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Sources of productivity growth in the Spanish pharmaceutical industry (1994–2000)

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Abstract

The Spanish pharmaceutical industry underwent an important transformation during the 1990s. To survive under the new market conditions, labs had to refocus their competitive strategies towards increasing productive efficiency or reinforcing research and development (R&D) activities. This paper analyzes the evolution of the productive patterns in a sample of 80 pharmaceutical laboratories that operated in Spain from 1994 to 2000. We estimate Malmquist productivity indexes and decompose them into four sources of productivity change. The results suggest that pure technical efficiency change and the scale change of the technology explain most of the productivity growth observed during the period. The contribution of technical change to productivity growth is negligible, indicating a poor result from R&D activities at least in the groups of Small and Medium-sized labs.

Keywords: Productivity; Malmquist index decomposition; Pharmaceutical labs; DEA

1. Introduction

Several important regulatory changes shaped the evolution of the Spanish pharmaceutical industry during the 1990s. First, the 1990 Drugs Act introduced new safety, quality, and effectiveness requirements for the registration of new drugs. Second, the 1986 reform in the patents system, adopted as a consequence of Spain's entry into the European Union, allowed for product patents to be registered in Spain from 1992 on. Third, the method employed to regulate the price of drugs was also changed in 1990. Despite the fact that since 1998 the Government can only regulate the prices of the drugs financed by the Health Administration, in practice, price controls on drugs intensified due to the pressure to comply with the strict budgetary requirements to enter the European Monetary Union.

The objective of this paper is to assess how these changes have affected the productive activity of the Spanish pharmaceutical laboratories. Pharmaceutical activity is complex, and can be divided into three principal tasks: production, distribution, and research and development (R&D). In the early evolution of the Spanish pharmaceutical industry, a protectionist regulatory environment fostered the proliferation of local labs whose main activity consisted of copying and manufacturing foreign products that were unprotected by product patents in Spain or other Euro-

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pean countries. This situation also led multinationals to locate production plants in every European country. The landscape changed dramatically after the consolidation of the European Common Market. Frontiers within the Euro-zone virtually disappeared and multinationals concentrated production in order to achieve economies of scale (Rodríguez and Miravitlles, 1999).

With respect to R&D activities, the primary inputs are the skills of scientists and the ability to maintain an extensive flow of information within firm boundaries and also between the firm and the scientific community. Firms wishing to take advantage of research conducted beyond the organizational boundaries need to invest in "absorptive capacity" (Cohen and Levinthal, 1989). In other words, they need to accumulate the knowledge, skills, and organizational routines needed to identify and use the knowledge that has been generated elsewhere (Cockburn and Henderson, 1998). Pharmaceutical research activities are subjected to significant economies of scale and scope[1] (Henderson and Cockburn, 1996).

The third task undertaken by pharmaceutical labs is commercialization. Labs commercialize two types of pharmaceutical products: own products (developed in-house) and licensed products (developed by other labs). The highest margins and sales come from own products. In general, labs concentrate their research efforts on a narrow range of pharmaceutical products, although sales may spread over a wide variety of products (licensed and generics). In order to gain access to a license the most important aspect is the sales force under the control of the lab. Competition to obtain licenses induces a decline in commercial margins. The environmental changes mentioned above have tended to increase the weight given to drugs commercialization in the activity of international companies present in Spain, thereby reducing investment in R&D and production facilities.

To assess the impact of these regulatory changes in the Spanish pharmaceutical industry, this paper estimates the sources of productivity change during the period 1994–2000 in a sample of 80 Spanish labs. We first describe the recent evolution of the Spanish pharmaceutical industry. Then, we present a non-parametric model that permits the measurement of pharmaceutical productivity change and its decomposition into two indexes related to efficiency gains and two indexes related to technical change. The subsequent sections describe the data and discuss the results. Concluding remarks are presented in a final section.

2. The pharmaceutical industry in Spain

The European pharmaceutical industry is heavily regulated. Within the European Union, about 63% of the global expenditure on drugs is financed by the Administration, with this figure increasing to 72% in Spain. It is therefore unsurprising that the growth in the pharmaceutical bill is an issue of maximum concern to all European Governments. These concerns increased during the second half of the 1990s due to the need to control public expenditure in order to meet the requirements for entry into the Monetary Union. In recent years, the Spanish Government has tried to achieve an exact balance between public income and public expenditure, a policy which has been labeled *déficit cero*. This objective has affected the pharmaceutical industry in the form of a stricter price regulation that has had the overall effect of decreasing the margins in the industry. The first price revision of the decade (undertaken in 1991) allowed an increase of 3.2%. The following revisions (in 1993 and 1999) forced reductions of 3%, although other revisions in the lists of drugs (in 1996 and 1997) may have had a favorable impact on the prices of 0.8% each year (estimates of Farmaindustria, 2001). In summary, while the price index of pharmaceutical products increased by 8.5% from 1992 to 2000, the general price index increased 30.4% during the same period (Farmaindustria, 2000). The margins of wholesalers and pharmacies were also significantly reduced during the decade. Additionally, the number of products reimbursable by the Health Administration has also decreased from 8210 in 1990 to 7350 in 2000, a 10.5% reduction.[2] However, the

[1] Achilladelis and Antonakis (2001) provide an excellent and exhaustive historical assessment of the driving forces of technological innovation in the pharmaceutical industry. While many of these can be considered environmental (Government legislation, competition, scientific and technological advances, etc.), company specific forces exert a very strong influence on the patterns of innovation within this industry.

[2] Prescription sales account for 94.5% of the market and the co-payment percentage (7%) is one of the smallest in the EU, with only The Netherlands (0.6%) and the UK (4.9%) having lower figures.