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CHOOSING AND EVALUATING TECHNOLOGY POLICY: A MULTICRITERIA (NON NEOCLASSICAL) APPROACH

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Introduction

In the era of knowledge-based and learning economy the issue of technology policy is getting a renewed attention (Bozeman, 2000; Cowling, 1999; Lundvall, 1999; OECD, 1998). The theorization of national (and regional, or even local) innovation systems (Archibugi, Howells & Michie, 1999; Baraczyk, Cook & Heidenreich, 1996; Cook, Uranga & Etxebarria, 1997; Edquist, 1997; Lundvall, 1992; Nelson, 1993; Teubal, 1998), jointly with the diffusion of the evolutionary perspective in economics and sociology (England, 1994; Hodgson & Screpanti, 1991; Metcalfe, 1998; Nelson, 1987, 1995; Rosenberg, 1994; Smelser & Swedeberg, 1994), is moving far from the simple and ethereal world of neoclassic economic theory (NET), and are showing the complexity of choosing and evaluating technology policy (Becher & Kuhlmann, 1995; Freeman, 1987; Georghiou & Roessner, 2000; Link, 1996, 1998; Meyer-Krahmer & Montigny, 1990; Papaconstantinou & Polt, 1997; Peterson & Sharp, 1998; Vonortas, 2000). However the debate seems still suffering on one side the seduction of NET and on the other side the lack of formal methods to decide and evaluate. Indeed the two things are strictly related, because often the resistance to abandon NET comes from the fact that it appears very theoretically robust, while the practices of decision making performed by institutions and even the methodologies proposed by the non-neoclassical theorists seem less rigorous and ongoing.

The seduction can be recognized in the frequent references made by evolutionary –or at least non neoclassical- theorists to typical neoclassical concepts, as optimization, marginal costs, game approach, welfare function, knowledge function, etc. A large part of theorizing and making in technology policy is definitely moving from the neoclassical framework, abandoning the idea of equilibrium, production function, etc.. Some approaches are going even to be modeled, as the national innovation systems, the triple helix, and the genetic algorithm (Arthur, 1994; Kaufman, 1998). However, especially in the attempts to choose and evaluate technology policy the lack of a

decision making procedure able to be practical and also non-neoclassical opens a big hole in the field, and allows for fostering the “neoclassical sirens”.

The gap can be filled in by some methods, called *outranking methods* (Roy, 1985; Roy & Bouyssou, 1993; Vincke, 1992), which are as robust as NET but are non-neoclassical. They can enrich the development of non-neoclassical approaches to technology policy in four main ways. First, they radicalize the move from NET, and at the same time reinforce its theoretical grounds, consisting in the behavioral-evolutionary economic theory (BET). Moreover they are definitely realistic, being easily applicable to choose and evaluate policy options, and any other kind of economic or social decisions. Finally, they allow to solve multicriteria problems, which instead cannot be faced by NET.

The Multicriteria Nature of Choosing and Evaluating Technology Policy

The choice and the evaluation of technology policy, as well as of any other kind of policy, are multicriteria. In other words, they imply the consideration of different economic, social and technical criteria at once. We could add that any human choice is multicriteria and that the unicriterion condition is an extreme case. We choose a car between competing products, based on the criterion of price, safety, size, comforts, speed, etc. The hardest question comes from the fact that, with special exceptions, criteria are conflicting ones, that is, they do not order our preferences in the same way. Moreover, we are speaking of genuinely independent criteria, that is, of criteria which are not reducible (transformable) each other through some parameter.

A brief glance at the literature on technology policy clearly show such a multicriteria nature. Depending on the geographical reference (national or regional or local), and depending on the theoretical and cultural backgrounds of policy makers (or of their consultants) many different criteria are set up. The same institution can have many different criteria, and usually changes them over time, because of changed priorities in the society and the economy. A criterion corresponds to an objective-function to maximize or satisfy. Well known examples are the GNP, the net employment, the average size distribution, the creation of new enterprises, the growth of productivity, the increase of firms' survival rates, etc.

In more specific technological terms, other criteria are the diffusion rate of ICT, the innovation rate, the R&D expenditure of business or non business organizations, the patent rate, etc. Looking at the last report on S&T (OECD, 2000), nearly all the indexes could be used as criteria to choose or evaluate the technology policy. Hence, a problem of how face multicriteria decision making is raised.