in how they're being taxed, and (2) differences in how hard they work.

4.1 Strong Principles of Fairness

Our first principle of fairness is a first attempt to formalize a liberal notion of fairness in the context of the economy I study and stems from the following observation: Consider two agents that have equal levels of work but where one of the agents enjoys a more favorable level of consumption than another. Since we cannot trace their consumption differences to differences in skill, or to how hard they work, we can call this situation unfair, *from a liberal perspective*, and thus consider a social improvement (or at least not a worsening) the transfer of an amount of the consumption good from the favored to the less favored agent.⁷

⁷ This is a version of the Pigou-Dalton transfer principle.

Formally, the principle can be expressed as follows:

Equal Pay for Equal Work. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$ if there exist $j, k \in N$ and $\Delta \in \mathbb{R}_{++}$ such that $l_j = l_k = l'_j = l'_k$,

$$c_j - \Delta = c'_j > c'_k = c_k + \Delta,$$

and for all $i \neq j, k$, $z_i = z'_i$, then $z'_N \mathbf{R}(E) z_N$.

Figure 4.1 below illustrates the principle.

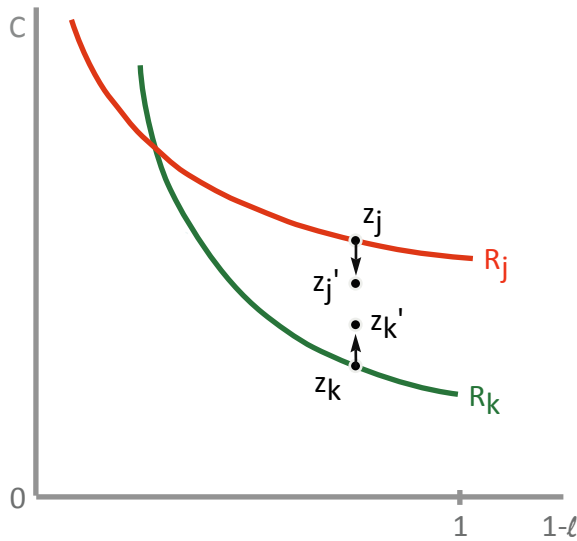


Figure 4.1. These individuals work the same amount yet they do not consume the same. According to equal pay for equal work a move from z_N to z'_N is a weak social improvement.

Our second principle of fairness regarding how the distribution of taxation ought to take place has libertarian roots: in an economy where a level g of the public capital good is provided everyone has the opportunity, *in principle*, to profit equally from the existence of the public capital good. Consequently, if an individual works hard, and this is why he or she ends up in a more favorable position in the distribution of the consumption good in a society, this is not a legitimate reason to distribute resources away from the hard working person towards a person that works less, because the person that worked less could have worked as hard but chose not to. Thus, to the extent that any such redistribution is present in the status quo, a desirable tax reform would aim to reverse it.

Formally, the principle can be expressed as follows:

Capitation. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if there exists $(g, t_N) \in \mathbb{R}_{++} \times \mathbb{R}^N$ with $\sum_i t_i \geq C(g)$, $j, k \in N$ and $\Delta \in \mathbb{R}_{++}$ such that, $z_j = z_j^*(g, t_j)$, $z_k = z_k^*(g, t_k)$, $l_j = l'_j$, $l_k = l'_k$,

$$m(z_j) - \Delta = m(z'_j) > m(c'_k) = m(c_k) + \Delta,$$

and for all $i \neq j, k$, $z_i = z'_i$, then $z'_N \mathbf{R}(E) z_N$.

Figure 4.2 below illustrates this principle. Capitation treats all individuals with equal access to the public good as equals and disregards the extent to which they differ by how hard they work in its approach to fair taxation.

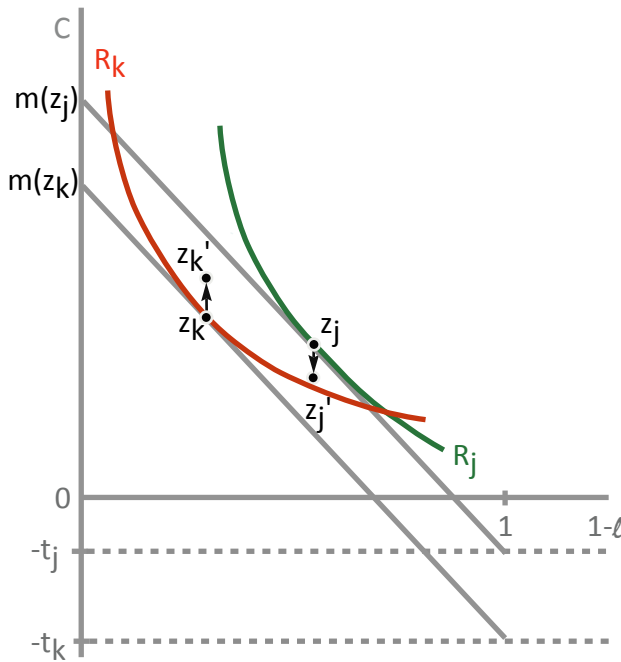


Figure 4.2. Individual k works more than j and is taxed more also but j could have worked as hard as k and chose not to. According to capitation a reduction in k 's taxes is a weak social improvement.

4.2 Fairness-efficiency tradeoffs

It turns out that these versions of the liberal and libertarian principles of fairness are too strong in the sense that they are each incompatible with Pareto efficiency.

Theorem 1. No social ordering function satisfies Strong Pareto and Equal Pay for Equal Work.

Theorem 2. No social ordering function satisfies Strong Pareto and Capitation.

All proofs are in the Online Appendix.

4.3 Moderate Principles of Fairness

A natural question follows: are there more moderate versions of the liberal and libertarian principles of justice that are compatible with economic efficiency?

A possible solution, in the liberal case, is a restriction to the application of the ideas behind Equal Pay for Equal Work to the case where two agents have the same preferences. Formally, the principle can be expressed as follows:

Liberal Reward. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if there exist $j, k \in N$ such that $R_j = R_k$ and $\Delta \in \mathbb{R}_{++}$ such that $l_j = l_k = l'_j = l'_k$,

$$c_j - \Delta = c'_j > c'_k = c_k + \Delta,$$

and for all $i \neq j, k$, $z_i = z'_i$, then $z'_N \mathbf{R}(E) z_N$.

Figure 4.3 illustrates this principle.

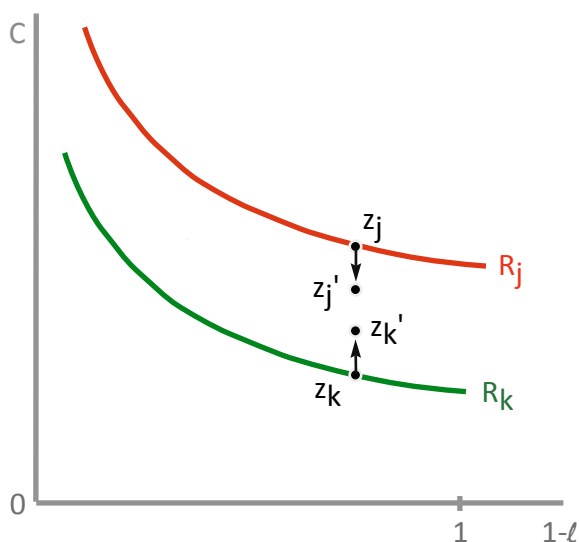


Figure 4.3. Liberal reward.

Our second version of libertarian fairness states that people have fundamental rights to the proceeds of their own labor that are tightly coupled with responsibilities in the procurement of whatever means they may need for their sustenance (including all capital goods). To develop this principle let's first study the decision problem individuals face in a situation of *laissez-faire*.

4.3.1 Laissez-faire choices

The decision problem for individual j , when in a situation of *laissez-faire*, can be expressed as follows:

$$\max_{c_j, l_j, g_j} u_j(1 - l_j, c_j)$$

subject to

$$\begin{aligned} 0 \leq c_j \leq g_j \cdot l_j - C(g_j), \\ 0 \leq l_j \leq 1, 0 \leq g_j \end{aligned}$$

with solution represented by the triple $(1 - l_j^L, c_j^L, g_j^L)$ or, more simply, by (z_j^L, g_j^L) . We call this solution the *laissez-faire position* of agent j .

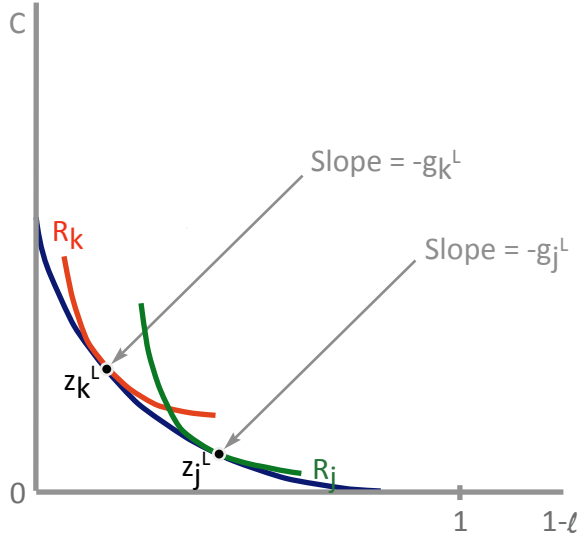


Figure 4.4. Choices in a laissez-faire world.

Let $\pi(l) := \max_g l \cdot g - C(g)$. It turns out that the decision problem under conditions of laissez-faire described above is equivalent to the following:

$$\max_{c_j, l_j} u_j(1 - l_j, c_j)$$

subject to

$$\begin{aligned} 0 \leq c_j \leq \pi(l_j), \\ 0 \leq l_j \leq 1 \end{aligned}$$

with solution represented by the triple $(1 - l_j^{L,E}, c_j^{L,E}, g_j^{L,E})$, and where the value of $g_j^{L,E}$ is obtained by $g_j^{L,E} = \pi'(l_j^{L,E})$, a fact that follows from an application of the Envelope theorem.⁸

Figure 4.4 uses this representation of the decision problem faced by these individuals to find the laissez-faire position of individuals j and k . The blue line depicts the function $l \mapsto (1 - l, \pi(l))$, as l varies from 1 to 0. The green and red lines are indifference curves from the indifference maps of individuals j and k with

⁸ When there is no ambiguity about which economy we are referring to, we simply refer to $(1 - l_j^{L,E}, c_j^{L,E}, g_j^{L,E})$ as $(1 - l_j^L, c_j^L, g_j^L)$.

preference relations R_j and R_k , respectively. Individuals with different preferences will in general choose, in a situation of laissez-faire, different leisure-consumption bundles, as well as different levels of the public good, g .

4.3.2 Fairness relative to a laissez-faire benchmark

From a classical liberal perspective, if an individual in a situation of laissez-faire works hard, and this is why he or she ends up in a more favorable position in the distribution of the consumption good in a society, this is not a legitimate reason to distribute resources away from the hard working person towards a person that works less. On the other hand if, in the *mixed economy* (the one with taxation and public provision of the public good), an agent ends up with an allocation that is less favorable (in his own opinion) than his laissez-faire position whereas another agent ends up with an allocation that is more favorable (in her own opinion) than her own laissez-faire position we would call this situation unfair and thus consider a social improvement (or at least not a worsening) the transfer of an amount of the consumption good from the favored person to the less favored person.⁹

Formally, the principle can be expressed as follows:

Laissez-Faire Reward. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if there exist $j, k \in N$ and $\Delta \in \mathbb{R}_{++}$ such that $l_j = l'_j, l_k = l'_k, c'_j = c_j - \Delta, c'_k = c_k + \Delta$,

$$\begin{array}{c} z'_k P_k z'_k P_k z_k \text{ and} \\ z_j P_j z'_j P_j z'_j \end{array}$$

and for all $i \neq j, k, z_i = z'_i$, then $z'_N \mathbf{R}(E) z_N$.

Figure 4.5 below illustrates this principle.

It is worth noting at the outset that both Liberal Reward and Laissez-Faire Reward are compatible with each other, and with Strong Pareto. More on this in Section 6 below.

⁹ This fairness principle is related to stand alone transfer, a principle introduced by Moulin 1987 to the literature on fair allocation.

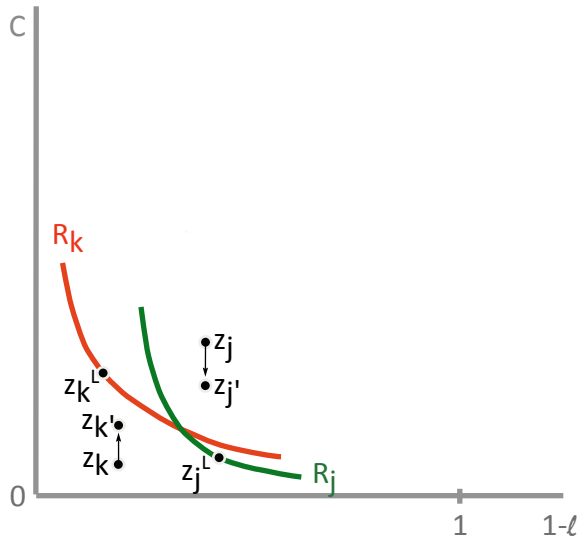


Figure 4.5. Individual k has been made worse off (relative to his laissez-faire position) by entering the mixed economy and landing at z_N whereas the opposite is true for individual j . Laissez-faire reward thus dictates that a move from z_N to z'_N is a weak social improvement.

5 Robustness Principles

The robustness principles introduced below follow the general requirement that solutions to similar problems also need to be similar.

Our first robustness principle is related to (but weaker than) Arrow's Independence of Irrelevant Alternatives condition from the social choice literature. Let the indifference curve that passes through z_i of agent i with preference relation R_i be defined as $I(z_i, R_i)$.

Hansson Independence. For all $E, E' \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if for all $i \in N$,

$$I(z_i, R'_i) = I(z_i, R_i) \text{ and } I(z'_i, R'_i) = I(z'_i, R_i)$$

then $z_N \mathbf{R}(E) z'_N \Leftrightarrow z_N \mathbf{R}(E') z'_N$.

This principle says that the social ranking of two allocations remains unaffected by a change in individual preferences that do not affect the agent's indifference curves at the bundles they receive in these two allocations.¹⁰

Our second robustness principle states that when an agent has the same bundle in two allocations the ranking of these two allocations should remain the same if this agent were simply absent from the economy.

¹⁰ This principle was first used by Hansson 1973 in an abstract voting model and by Pazner 1979 in the context of fair division.

Separation. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, with $|N| \geq 2$ if there is $i \in N$ such that $z_i = z'_i$, then $z_N \mathbf{R}(E) z'_N$ if and only if $z_{N \setminus \{i\}} \mathbf{R}(R_{N \setminus \{i\}}, C) z'_{N \setminus \{i\}}$.

Our third robustness principle states that, in an economy obtained by *blowing up* an initial economy in size and productivity, blown up allocations should be ranked exactly as in the initial economy.¹¹ Economy $E' = (R_{N'}, C') \in \mathcal{E}$ is said to be a blow up of $E = (R_N, C) \in \mathcal{E}$ if there is a positive integer r and a mapping $\gamma: N' \rightarrow N$ such that for all $j \in N'$ $z_j^{L, E'} = r z_j^{L, E}$, for all $i \in N$, $|\gamma^{-1}(i)| = r$ and for all $j \in \gamma^{-1}(i)$, $R_j = R_i$. Profile $R_{N'}$ is an r -replica of R_N for some positive integer r if there exists a mapping $\gamma: N' \rightarrow N$ such that for all $i \in N$, $|\gamma^{-1}(i)| = r$ and for all $j \in \gamma^{-1}(i)$, $R'_j = R_i$. Similarly, allocation $z_{N'}$ is an r -replica of z_N for some positive integer r if there exists a mapping $\gamma: N' \rightarrow N$ such that for all $i \in N$, $|\gamma^{-1}(i)| = r$ and for all $j \in \gamma^{-1}(i)$, $z'_j = z_i$.

Blow Up. For all $E \in \mathcal{E}$, $z_N, z'_N \in Z(E)$, if E' is a blow up of E , $z_{N'}$ is a replica of z_N and $z'_{N'}$ is a replica of z'_N then $z_N \mathbf{R}(E) z'_N$ if and only if $z_{N'} \mathbf{R}(E') z'_{N'}$.

6 Fair Social Orderings

Consider the following utility representation u_i^L of preference relation R_i in economy $E \in \mathcal{E}$.

$$u_i^{L, E}(z_i) = \lambda \Leftrightarrow z_i I_i \lambda z_i^L$$

This is the *laissez-faire equivalent income* function, as it measures the proportional share of the laissez-faire bundle for agent i in economy E , z_i^L , that would keep the agent indifferent between such share and z_i .¹² For future reference we denote this bundle by $h_i^L(z_i)$. Figure 6.1 below illustrates.

¹¹ Blow up is a variation on the principle of Replication, which is used extensively in Maniquet and Fleurbaey 2011.

¹² When there is no ambiguity about which economy we are referring to, we simply refer to $u_i^{L, E}$ as u_i^L .

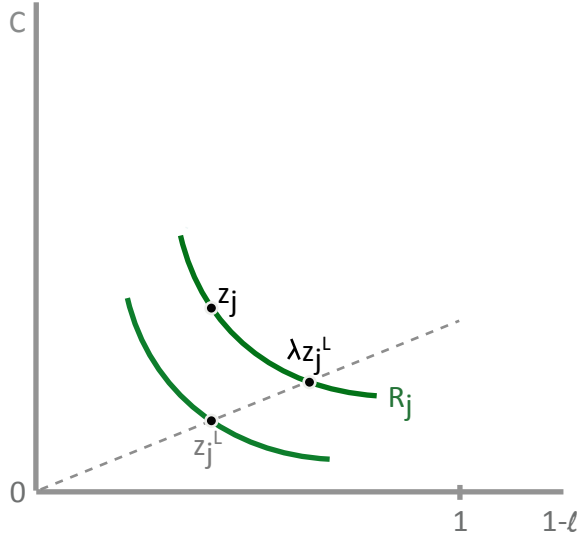


Figure 6.1 At z_j , individual j is as if he was consuming λz_j^L . In other words: λ is the maximum amount j is willing to pay (in units of z_j^L) for the right to consume bundle z_j .

This representation, together with the maximin criterion, allows us to define the following social ordering:

Laissez faire-Equivalent maximin (R^L)

For all $E \in \mathcal{E}, z_N, z'_N \in Z(E)$,

$$z_N R^L(E) z'_N \Leftrightarrow \min\{u_i^{L,E}(z_i)\} \geq \min\{u_i^{L,E}(z'_i)\}$$

This social ordering has a number of appealing properties, which are summarized in the theorem below.

Theorem 3. The laissez-faire equivalent maximin ordering R^L satisfies strong Pareto, liberal reward, laissez faire reward, Hansson independence, separation and blow up. *Conversely*, if a social ordering R satisfies strong Pareto, liberal reward, laissez faire reward, Hansson independence, separation and blow up, then for all $E \in \mathcal{E}, z_N, z'_N \in Z(E)$,

$$\min_{i \in N}\{u_i^{L,E}(z_i)\} > \min_{i \in N}\{u_i^{L,E}(z'_i)\} \Rightarrow z_N P(E) z'_N$$

In other words, R exhibits a maximin property with respect to laissez-faire equivalent incomes: If the smallest equivalent income is greater in one allocation, this allocation is preferred. The laissez faire equivalent maximin ordering R^L satisfies this property but it is not the only one that does.¹³

¹³ This is just as in Fleurbaey and Maniquet 2011, p. 76.

The interpretation is that, in its consideration of the fairness of an allocation, R^L gives priority to the person treated most unfairly, where the degree of unfairness is measured by comparing what the person achieves in an allocation relative to his or her laissez-faire position to what others achieve in that allocation relative to *their own* laissez faire position.

6.1 Remarks

- To be sure, the equivalent income representation of preferences and the aggregation rule embedded in R^L are not chosen arbitrarily: they follow from the consideration of the efficiency, fairness and robustness principles identified above.
- No interpersonal comparisons of well-being take place here, as these equivalent incomes are utility indices that merely represent ordinal and noncomparable preferences, as usual.
- Something, of course, is being compared: *degrees of differential access to the resources available to the individuals in the economy*. It is an approach that is based on what rights people have given the situations they face. To the extent that a person's rights are being violated, to that same extent we say this person is deemed as disadvantaged in a society and restitution of those rights becomes the focus of policy evaluations.
- As far as what people have a right to in the present setting, the answer is: *they have a right to "what they built" in their laissez-faire position*. And since each person has a different laissez-faire position depending on their disposition towards work and leisure, the implication is that what they have original rights to, in terms of leisure-consumption bundles, differs among individuals.
- A way of thinking about how the fairness axioms interact in R^L is that the liberal reward, together with Pareto efficiency and the robustness principles, drives the ordering to focus on the individual treated most unfairly in a given allocation; and laissez faire reward determines the yardsticks to be used in the determination of who is being treated fairly or unfairly.

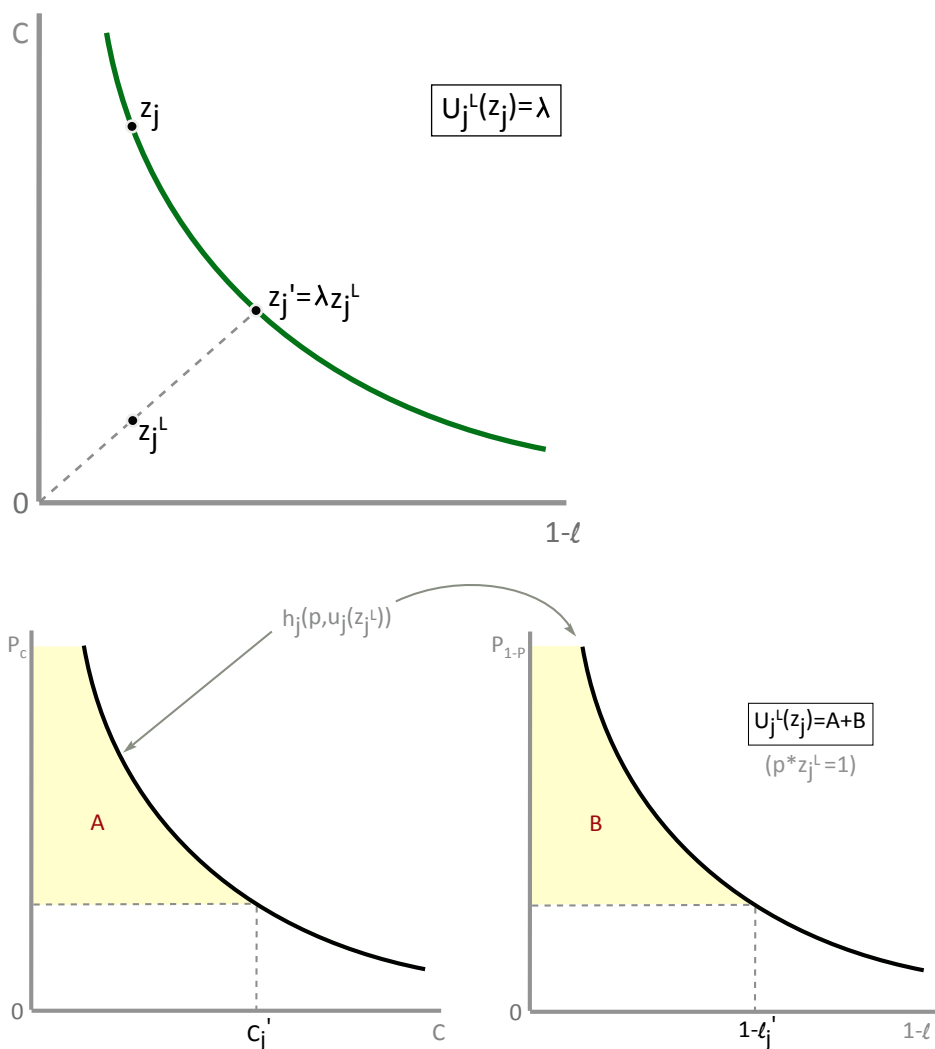


Figure 6.2. Two ways of calculating $u_i^l(z_i)$.

- The value $u_i^l(z_i)$ admits an interpretation familiar from the Welfare Economics literature: it is the joint area under the inverse hicksian demand curves for leisure and for the consumption good (with prices measured in units of z_j^l) evaluated at $h_i^l(z_i)$.¹⁴ Figure 5.2 below illustrates this calculation.
- This interpretation helps us understand better the social choices that arise from R^L : under this criterion, *one does not add* areas under demand curves across individuals to determine the worth of a particular allocation (as it is often done in applied welfare economics). Rather, one compares areas under

¹⁴ Such area, as usual, measures the *commodity value* of $h_i^l(z_i)$, that is, the maximum number of units of the numeraire basket (z_j^l in this case) that the individual is willing to sacrifice in exchange for being able to consume bundle $h_i^l(z_i)$. Since the individual is indifferent between $h_i^l(z_i)$ and z_i , then this area represents the *commodity value* of z_i as well.

demand curves across individuals and identifies the worth of a particular allocation *with the smallest* calculated area.

7 Fair and efficient public policy

In Section 2 we studied the choices regarding consumption and leisure that individuals make in the mixed economy, that is, given a level of government expenditure g and a distribution of the tax burden $t_N := (t_j)_{j \in N}$. In this Section we investigate what those levels $[g, t_N]$ ought to be according to social ordering \mathbf{R}^L .

7.1 The first-best

We first use the social ordering \mathbf{R}^L to determine what public policy $[g, t_N]$ to adopt in an environment in which the government knows the preferences of all agents in the economy.

Given the policy $[g, t_N]$ let $V_i^L(g, t_i) := u_i^L(z_i^*(g, t_i))$ denote the *advantage over laissez-faire* of $[g, t_N]$ for agent i . Such value is a way of measuring the benefit each individual derives from the public policy relative to each individual's laissez faire position. The problem for the government is therefore to find the policy $[g^f, t_N^f]$ such that

1. The sum of the marginal rates of substitution between the public good and the consumption good across individuals must equal the marginal cost of providing the public good (Samuelson's rule).
2. The taxes collected from all individuals must cover the cost of the public good (Budget balance).
3. The advantages over laissez-faire from the public policy are equalized across individuals (Tax fairness).

Figure 7.1 illustrates how the first-best level of the public policy $[g^f, t_N^f]$ is determined in an economy with two individuals.

7.2 Second-best policies when preferences are not observable but income is observable

Even when the government is not able to observe the agent's private information regarding their preferences, agents are often not able to hide their consumption levels, and therefore their wage income, from the government. In this situation the first-best optimal policy may be able to be implemented by the government through the establishment of a suitably defined income tax scheme.

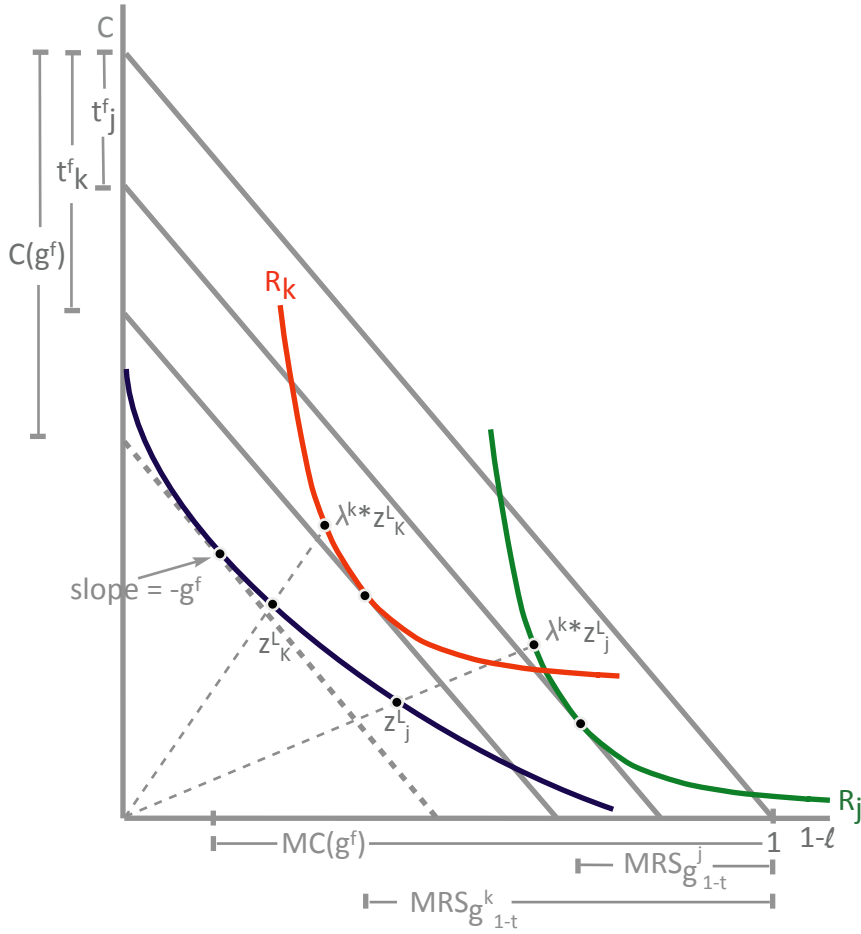


Figure 7.1. The first best policy is the policy $[g^f, t_j^f, t_k^f]$. Such policy satisfies: $MRS_{g,-t}^k + MRS_{g,-t}^j = MC(g^f)$, $C(g^f) = t_j^f + t_k^f$, and $\lambda^j = \lambda^k$.

Figure 7.2 illustrates how this could be done for the case of two agents. In this Figure the public policy is the same as in Figure 7.1, that is, it is a first-best optimal policy. It is, however, implemented differently. Upon selecting g^f as the level of public good to be provided all agents face a budget constraint, before taxes, equal to the light blue line. The government then adopts the following income tax policy:

$$\tau(y) = \begin{cases} \min\{y, t_j^f\} & \text{if } y \leq g^f \cdot l_j^f \\ t_j^f & \text{if } g^f \cdot l_j^f < y \leq g^f \cdot l_k^f \\ t_k^f & \text{if } y > g^f \cdot l_k^f \end{cases}$$

This leads all agents to face the same after-tax budget constraint given by the light pink line. From this common menu agent k chooses bundle z_k^f and agent j chooses bundle z_j^f , in accordance to their preferences.¹⁵

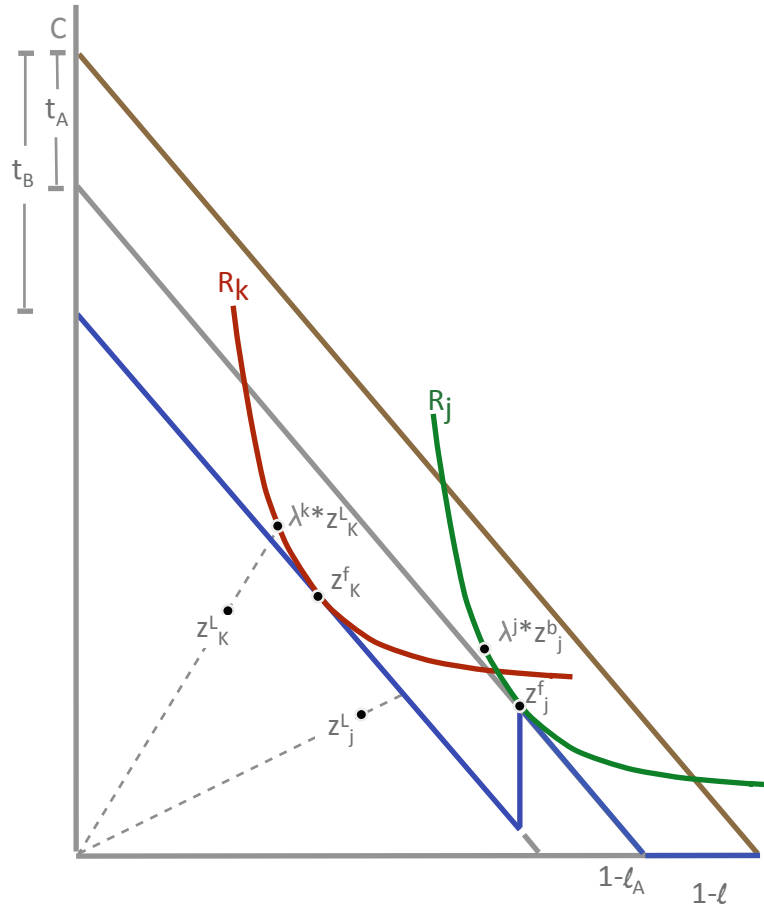


Figure 7.2. Second-best optimal policies can sometimes implement the first best outcome.

8 An Extended Example: Fair and Efficient Taxes for the US Economy

In the example the unit of analysis is the household. Consider an economy composed of N types of households with preferences given by the function

$$u_j(1 - l_j, c_j) = (1 - l_j)^{1-\alpha_j} \cdot c_j^{\alpha_j}$$

¹⁵ Implementation of the first best via tax functions is not always possible in this way. In the example from Figure 7.2 neither agent envies the other agent's allocation and that is why it is suitable to be implemented through an income tax function. See, e.g., Fleurbaey and Maniquet 2011, pp. 205-206.

with $j = 1, \dots, N$ and $0 < \alpha_j < 1$.¹⁶ Let ω_j be the proportion of households that are of type j in a population of H households. I calibrate these preferences to reproduce the pre-tax distribution of labor income for 2011, as released by the CBO in November 2014 (CBO 2014), and depicted in Figure 8.1 below. The CBO reports labor income, non-labor income, federal taxes and transfers for eight quantiles (therefore $N=8$) from a population of 121.2 million households and from that information, together with an estimate of potential output per household for the economy, one can identify the α_j consistent with that income and tax information.¹⁷

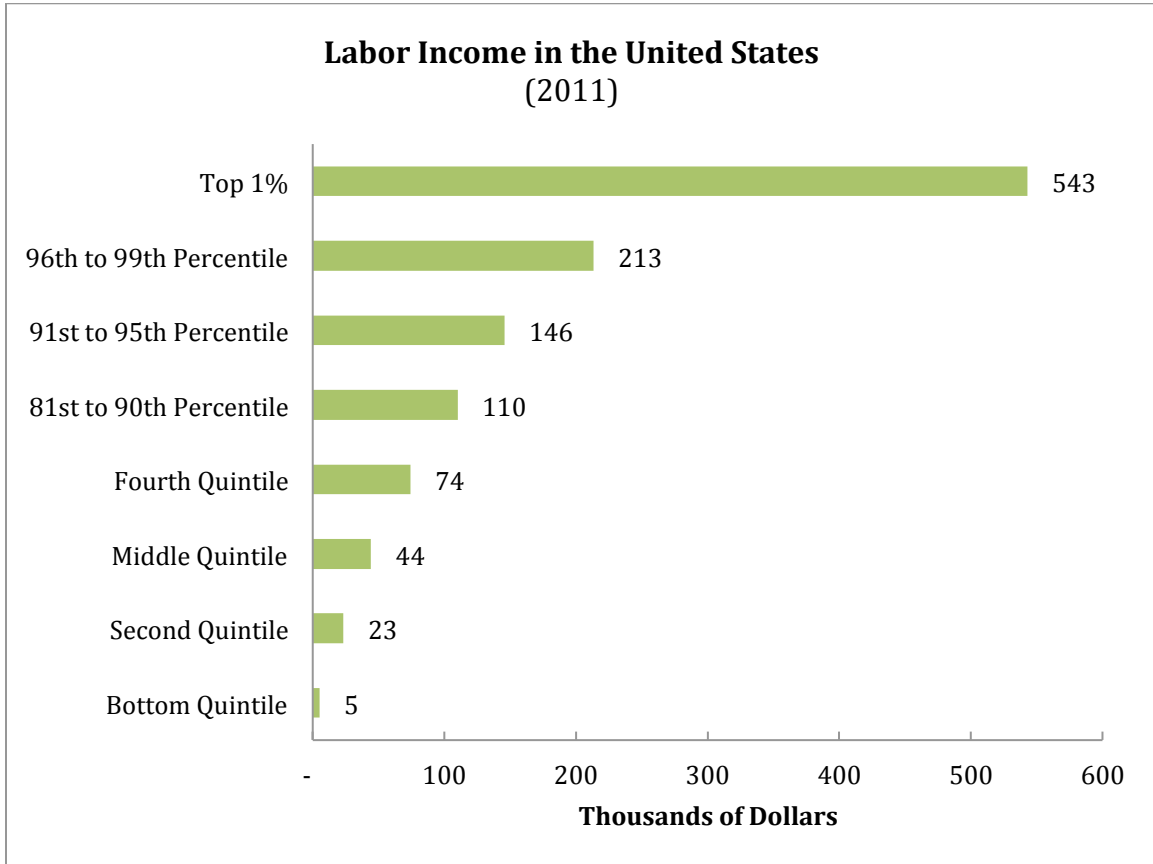


Figure 8.1 2011 US Labor Income

The cost function for the public capital is given by $C(g) = a \cdot g^{1+b}$ for $a > 0$ and $b > 0$. I calibrate the cost function so that $g = 1$ corresponds to a potential output per household of 600 thousand dollars a year.¹⁸ Coming up with an estimate of how much the government’s activity increases potential output’ is more difficult, as it involves the counterfactual “what would the US economy look like in 2011 if the

¹⁶ Notice that these household’s preferences satisfy the Spence-Mirrlees single-crossing condition property in that an indifference curve of an agent crosses an indifferent curve of another agent once, at most.

¹⁷ I provide details of how these α_j ’s were estimated in the Online Appendix.

¹⁸ As reference, notice that labor income earned by the top 1% in the US reached its highest level in 2007, at 580 thousand dollars for the year.

government did not provide any public capital?” For illustrative purposes I make all my calculations under two baselines: a ‘liberal’ baseline in which government’s activity is believed to increase potential output by fifty percent, and a ‘conservative’ baseline in which government’s activity is believed to increase potential output by one third.

Table 8.1 below summarizes the information about preferences and technology parameters in the example.

Preference Parameters across Households		
Quantile	α_i	
Bottom Quintile	0.06	
Second Quintile	0.09	
Middle Quintile	0.13	
Fourth Quintile	0.19	
81st to 90th Percentile	0.26	
91st to 95th Percentile	0.34	
96th to 99th Percentile	0.50	
Top 1%	0.97	
Technology Parameters, in Per Household terms		
	$\frac{a}{H}$	b
	Thousands of \$	
Liberal baseline	21.5	26.9
Conservative baseline	9.1	64.7

Table 8.1. The distribution of characteristics in the stylized 2011 US Economy

Household type j therefore makes the following choices in the mixed economy:

$$c_j^* = \alpha_j \cdot (g - t_j), \text{ and}$$

$$l_j^* = \alpha_j + (1 - \alpha_j) \frac{t_j}{g};$$

and the following choices in a situation of laissez-faire:

$$g_j^L = \left(\frac{\alpha_j}{a(\alpha_j + b)} \right)^{\frac{1}{b}},$$

$$c_j^L = \frac{b}{a^{\frac{1}{b}}} \left(\frac{\alpha_j}{(\alpha_j + b)} \right)^{\frac{1+b}{b}}, \text{ and}$$

$$l_j^L = \alpha_j \frac{(1+b)}{\alpha_j + b}.$$

With this in hand we can compute the advantage over laissez-faire of a particular public policy for each household:

$$V_j^L(g, t_j) = \left(\frac{a}{\alpha_j}\right)^{\frac{\alpha_j}{b}} \frac{(\alpha_j+b)^{\frac{\alpha_j+b}{b}}}{b} \cdot \frac{g-t_j}{g^{1-\alpha_j}}$$

Recall that, by construction,

$$V_j^L(g_j^L, C(g_j^L)) = 1.$$

8.1 Laissez Faire, USA

To illustrate the determination of the first best optimal policy for our stylized economy let's first consider the situation of laissez faire in which those households would hypothetically find themselves according to our two baselines. Figure 8.2 illustrates. The figure reveals that there is considerable income variation in each of the baselines. This is due to two effects: (i) households with lower α_j work less, and therefore produce less income than households with higher α_j , and (ii) households with lower α_j build less of the capital good in a situation of laissez faire than those households with higher α_j . Building capital on one's own term is so onerous that all households, even those with very high α_j , realize income levels that are far from the economy's potential output of 600 thousand dollars a year in both baselines. The economy is very inefficient.

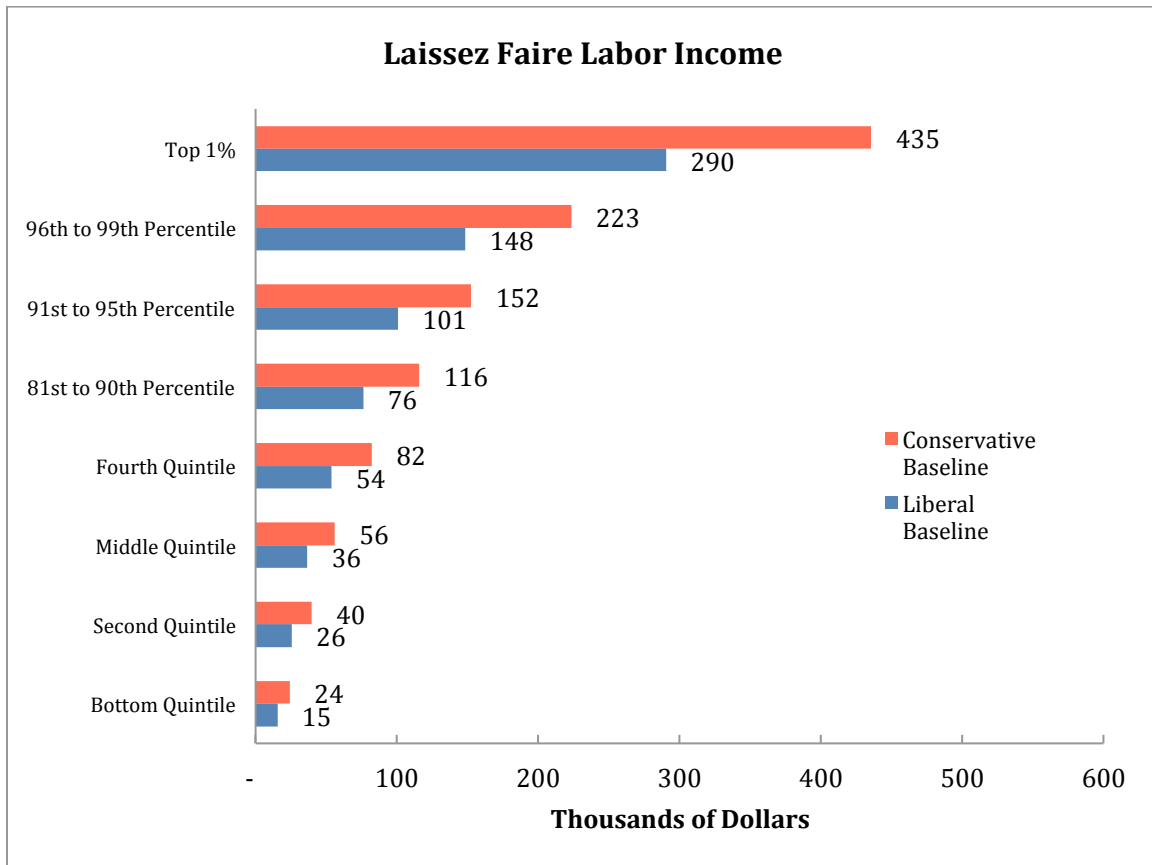


Figure 8.2 The liberal and conservative laissez faire baselines

8.2 The first best fair-and-efficient policy

The first best fair-and-efficient policy is a collection of lump-sum taxes (t_1, \dots, t_8) and a public good level g such that:

$$H \sum_{i=1}^8 \omega_i \left(\alpha_i + (1 - \alpha_i) \frac{t_i}{g} \right) = a(1 + b)g^b,$$

$$H \sum_{i=1}^8 \omega_i t_i = a \cdot g^{1+b}, \text{ and}$$

$$\left(\frac{a}{\alpha_i} \right)^{\frac{\alpha_i}{b}} \frac{(\alpha_i + b)^{\frac{\alpha_i + b}{b}}}{b} \frac{g - t_i}{g^{1 - \alpha_i}} = \left(\frac{a}{\alpha_j} \right)^{\frac{\alpha_j}{b}} \frac{(\alpha_j + b)^{\frac{\alpha_j + b}{b}}}{b} \frac{g - t_j}{g^{1 - \alpha_j}} \text{ for all } i, j \in \{1, 2, \dots, 8\}$$

The first equation is Samuelson's condition. The second condition ensures that the government's budget is balanced. The third condition ensures that the advantages over laissez-faire from the public policy are equalized across households.

Table 8.2 below shows the first best policies for our two baselines, and where g is presented in terms of the *maximum achievable income* it allows a household in the mixed economy (equal, by construction, to $600 \cdot g$).

	Liberal Baseline		Conservative Baseline	
	(In Thousands of Dollars)			
	Income	Taxes	Income	Taxes
Bottom Quintile	0	-39	17	-17
Second Quintile	29	-24	43	-10
Middle Quintile	63	-9	71	-4
Fourth Quintile	114	14	113	6
81st to 90th Percentile	175	40	166	18
91st to 95th Percentile	235	67	220	31
96th to 99th Percentile	335	115	319	55
Top 1%	547	229	570	117
Maximum Achievable Income	558		585	

Table 8.2 Fair and efficient optimal labor income and taxes

The liberal baseline is based on the premise that governmental activity increases the productivity of the private sector much more than in the conservative baseline and, since in this economy the top earners benefit from the public capital more than the rest of the population they are taxed more heavily in the liberal baseline. Everybody benefits from the public capital provision, and the differential tax rates ensure that those benefits are shared equally, relative to their initial –laissez faire– conditions, and this requires in this case that a large fraction of households receive subsidies in both baselines. Because there are fewer gains from government activity in the conservative baseline, taxation of the top earners is much smaller in that case, and so are the magnitudes of the subsidies to the bottom earners. As a consequence of

these lower subsidies, the bottom earners work harder in the conservative baseline, and earn a higher income, than in the liberal baseline.

It is important to stress that the work disincentives that arise due to the differential taxation of the different kinds of households described above should not be called, “distortionary” as these policies are first-best Pareto efficient in the economy under consideration. There are many Pareto efficient allocations in this economy, and the one singled out here is the one consistent with the principles of efficiency, fairness and robustness principles studied in Sections 3-5.

8.3 Properties of the first-best tax system across baselines

As a way to understand the characteristics of the optimal taxes recommended above Figure 8.3 plots these taxes vs. the corresponding incomes against which they’re levied.

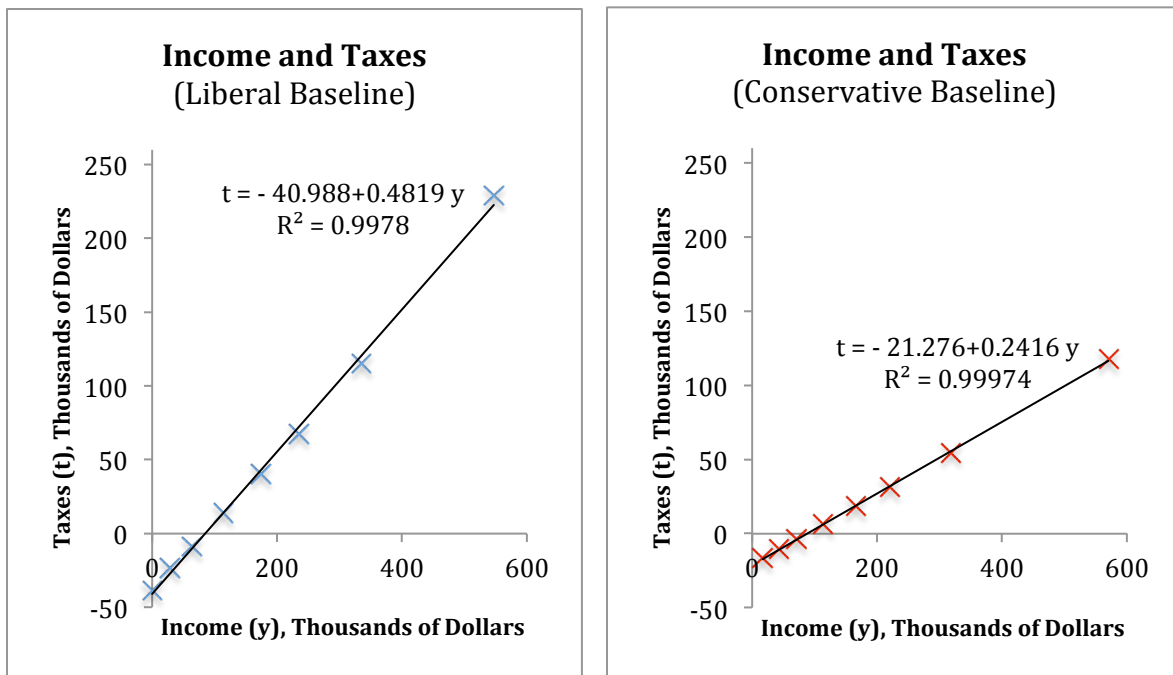


Figure 8.3 The first-best fair and efficient tax policy can be represented as a negative income tax

In both cases the first-best policy can be represented as a *negative income tax*, namely, a tax credit per household plus a constant marginal tax rate on labor income. In the liberal baseline the approximation is a tax credit per household of about \$41 thousand dollars a year and a marginal tax rate of 48% of labor income, whereas in the conservative baseline the approximation is a tax credit per household of about \$21 thousand dollars per year with a constant marginal tax rate of about 24% of labor income. This is interesting, of course, because a constant marginal tax rate is being implemented in practice despite the strong progressive content of the fairness principles from which these optimal taxes were derived.

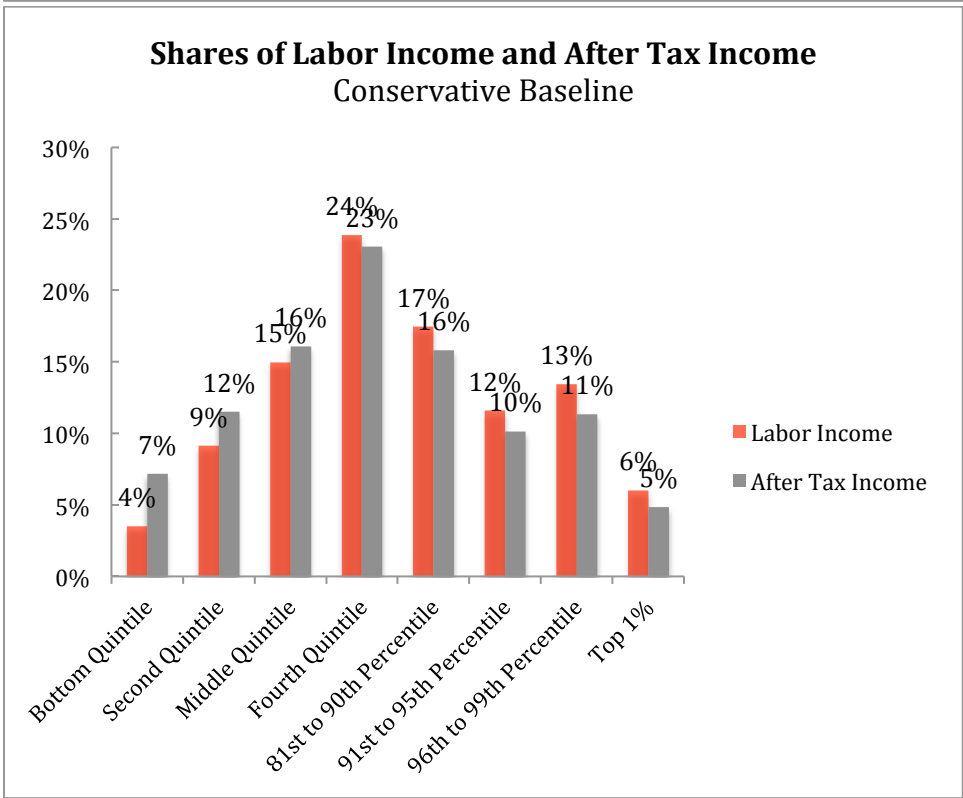
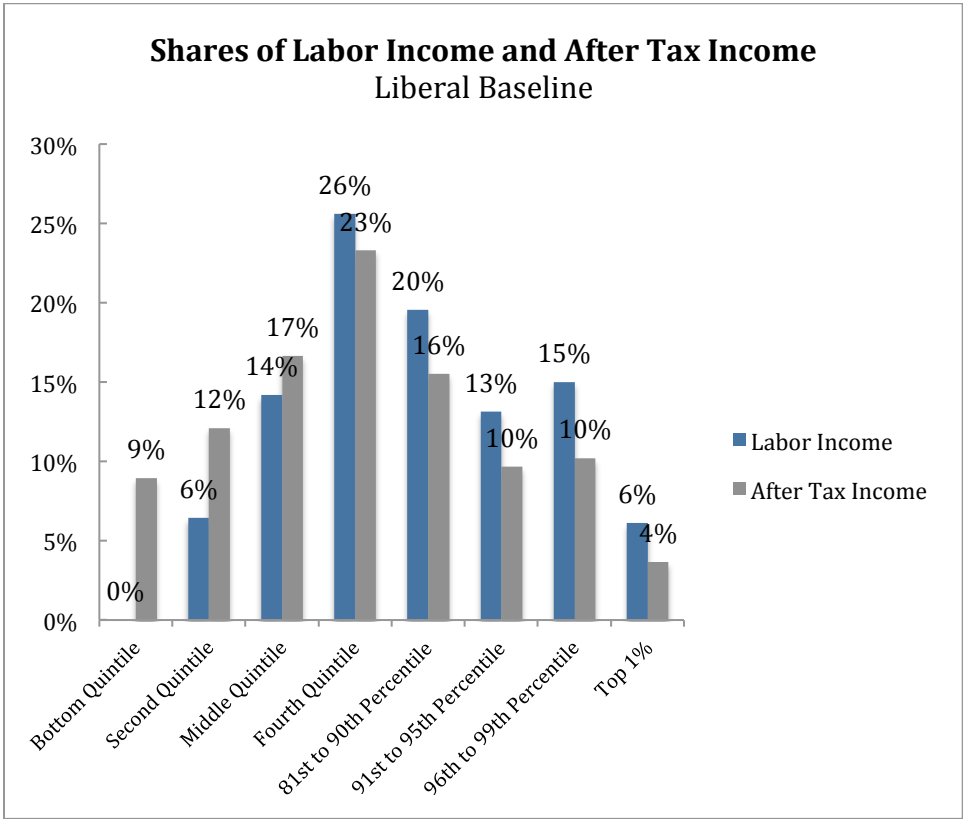


Figure 8.4 Fair and Efficient 'first best' redistribution

Underlying the optimal policies in each of the baselines are principles that limit to the size of the tax credit. Were they to be any higher and the taxes on the high income households needed to finance them would be high enough to be unfair to those earners. After all, high income earners deserve to keep “a big hunk” of their proceeds, by laissez-faire reward.

Whether these optimal policies call for very little or a lot of redistribution is, of course, in the eye of the beholder. It is exactly “the right amount” according to the principles discussed above for those baselines, but reasonable people can disagree. For reference one may wish to compare the differences in the distributions of pre and post tax income that arise under each of these baselines (Figure 8.4) against the differences in the distribution of pre and post tax (market) income for the 2011 US Economy (Figure 8.5).¹⁹ On the one hand, we learn that, as fractions of total income in the economy, the optimal policies across baselines are *not too dissimilar*.²⁰ On the other hand, we learn that the optimal tax policies in our liberal and conservative baselines roughly ‘sandwich’ the 2011 US Tax System: the policies in the liberal baseline are clearly more progressive than those in the conservative baseline, and the 2011 US tax policies fall somewhere in between.

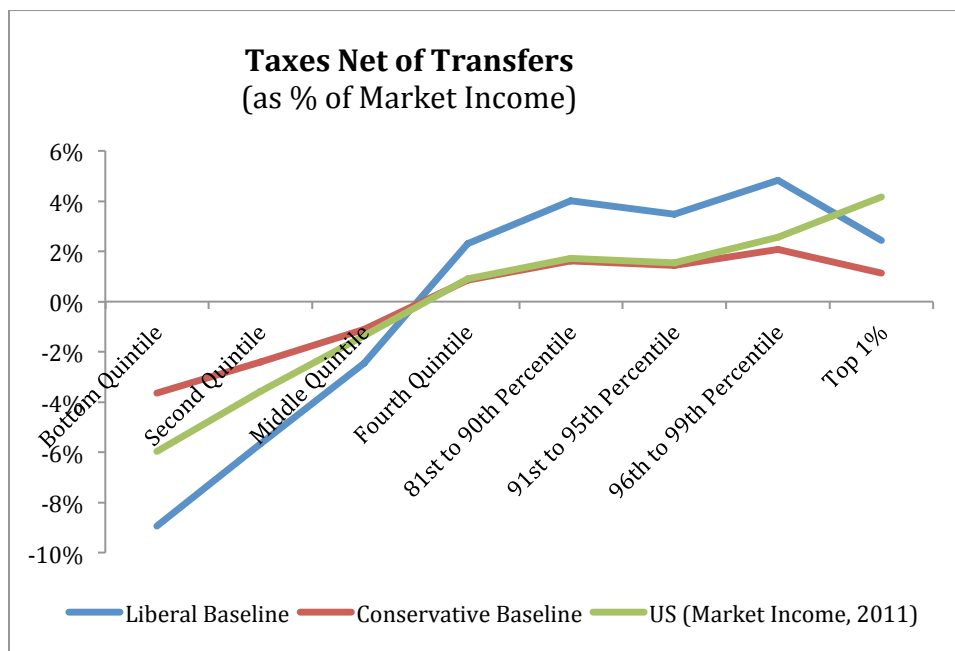


Figure 8.5 The degree of progressivity in the liberal and conservative baselines and in the 2011 US Economy. Steeper lines roughly indicate more progressive tax systems.

¹⁹ The scope of what can be learned from these comparisons is limited by the fact that market income includes forms of non-labor income that are especially large for high-income earners. A detailed treatment of non-labor income requires a richer model, and possibly different normative principles, than what is discussed here.

²⁰ In the sense that the average absolute distance between the liberal and conservative baselines of the fraction of economy wide income paid in taxes across the eight quantiles depicted in Figure 8.5 is less than 2.5 percentage points. In other ways they clearly differ, as Table 8.2 and Figure 8.3 show.

8.4 Second-best piecewise step income tax functions

Because in this economy all income differences can be traced to differences in household preferences, observing income is sometimes all one needs to know in order to design a tax policy that implements the first best. That this is sometimes possible was illustrated in Figure 7.2 for the case of two agents. This is, unfortunately, not the case for the first best policies depicted in Table 8.2, *as these policies are not incentive compatible*.²¹ Considerations of incentive compatibility require the resulting allocations implied by the income tax policy to be *envy-free*. Table 8.3 below presents piecewise step (second-best) fair-and-efficient policies for our two baselines.

Tax Table – Liberal Baseline (In Thousands of Dollars)			Tax Table – Conservative Baseline (In Thousands of Dollars)		
If your household income is			If your household income is		
At least	But no greater than	Your tax is	At least	But no greater than	Your tax is
0	16	-14	0	18	-15
16	41	-9	18	44	-9
41	65	-5	44	69	-4
65	102	3	69	109	3
102	149	12	109	159	13
149	198	20	159	210	22
198	293	46	210	311	50
293	531	226	311	560	109

Table 8.3 Piecewise step fair-and-efficient policies in the liberal and conservative baselines. The maximum achievable income are: 541 thousand dollars a year (liberal baseline) and 575 thousand dollars a year (conservative baseline).

To better understand these policies Figure 8.4 plots the piecewise step taxes vs. the maximal incomes against which they're levied. We learn that, while the negative income tax is still a very good approximation of the relationship between taxes and income in the conservative baseline, this is less so in the liberal baseline: a representation with increasing marginal tax rates would provide a much better fit in this case.

Most interestingly, the source of the tax progressivity in this case is not the set of fairness principles adopted, when considered in isolation, but how they interact with the incentive constraints. An informal rendition of what is happening is the

²¹ The problem, in the liberal baseline, is that, given the income tax policy implied by Figure 8.3, households types 2 through 7 would rather have the allocations of types 1 through 6, respectively. The same problem arises with households types 2 through 6 in the conservative baseline with regard to the allocation of types 1 through 5.

following: The ‘middle class’ households (everybody but the bottom quintile and the top 1 %) are not content with the bundles they receive according to the first best policies in the sense that they envy bundles which involve lower income (and taxes) but more leisure, which they value greatly. To make them like the bundles they receive according to a particular policy we have to make those allocations sufficiently attractive, and that is achieved in this second-best treatment through the lowering of their taxes. This does not happen to the bottom 20% (because they’re already receiving the lowest taxes), or to the 1% (because they like the consumption good so much they don’t envy allocations that have a lot less of it). In sum, the tax progressivity arises not due to a desire to tax the rich disproportionately more ‘because that is what is fair’ but due to the need to tax the middle class households disproportionately less ‘because that is what is incentive compatible.’ As a result, the advantages over laissez faire are only equalized across the bottom 20% and the top 1% in the second-best allocation with the rest of the households obtaining a larger advantage. This is true in both baselines, but the effect is much more pronounced in the liberal baseline, and especially for the top 81%-99% of households.

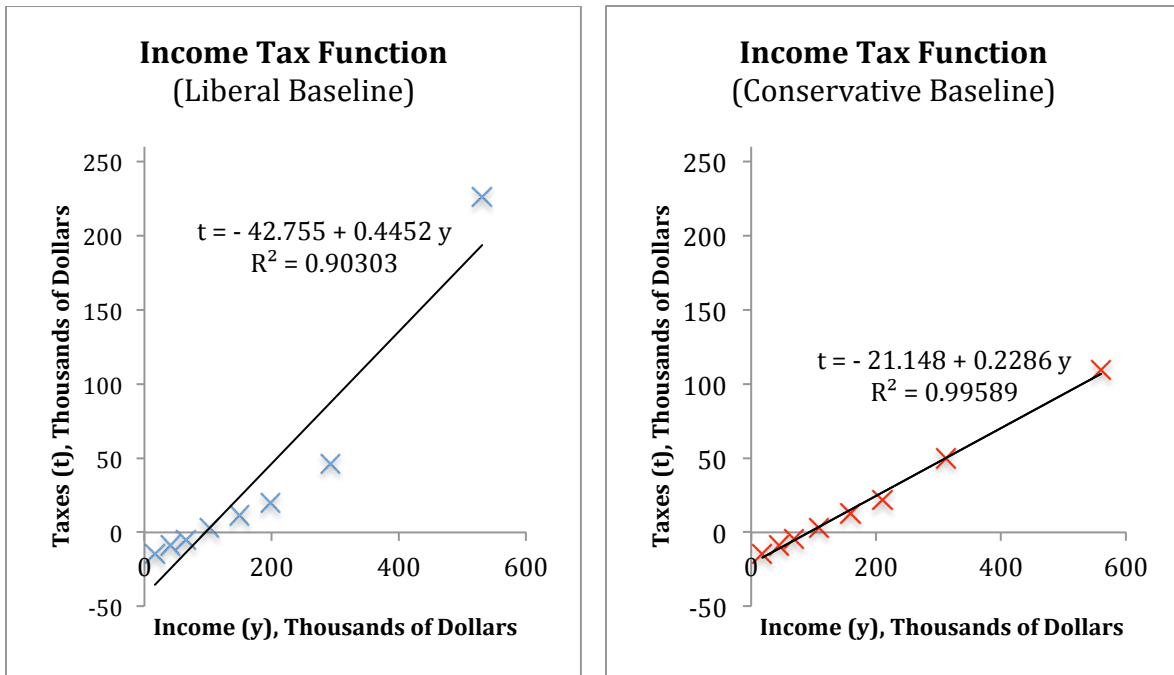


Figure 8.4 The piecewise step fair-and-efficient tax policies in the liberal and conservative baselines

This picture is corroborated in Figure 8.5, which depicts the first-best and piecewise step average tax rates as functions of income in both baselines. We learn that, relative to the first-best, subsidies to the bottom 20 percent of households are much smaller as fractions of income in this second-best world, as are the average tax rates of the middle class. Not so for the average taxes of the top 1%, which are nearly the same.

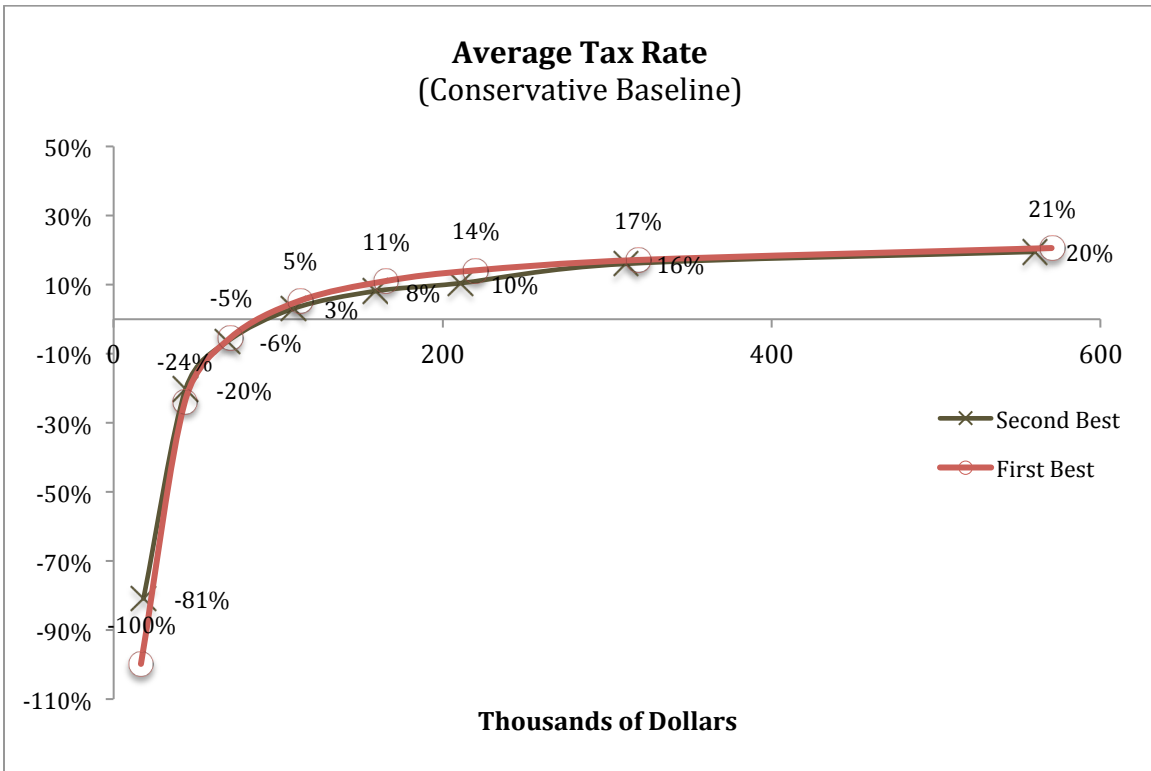
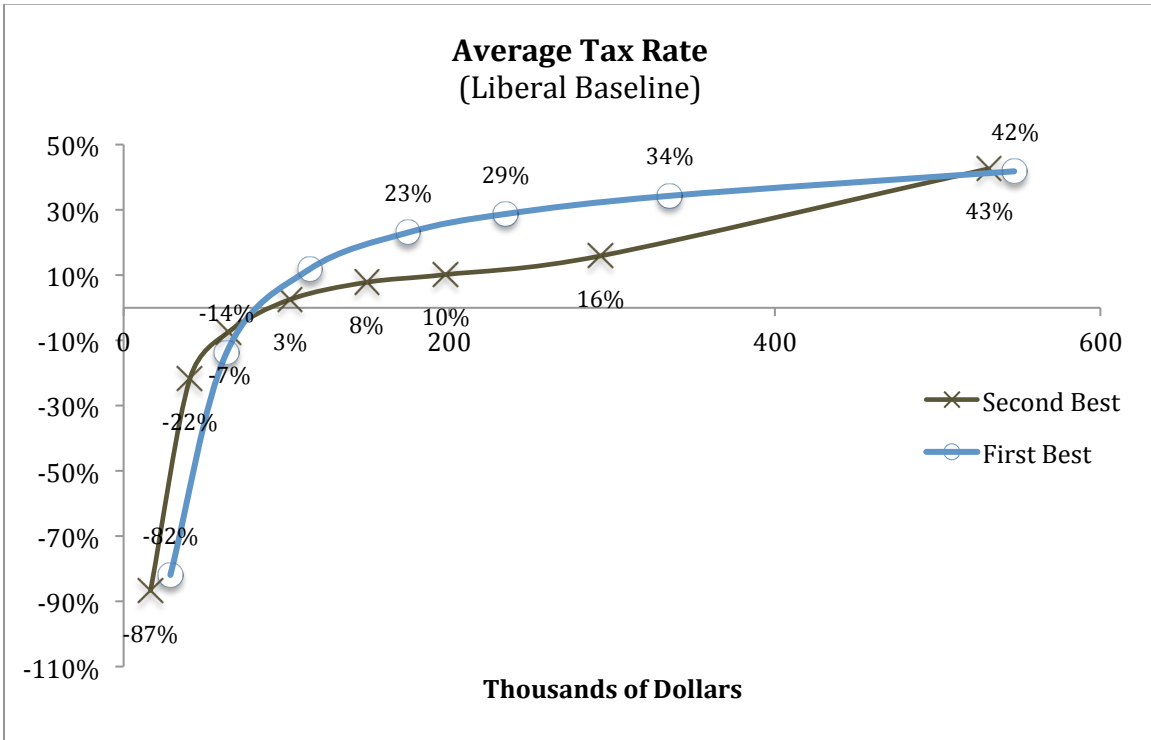


Figure 8.5 Average tax rates in the first-best and the 'piecwise step' second-best world.

8.5 Second-best affine income tax functions

As discussed in Section 8.3, the first-best taxes can be described as a negative income tax, but this is not the same thing as saying that implementing said negative income tax would produce the first best allocation as a result. This, as discussed in Section 8.4, is due to the presence of incentive constraints. A natural question arises: what are the consequences, in the second-best world, to restricting the policy choices to negative income tax policies? Table 8.4 below provides the result.

Second–Best Negative Income Tax (In Thousands of Dollars)	
Liberal Baseline	$Taxes = -24 + 47.4\% \cdot Income$
Conservative Baseline	$Taxes = -17 + 23.6\% \cdot Income$

Table 8.4 Negative income tax fair-and-efficient policies in the liberal and conservative baselines. The maximum achievable income are: 551 thousand dollars a year (liberal baseline) and 581 thousand dollars a year (conservative baseline).

The tax credits per household and marginal tax rates are lower than those implied by the first-best policies although the changes are much more pronounced for the liberal baseline. In the liberal baseline the subsidies to the bottom 20 percent are larger and the marginal tax rates on the top 1 percent smaller than those implied by the piecewise step second best policies. The implication is that passing from the piecewise step policies to the negative income tax fair and efficient policies in the liberal baseline would benefit the bottom 20 percent and the top 1 percent at the expense of the middle class. In fact, the benefit to the bottom 20 percent is large enough to rank the negative income tax policies above the piecewise step policies according to social ordering R^L . To be sure, the negative income tax economy has smaller income and more leisure across all households than the piecewise step policies. It is preferred by the top 1% because of its substantial tax savings and by the bottom 20% because of the premia those households put on leisure.

Table 8.5 below summarizes how all households fare across the two second best environments, in terms of equivalent income, and relative to their laissez faire equivalent income under the first best policies.

The negative income tax fair-and-efficient policy has the feature that it distributes the social losses that the incentive constraints create (relative to the first best) in a near equal fashion. Many factors contribute to this conclusion, but this is in large part due to the fact that the first best policy admits a close affine representation, as shown in Section 8.3 above.

	Equivalent Incomes(*)			
	Liberal Baseline		Conservative Baseline	
	PS	NIT	PS	NIT
Bottom Quintile	.959	.974	.996	.994
Second Quintile	.973	.979	.996	.995
Middle Quintile	.990	.981	.999	.996
Fourth Quintile	1.014	.983	1.001	.997
81st to 90th Percentile	1.047	.984	1.004	.998
91st to 95th Percentile	1.084	.985	1.01	.998
96th to 99th Percentile	1.135	.985	.998	.998
Top 1%	.959	.974	.996	.994
(*) Relative to their laissez faire equivalent income under the first best policies				

Table 8.5 Equivalent incomes are more equally distributed under the negative income tax (NIT) fair-and-efficient policy than under the piecewise step (PS) fair and efficient policy.

9 Conclusions

This paper provides a language in which the fairness and the efficiency of different public policies can be discussed and employs it to identify the optimal policies that would ensue in an environment in which different agents benefit differentially from the provision of public capital. The optimal policy strikes a balance between ‘taxing the rich’ (because they benefit the most from the provision of the public capital) and ‘not taxing the rich too much’ (because they have the right to keep ‘a hunk’ of the proceeds of their hard work). This balance arises from the simultaneous consideration of liberal and libertarian principles of fairness. It turns out that a version of these principles is compatible with the Pareto criterion, and that opens up the possibilities for a rich discussion of both efficient and fair social policies, a discussion that is sorely needed in modern society.

To illustrate the potential of the methodology I develop an example loosely based on the characteristics of the US economy in 2011 aimed at determining the optimal degree of tax progressivity implied by the methodology and find that the first best fair and efficient policy can be described as a negative income tax, a policy with a clearly conservative pedigree. The implied tax credits are, however, quite large, thus producing substantive average tax progressivity (albeit not at the margin). It is my hope that the example shows that the methodology is rich enough to be used in realistic applications aimed at the determination of second-best fair and efficient policies, the characteristics of which will depend on the nature of the policy instruments that are available to the decision maker. We thus have a language in which to investigate the extent to which different tax policies in general, and the negative income tax in particular, execute a first or second-best efficient compromise between what is efficient and what is fair.

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