GRÉDI

Groupe de Recherche en Économie et Développement International

Cahier de recherche / Working Paper
06-24

On the Definition of Economic Efficiency

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November 2006

Abstract

This paper analyzes the definition of economic efficiency. The standard definition used in economic literature is the Pareto Optimum which is based in the space of individual utilities. This paper proposes new definitions based on alternative spaces. The paper also introduces a dominance criterion for efficiency over a set of social evaluation spaces.

Keywords and phrases : Efficiency, Social justice, Dominance.

JEL Codes : D63, H20.

1   Introduction

In their first introductory courses, economists learn that efficiency is achieved when an economic allocation is Pareto optimal. In other words, economic efficiency implies that it is impossible to increase one's utility without decreasing someone else's utility. However, the normative concepts underlying the definition of efficiency are far more complex than it seems. Since Rawl's *Theory of Justice* (Rawls, 1971), political philosophers have questioned the appropriateness of utilities for the evaluation of social justice. If social objectives are not defined in the space of utilities; efficiency must therefore be defined in another more appropriate space. This paper's objective is to address this question. A brief overview of the philosophical debate is presented in section 2. Section 3 presents the formal definition of efficiency. A simple example is presented in section 4. A brief conclusion then follows.

2   An Overview of the Debate

From the eighteenth century until the twentieth century, utilitarianism, in the tradition of Bentham and Mill, was the main political philosophy in the anglo-saxon tradition. This position was first criticized by Rawls (1971) who argues that the appropriate space for evaluation of social justice is not individual utilities but the space of social primary goods. Those goods are civil liberties, free access to social position and socio-economic advantages. The *Theory of Justice* is so important in political philosophy literature that since it has been published, every author in this field has to explain the differences and similarities between his view and Rawls'. In this section, I present briefly the most known piece of work in post-rawlsian political philosophy.

Nozick (1974) criticizes Rawls and argues that the criterion of social justice must be procedural and that the appropriate space to assess social justice is the space of formal liberties.

Sen (1980) argues that although Rawls properly demonstrates that utility is not an appropriate space for social justice evaluation, he eliminates too many of the differences between individuals. Some differences, such as handicap, gender or race may be important. Thus, he proposes to evaluate social justice in the space of capabilities which are sets of social functionnings available to each individual. Sen (1980) was also the instigator of the debate on "equality of what?".

Dworkin (1981a and b) formalizes the principle of individual accountability which was inherent in Rawls (1971) and Sen (1980). In this context, he argues that social justice must be evaluated in a space defined by the resources available to individuals.

Arneson (1989) criticizes Dworkin on the link he draws between resources and preferences. He argues that the appropriate link between resources and preferences should be opportunities of welfare. He thus proposes to evaluate social justice in the space of opportunities of welfare. Cohen (1989) argues that the space of opportunities of access to socio-economic advantages is more appropriate [1].

Van Parijs (1995) adopts a completely different framework and proposes to assess social justice in the space of real liberties.

3   Defitinions

As briefly discussed in the previous section, a social planner's objectives may be evaluated in different spaces. An efficiency criterion must then be associated to each respective space. In order to do so, let us consider an economy of I individuals may be described by the individuals initial allocation, $\Omega = (\varpi_1, \varpi_2, ..., \varpi_I)$, by the procedure ψ that transforms those initial allocations and by the final allocation $X = (x_1, x_2, ..., x_I)$. Let $\Theta = (\phi_1, \phi_2, ..., \phi_I)$ be a social evaluation space associated with this economy. If this space is individual utilities, then ϕ_i is the utility of individual i. If we consider opportunities of welfare than ϕ_i is the opportunities of welfare available to individual i, etc. We can now give a first definition.

Definition 1: Θ-*efficiency.* *An economy* (Ω, ψ, X) *is* Θ-*efficient* $\leftrightarrow \nexists$ $(\Omega', \psi', X') : \{\phi_1' \geq \phi_i \forall i \wedge \exists k : \phi_k' > \phi_k\}$

In this context, it is easy to see that Pareto efficiency is a particular case ; such that the economy (Ω, ψ, X) is efficient in the space of individual utilities if and only if $\nexists (\Omega', \psi', X') : \{u_i(x_i') \geq u_i(x_i) \forall i \wedge \exists k : u_k(x_k') > u_k(x_k)\}$.

As economist, we may face situations in which policy makers do not agree on the appropriate social evaluation space. It is then interesting to identify situations which are efficient for a wide spectrum of social evaluation spaces.

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[1]Roemer (1993) formalizes the theory of equal opportunities. Fleurbaey (1994, 1995), Bossert (1995) and Bossert and Fleurbay (1996) adopt an axiomatic approach to those theories

Let $\Lambda := \left\{\Theta^1, \Theta^2, ..., \Theta^N\right\}$ be a set of N different social evaluation spaces. We can now give a second definition.

Definition 2: Λ-***efficiency.*** *An economy* (Ω, ψ, X) *is* Λ-*efficient* $\leftrightarrow \nexists$ $(\Omega', \psi', X') : \left\{\phi_1^{n\prime} \geq \phi_i^n \forall i \wedge \exists k : \phi_k^{n\prime} > \phi_k^n\right\} \forall \Theta^n \in \Lambda$

4 Two Simple Examples

In this section, we consider $\Lambda_0 :=$ {Utility, Resources, Formal Liberties}. This set of social evaluation spaces will be used in two simple examples. First we will consider a purely competitive economy and analyze its efficiency. Secondly, we will discuss the case of provision of a public good.

First, consider a purely competitive economy (Ω_1, ψ_1, X_1) of I individuals with private goods, perfect and symmetric information and complete markets. From the *First Fundamental Theorem of Welfare Economics*, we know that this economy is Utility-efficient. Since it is impossible to increase ϖ_i without decreasing ϖ_j for at least one $j \neq i$, this economy is also Resources-efficient. If ψ_1 is such that all production decisions and all exchanges between individuals are non coercive, this economy is also "Formal Liberties"-efficient. This economy is thus Λ_0-efficient.

Let us now consider Dworkin's (1981b) proposition for social justice. After choosing resources as the appropriate space, Dworkin suggest that justice requires the equality of resources. As some resources are non-transferable, he suggest that the just distribution will transfer resources from one individual to another in order to mimic an insurance system that will have been chosen by the individuals if they were placed behind the veil of ignorance. This yields a new procedure ψ_2. This redistribution of resources yields another Resources-efficient outcome of the economy. The *Second Fundamental Theorem of Welfare Economics* also insures that (Ω_1, ψ_2, X_1) will also be Utility-efficient. However, coercion is needed to transfer resources from an individual to the other. As a result, some individuals experience a decrease in their formal liberties without increasing anyone else's. This implies that (Ω_1, ψ_2, X_1) is not "Formal Liberties"-efficient. We conclude that (Ω_1, ψ_2, X_1) is Λ_1-efficient where $\Lambda_1 :=$ {Utility, Resources}

Let us now consider our second example which is the provision of a public good. Suppose now an economy where (Ω_2, ψ_1, X_2). Here, X_2 incorporates a non rival public good without exclusion. This implies that this public good is consumed in equal quantity by every agent. Note that the procedure ψ_1 is such that all production and consumption is chosen by the individuals who

interact through market mechanism. Introductory public economics teaches us that (Ω_2, ψ_1, X_2) is not Utility-efficient. However, since it is impossible to increase ϖ_i without decreasing ϖ_j for at least one $j \neq i$, this economy is Resources-efficient. The use of procedure ψ_1 also implies that it is also "Formal Liberty"-efficient. We conclude that (Ω_2, ψ_1, X_2) is Λ_2-efficient where $\Lambda_2 := \{\text{Resources}\}$

Let us now consider a new procedure ψ_3 which consist of free markets with the exception imposing a tax on the initial allocation of resources in order to produce a quantity of public good that is compatible with Samuelson's rule. This new economy (Ω_2, ψ_3, X_2) is Resources-efficient since it is impossible to increase ϖ_i without decreasing ϖ_j for at least one $j \neq i$. Standard public economics teaches us that (Ω_2, ψ_3, X_2) is also Utility-efficient. However, taxing individuals implies coercion. So, all individuals experience a decrease in their formal liberties. This implies that (Ω_2, ψ_3, X_2) is not "Formal Liberties"-efficient. We conclude that (Ω_2, ψ_3, X_2) is Λ_1-efficient.

5   Conclusion

In this paper, we have introduced a more general definition of economic efficiency for which Pareto-efficiency is just a particular case. We have also introduced a definition of efficiency dominance for which an economy is efficient for a wide spectrum of social evaluation spaces.

Our discussion of some simple examples has shown that analysts need to identify the social evaluation space that they refer to before stating that an economy is efficient. In other words, even in some simple cases, there may be divergence in opinion if two analysts chose different social evaluation spaces.

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