Characteristics of innovating firms in Tunisia: The essential role of external knowledge sources

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ABSTRACT

This article is dedicated to the analysis of the first innovation survey of the Tunisian firms. Starting from basic mechanisms of innovation processes and existing results on other developing countries, we test a set of assumptions on the characteristics of innovating firms in a developing country like Tunisia. The analysis of product and process innovations shows the essential role played by external technical knowledge sources: firms must be able to benefit at least from one such a source in order to attain a significant innovation propensity. We also show that the profile of Tunisian firms can be contrasted with other developing countries. The main contrast concerns the limited role of internal R&D and the insignificant role played by foreign participation. For both types of innovations, another important contrasting result concerns the role of sectoral membership. In Tunisia, this dimension does not seem to structure enough systematically the innovative capabilities of firms. That could indicate an immaturity of sectoral systems of innovations in this country.

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1. Introduction

Innovation appears today as the central driver of sustained growth. The theoretical literature in economics, when it analyzes the growth in the developed world, generally defines innovation as the advancement of the global technological frontier (Aghion and Howitt, 1998). If we consider the developing/emerging countries, this definition must be adapted to their conditions. The introduction of technologies and products that do not advance the global technology frontier, but that are, nevertheless, new to firms in these countries can indeed also foster growth and help them to close the gap with the frontier and increase their competitiveness in domestic, as well as foreign markets. Therefore, understanding the factors favourable to inno-

vating firms is, at least, as important in these countries as in the developed ones.[1]

A large theoretical and empirical analysis has been dedicated to the analysis of the innovation process in developed countries. Starting from the macro level (growth theories and econometrics, following Grilliches, 1979), this analysis has been more recently able to better uncover sectoral and microeconomic mechanisms that underlie innovative capacity of these countries.

In Europe, the main data source for the microeconomic and sectoral analysis of firms' innovative activities is the community innovation surveys (CIS) that have been progressively introduced in many countries (see Mohnen and Mairesse, 2010), following the Oslo Manual (first version

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[1] For an in depth comparison of technological innovation processes in developed and developing countries see Bell and Pavitt (1993) and Fagerberg et al. (2010).

in 1992, see OCDE, 2008, for the most recent edition). Given the importance of innovative activities, developing countries are also progressively adopting this survey approach, and we are beginning to accumulate knowledge on their specificities. Unfortunately, this knowledge is yet quite sparse and quite heterogeneous (surveys not always repeated in time, different surveys containing inhomogeneous sets of questions, making difficult the comparison of their results in time or between countries, etc.). As a consequence, even incremental contributions to this knowledge would be beneficial to our understanding of innovation processes, allowing a finer analysis, better comparison with the data on developed countries and, hence, better generalization about the particularities of developing ones (see Jaramillo et al., 2001).

This study aims to contribute to this accumulation, and it analyzes the main characteristics of the innovating manufacturing firms in Tunisia. We tackle this question through a systematic analysis of the only innovation survey carried out in this country in 2005, by the Ministry of Scientific Research, Technology and Competency Development (MSRTCD).[2] This survey is in conformance with the increasing emphasis put on the modernization of Tunisian industries and on their innovations. This emphasis has been principally triggered by the accession to the GATT, and by the establishment of the free trade union with European Union (1995). This emphasis has taken a more deliberate form as the first law on research and technological development in 1996 (extending the *Mise à niveau*– upgrade – program started in 1995, mainly focused on industrial competitiveness). This law aims to improve the participation of private firms, organisation to research and technological development, to foster the coordination of different components of the national innovation system, to facilitate technology transfers towards Tunisian firms, and to promote innovatory activities through partnerships between firms and research structures. This survey corresponds, as a consequence, to a photography of innovation in manufacturing sectors after a decade of effort to enhance the technological development in Tunisia.

This article proposes a detailed analysis of this photography, in order to determine the main characteristics of innovating firms in Tunisia. In comparison with other articles (see Section 2), the contribution of this article will consist in the focus that we will put on the specific role of external knowledge sources in supporting the innovative activity of Tunisian firms. We will analyze them as important complements to other important characteristics such as market demand, firm size, internal R&D, foreign exposure, public ownership and capital, as well as sectors. Our main results concern the differentiated behavior of firms for product and process innovations in Tunisia, and the marked role played by different knowledge sources for these two types of innovation.

The context of a developing country imposes on us two important modulations of the concepts and results devel-

oped for industrial countries. First, we can expect a balance between the characteristics of innovating firms quite different from the one observed in the innovation studies that are based on formal R&D investments of firms (see also Bell and Pavitt, 1993 and the Bogotá Manual, Jaramillo et al., 2001). Second, we observe that in developing economies all firms cannot necessarily develop completely new and better products or production processes for the market. Many innovations simply consist in introducing better products that are new only for the Tunisian firms, without being new at the international level. Thus, our analysis must not be restricted to the group of firms that undertake formal R&D activities, but cover all firms that rely on the introduction of novelty to face the market competition and demand. This more broad definition of innovations is also adopted by other studies on developing countries (see, for example, Almeida and Fernandes, 2008 or Kannebley et al., 2005).

The following section discusses the main characteristics of firms that are connected to their propensity to innovate. We consider here the dimensions that have been emphasized in the theoretical and empirical studies. This discussion guides us in the specification of the necessary components of the econometric model that we use and in the formulation of some hypotheses about the type of relationship we can expect between each characteristic and the innovativeness of firms. The third section presents the data set that we use, as well as the research methodology that we adopt to analyze it. The fourth section is dedicated to our results. We first proceed with a quick analysis of the declared motivations of firms for their R&D activity. The results confirm that product and process innovations do not respond to same objectives, and they should be studied separately. We then present the results of the probit models. These models are formulated in accordance with the discussion developed in the second section, and they analyze the relations between the characteristics of firms and their propensity to innovate. The interaction between these characteristics is further analyzed using regression trees. We also provide a detailed analysis of the kind of cooperation firms establish with different knowledge sources. The last section concludes the article. Two statistical appendices support this article, one at the end of this document and another, more detailed one, on line.[3]

2. Characteristics of innovating firms in a developing country

In this section, we present and discuss the main mechanisms (see Dosi, 1988) on which we will focus in order to develop our econometric model. We will draw from both the theoretical literature on product and process innovations and the empirical studies on developing countries. Our model construction will also take into account the shortcomings of the data that is provided by this first survey (we will discuss more explicitly these shortcomings in the next section). For each potential dimension, we will start from the general theoretical point of view and confront it

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[2] This survey is based on the well known CIS methodology. The authors are very grateful to Hatem Mhenni, National Observatory of Science and Technology, for providing the data.

[3] Detailed statistical results can be consulted at the following address http://www.vcharite.univ-mrs.fr/PP/yildi/files/appendixtunis1.pdf.