Health Policy 123 (2019) 1108–1115

Contents lists available at ScienceDirect

Health Policy

journal homepage: www.elsevier.com/locate/healthpol

A spatial analysis to evaluate the impact of deregulation policies in the pharmacy sector: Evidence from the case of Navarre

Ilaria Barbarisi[a], Giuseppe Bruno[a], Antonio Diglio[a], Javier Elizalde[b], Carmela Piccolo[a,*]

[a] Dipartimento di Ingegneria Industriale (DII), Università degli Studi di Napoli Federico II, P.le Tecchio 80, 80125 Napoli, Italy
[b] Facultad de Ciencias Económicas y Empresariales, Universidad de Navarra, Campus Universitario, 31080 Pamplona, Spain

ARTICLE INFO

Article history:
Received 6 April 2019
Received in revised form 23 July 2019
Accepted 18 August 2019

Keywords:
Healthcare
Community pharmacy
Pharmacy density
Deregulation
Locational analysis
Accessibility

ABSTRACT

Community pharmacies represent unusual enterprises as their main function is intrinsically related to the provision of healthcare services. Hence, market competition in this sector needs to be regulated, in order to ensure equitable accessibility, efficiency and quality of services. However, recently a general deregulation trend may be observed in Europe. In this paper, we focus on *location restrictions*, i.e. on demographic and geographic constraints to open new pharmacies, and we evaluate the impact of their relaxation. In particular, we analyze the case of the city of Pamplona (ES), where a striking increase in the number of pharmacies occurred, after the introduction of a new regulatory system in 2000. We evaluate, thanks to an in-depth spatial analysis, the evolution of the system to date and the effects produced on the consumers, in terms of accessibility, and on the competitors, in terms of market shares distribution. By comparing the obtained results with the ones related to the case of a second Spanish city, characterized by more strict restrictions, it emerges that the deregulation risks to produce a limited improvement in terms of accessibility and to exacerbate differences among consumers. Moreover, an increasing number of competitors does not necessarily imply a more equitable distribution of market shares, thus putting at risk the desired effects in terms of cost reduction and service quality improvement.

1. Introduction

During the last decades OECD countries have been implementing policies for the reorganization of public services in order to reduce public expenditures and improve performances. These policies have been often driven by a managerial approach derived from the private sector, known as New Public Management, and mainly inspired to deregulation and out-sourcing principles [1,2].

The described transformations also involved the retail (or community) pharmacy sector, whose main role consists in the distribution of a wide range of medicines and health care products. Additional services, concerning information to patients on the effective use of medicines or the offer of non-pharmaceutical products, are expected to significantly expand in the future [3]. The peculiarity of its role in the provision of an essential service requires the need of market regulation, with the aim of guaranteeing objectives of equitable accessibility, efficiency and quality.

The most common regulatory features may be classified in four classes: (a) restrictions on entry, (b) cost-containment mechanisms about the reimbursement of the price of medicines, (c) classification of medicines in relation to the possibility of prescription and (d) price regulation of prescription drugs [4]. In the first class, it is possible to distinguish among conditions on ownership and constraints to open a new pharmacy in a given territorial context. In this paper, we are specifically interested in the latter, usually referred to as *location restrictions*, that are typically represented by demographic (e.g., maximum number of inhabitants per pharmacy) and geographical (e.g., minimum distance between pharmacies) conditions.

In the last years, many countries have undertaken reforms aimed at promoting the competition. The analysis of the effects produced by such deregulation processes on the main stakeholders of the sector have been attracting a great attention of the scientific community and policy makers.

Mossialos and Mrazek [5] provided a brief overview of the regulations governing the retail pharmacy sector in six OECD countries, examining four parameters (number of pharmacies, restrictions on entry, on ownership and on price). In 2006, a report commissioned by the European Commission produced a detailed survey on the characteristics of the sector in the then 25 EU Member States,

* Corresponding author.
E-mail addresses: ilaria.barbarisi@libero.it (I. Barbarisi), giuseppe.bruno@unina.it (G. Bruno), antonio.diglio@unina.it (A. Diglio), jelizalde@unav.es (J. Elizalde), carmela.piccolo@unina.it (C. Piccolo).

https://doi.org/10.1016/j.healthpol.2019.08.010
0168-8510/

mainly focusing on the price and reimbursement mechanisms [6]. ECORYS [7] evaluated the impact of different regulatory systems in EU using three performance indicators (productivity, allocative efficiency and quality/ product range).

A significant number of scientific papers were devoted to the analysis of the effects produced by modifications of the regulatory systems in single or groups of countries. Almarsdóttir et al. [8,9] and Anell [10] studied the cases of Iceland and Norway, where new relaxed restrictions on ownership and competition were introduced in 1996 and 2001, respectively. They determined a significant increase in the number of pharmacies but, in the case of Iceland, it was mainly restricted to the capital while most rural areas suffered a reduction in the accessibility. In both cases, the market underwent significant changes in terms of horizontal and vertical integration, with a strong concentration of the ownership. Concerning the Norwegian case, Rudholm [11] pointed out that the deregulation also produced an increase of costs, as individual pharmacies had to compete by means of location instead of price. Lluch and Kanavos [12] analyzed the impact of regulations on efficiency, access and equity, comparing the case of Spain, where the sector is significantly regulated, with that of UK, representing a highly liberalized model in Europe. They concluded that, on the one hand, the goal of efficiency was better obtained through a less regulated system while equity and accessibility were better achieved in a more regulated market, where conditions to open new pharmacies are based on geographic, demographic and needs-based criteria. Gorecki [13] studied the effects produced in Ireland by a new reform dated 1996, whose basic pillar was the introduction of demographic and geographic criteria under which a contract for a new community pharmacy could be awarded, provided that its location should not "have an adverse impact on the viability of existing community pharmacies in their respective catchment areas". On the basis of the analyzed data, the authors highlighted how the introduction of more restrictive criteria determined a marked decline of new pharmacy contracts. Garattini et al. [14] analyzed the novelties introduced in Italy by Law Decree n.1/2012. Although the new provision relaxed the demographic and geographic constraints, the authors forecasted not much significant changes, given the presence of tight restrictions on the ownership. They also predicted that a higher density of pharmacies would not prevent the problem of rural areas. Vogler et al. [15] compared the community pharmacy system of nine EU countries, with different levels of regulation, on the basis of secondary data collected via internet and literature search, a questionnaire survey and supplementary interviews. They focused on three pillars (i.e., accessibility, quality and costs), through the use of 15 indicators. They observed that in all deregulated countries and in Austria, the number of inhabitants per community pharmacy decreased since 2000, whereas in the others it increased, in spite of newly opened pharmacies [16]. However, since these countries had (and still have) a high number of inhabitants per pharmacy, the observed increase could also be due to the low starting level. They also cited the case of the Spanish Autonomous Community of Navarre, where, after a striking liberalization, the strong competition even led to some closures of pharmacies.

The literature review shows that there is a great interest in evaluating consequences of re-regulation or deregulation reforms in individual countries. In particular, as concerns location restrictions, there is a quite general consensus about the fact that their relaxation produces an increase in the number of pharmacies but, at the same time, a negligible accessibility improvement for users living in low densely populated areas. However, studies supporting this thesis are mainly based on secondary data and analyze the phenomenon at a regional or national level, by monitoring very aggregated indicator such as provider to population ratio, density of pharmacies, etc. No spatial analysis is performed in order to describe how the entry of new pharmacies in the market affects the accessibility of users to the service, how location choices are made in the context of the competition game among pharmacies and how the market share distribution changes. Such a study would allow to gain interesting indications for policy makers, that need to regulate the sector and to monitor, at a microscopic level, if the desired effects related to certain location restrictions, in terms of users' accessibility and market competition, are observed when the real dynamics within the market take place.

In this paper, we aim at filling this gap by conducting a deep spatial analysis within a urban area in the Spanish Autonomous Community of Navarre, where a change of market regulation in 2000 caused a strong relaxation of the entry restrictions. In particular, we introduce some quantitative indicators in order to measure the distribution of market shares among the pharmacies and the accessibility of potential users to the service before and after the new reform. Accessibility is a multi-faceted concept, encompassing: *availability* (i.e. the adequacy of the service capacity to the demand volumes), *geographical accessibility* (i.e. the spatial relationship between users and facilities), *accomodation* (i.e. the appropriateness of provision), *affordability* (i.e. the cost of services utilization) and *acceptability* (i.e. compliance and satisfaction) [17]. In this context, we are specifically interested in the geographical accessibility as, from a regulatory point of view, it certainly represents the dimension more directly affected by the modification of location restriction; while the others are much more influenced by further regulatory leverages (i.e. affordability by price regulation mechanism) and/or by the competitive choices made by single players. Methods and approaches to measure geographical accessibility may vary in dependence on the specific context, the peculiar characteristics of the considered service, the interaction model between users and facilities, etc [18–21]. The most adopted ones range from the minimum travel time and/or minimum distance to gravity methods, floating catchment areas and kernel density function [17].

The remainder of the paper is organized as follows: in Section 2 the evolution of the regulatory system in Spain is described. In Section 3, the case study of Pamplona is illustrated. In Section 4, the scenarios before and after the deregulation reform are analysed. In Section 5, a comparative analysis of the accessibility with a further city, with considerably different regulatory conditions, is performed. Finally, some conclusions are drawn in Section 6.

2. The regulation of the retail pharmaceutical sector in Spain

Traditionally, the retail pharmaceutical sector in Spain has been strongly regulated. As concern location requirements, they were first introduced in 1941 and they combine demographic and geographic conditions, based on the number of inhabitants per store and the minimum distance between neighboring pharmacies. Similarly to Spain, Italy and France apply demographic constraints and, among them, Italy has also additional geographical restrictions. On the contrary, Germany, Netherlands and UK do not impose any location restrictions to opening new pharmacies [14].

In the last two decades, many regulated countries started to progressively relax their location restrictions. For example, in Italy, the Law Decree n.1/2012 cancelled most of the rules on the distance between pharmacies (with the exception of the minimum of 200 m between two stores) and made less restrictive the demographic constraints, as the old limit of one pharmacy per 5000 and 4000 inhabitants for rural and urban areas, respectively, passed to one pharmacy per 3300 inhabitants.

Almost two decades before, in Spain, the Decree-Law 11/1996 introduced new regulations at national level, thus making it the

first country interested by this phenomenon. In particular, the new demographic criterium was fixed at one pharmacy every 2800 inhabitants while the geographic constraint imposed a minimum distance of 250 m between two pharmacies in the closest pedestrian way. However, within this national framework, the single Autonomous Communities were allowed to modify these values according to local priorities. Even if most of them implemented the indications fixed at national level, significant exceptions occurred. In particular, the Communities of Catalonia and Navarre implemented in some sense opposite policies; on one side, Catalonia imposed stricter restrictions on the demographic criterium (one pharmacy every 4000 inhabitants), while on the other, Navarre strongly relaxed both of them with an evident objective of farther deregulating the system. Specifically, the new geographic rule established a minimum distance of 150 m among pharmacies and the new population rule allowed the possibility of opening one pharmacy every 700 inhabitants in the whole autonomous community (Ley Foral 12/2000). Of course, as consequence, a striking entry process occurred compared to the rest of Spain. Specifically, comparing the current number of pharmacies with the one before the reform, it is possible to notice that while in Navarre it has more than doubled, it increased only of almost 20% in the rest of the country (National Commission on Markets and Competition, 2015).

Apart from the location restrictions, Ley Foral 12/2000 introduced new regulations also for the ownership and for the price of pharmaceuticals. Regarding ownership, only a person with a university degree in Pharmacy may own and manage a pharmacy and horizontal integration is not allowed (article 15). Moreover, (s)he cannot have any economic interest on the production of drugs (article 9), so vertical integration between production and retail is forbidden. What the law does not forbid is the existence of vertical integration with the wholesaler, when it is independent of the laboratories producing drugs. Accordingly, in Spain most wholesalers are cooperatives of pharmacies who deal with the storage and distribution of drugs to the community pharmacies. In the particular case of Navarre, around 80% of the pharmacists managing a drugstore are part of a cooperative of distribution, either Cofares (which operates at national level) or Nafarco (which operates at regional level) or both of them. Regarding price, all the prescription drugs, whose consumption is financed by the national health system, have their prices regulated by the Royal Law Decree 1/2015, articles 94–100, which also allow for regulation of the rest of pharmaceuticals and over-the-counter products. Given these regulations, the competitive scope of community pharmacies is very narrow and mainly consists of the decision of location, customer attention and advice and the range of non-prescription products which are offered.

In this work, we specifically focus on the effects produced by the relaxation of location restrictions on the main stakeholders involved in the market. In order to better highlight the phenomenon, we selected two interesting case studies, corresponding to two cities (Pamplona and Sabadell), which are similar from a demographic point of view but belong to the two Communities adopting the most different regulatory policies (Navarre and Catalonia, respectively). As expected, the number of pharmacies within the two cities is significantly different, equal to 202 in Pamplona and 68 in Sabadell, despite a comparable population value, equal to 197,604 and 206,556 inhabitants, respectively (Instituto Nacional de Estadistica - INE, 2017). Of course, such situation is expected to translate in different accessibility conditions for consumers on a hand, in terms of proximity to available pharmacies, and in different characteristics of the market competition on the other, in terms of market shares distribution. In the next sections, the methodology adopted for the evaluation of such effects will be introduced and the results obtained on the two selected case studies will be analyzed and compared.

3. Materials and methods

In order to deeply analyze the effects produced in Spain by the deregulation policies, and specifically by the modification of the location requirements, we first focus on the case of Pamplona (Navarre). The analysis of the case study was developed according to the following steps:

1 Delimitation of the study region;
2 Mapping the positions of the pharmacies;
3 Definition and positioning of the potential users;
4 Introduction of indicators to measure the effects of the phenomenon;
5 Analysis of the results.

In the following, steps (1–4) are described, while Section 4 is devoted to the analysis of the results.

3.1. Delimitation of the study region

We considered the area included in the administrative boundaries of the city of Pamplona. The period under observation is the time span ranging from 2000 (year of approval of the Ley Foral) to 2017. Data and statistics were extracted by official sources, as described in the next steps.

3.2. Mapping the positions of the pharmacies

The number of pharmacies in Pamplona passed from an initial value of 119 in 2000 to a final one of 202 in 2017. Specifically, in this time horizon, it is possible to distinguish: a first short period (2000–2002), immediately after the implementation of the law, characterized by a huge increment of pharmacies, from 119 to 170 (42.9%); a second period (2003–2008), in which the increasing trend is confirmed but characterized by a lower dynamic, with an increment from 177 to 197 (11.3%); finally a last period (2009–2017), in which the phenomenon can be considered consolidated with no variation in the last 3 years. In order to perform the analysis, we considered two scenarios; the first one (named 'Scenario A' - After) corresponds to the current situation (at the end of 2017), while the second one (named 'Scenario B' - Before) corresponds to the situation before the application of Ley Foral/2000. The exact position of the pharmacies in the two scenarios has been defined through their georeferential coordinates and mapped thanks to a GIS, as reported in Fig. 1. We will denote with J_B the set of 119 pharmacies of scenario B and with J_A the set of 202 pharmacies of scenario A. The difference between the two sets ($J_A - J_B$) will represent the set of new pharmacies opened during the observed period.

3.3. Definition and positioning of the potential users

In order to effectively represent the demand of potential users, we referred to the zoning system adopted for the Municipal Plan of the Pamplona City Council (Ayuntamiento de Pamplona, 2017 - https://sig.pamplona.es/). According to such plan, the city is partitioned into 6748 elementary areas (or Territorial Units – TUs), classified on the basis of their land use destination (i.e., non-urban, commercial, residential areas, parks, etc). Assuming that the demand for pharmaceutical services may be reasonably represented by the population living within the city, we selected only the 4828 TUs classified as *residential* (i.e., hosting single-family and multi-family buildings). Hence, the set I of Demand Points (DPs) coincides with the centroids of these 4828 TUs, reported in Fig. 1.

Given that the most disaggregated population data refer to census tracts (INE, 2017), in order to estimate the population associated

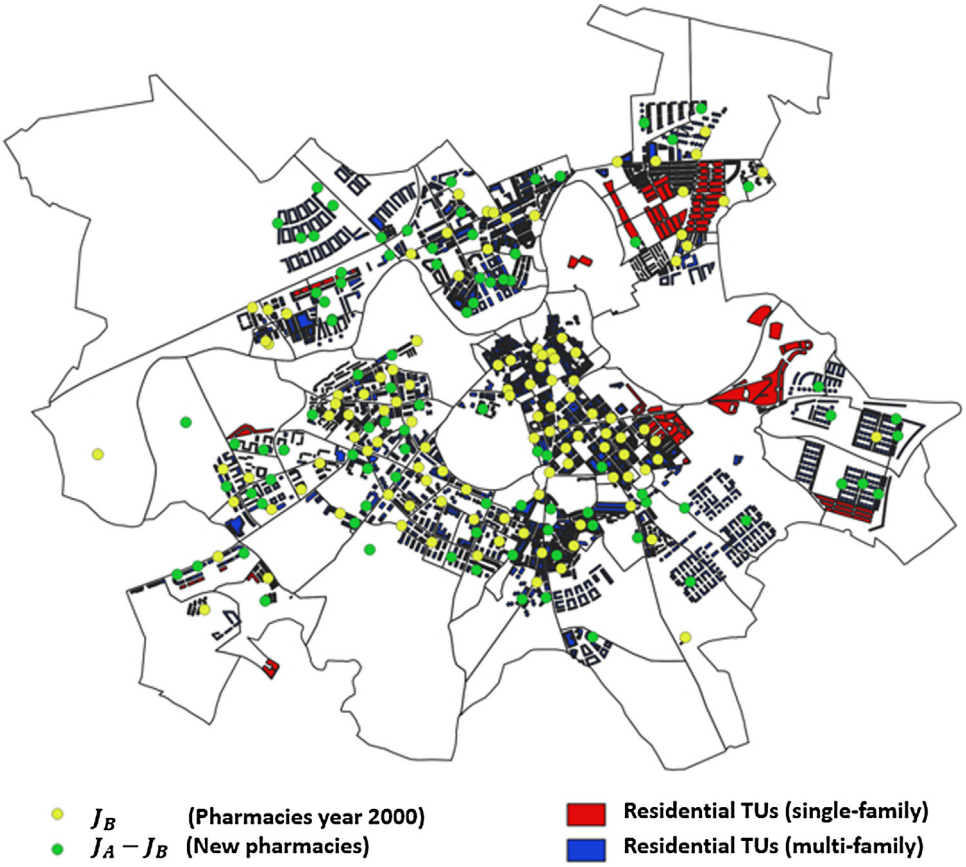

Fig. 1. Distribution of demand and pharmacies in the two scenarios (Pamplona).

to each DP, we assumed a uniform distribution of population density within each census tract and we associated to each DP a fraction of population proportional to the area of its related TU.

3.4. Introduction of indicators to measure the effects of the phenomenon

Once defined the set I of the DPs and the sets of facilities J_A and J_B, we calculated the distances among pairs of facilities and between each DP $i \in I$ and each facility $j \in J_A$ as the shortest pedestrian path on the road network, through customized requests to the service Distance Matrix API, provided by Google. We compared the two scenarios (before and after the new regulation), on the basis of the changes in the geographical accessibility of users to pharmacies and in the potential market shares associated to single pharmacies.

- *Geographical accessibility*

In order to measure the geographical accessibility of users to the services provided by pharmacies, we are not interested in determining the patronized facility, on the basis of a realistic (multidimensional) interaction model. Indeed, even if we are conscious that, according to the attractiveness of single pharmacies and the preferences of single users, they are free to choose farther options, in the case under analysis the main interest of the regulator is to guarantee the presence of a facility within acceptable distances. Hence, the distance from the closest facility d_i ($d_i = \min_{j \in J}\{d_{ij}\}$) appears the most appropriate indicator to measure geographical accessibility of the population in $i \in I$ to the service. In order to compare the accessibility to the service in the scenarios before and after the introduction of the new reform, we defined an accessibility function $\alpha(d) \rightarrow [0, 1]$, representing the percentage of population having a distance from their closest facility not exceeding d. This means, for instance, that, fixing a distance $d = 1000\,m$, a value $\alpha(1000) = 0.7$ indicates that 70% of the population has at least one facility at a distance not exceeding 1000 m. On the other hand, if we want to evaluate the accessibility of a given percentage of population, for instance 90%, we have to find the value d such that $\alpha(d) = 0.9$.

- *Competition among facilities*

Opening new facilities may perturb market competition. From this perspective, *geographical restrictions* are intended to avoid the cannibalization among the market players; indeed, by fixing a minimum distance between pharmacies, they aim at separating, at a certain extent, their cathcment areas and to preserve a minimum demand niche for each of them.

In order to evaluate how new pharmarcies reacted to the relaxation of such restrictions, we first analysed their distribution in the study region, by introducing some *dispersion indexes,* based on the related pairwise distances. Then, we estimated how changed the *market shares* distribution among competitors. In particular, assuming the total population P living in Pamplona as a proxy of the total market demand, we allocated the population p_i of each DP $i \in I$ to the closest facility and we calculated the market share captured by each pharmacy j as $MS_j = \sum_{i \in I_j} p_i$, where I_j is the set of DPs allocated to facility j. Such allocation rule presumes that all pharmacies are similar in terms of attractiveness (i.e., opening hours, gamma of provided services and/or products, waiting times, etc) and that the distance is the only choice factor. Of course, we are con-

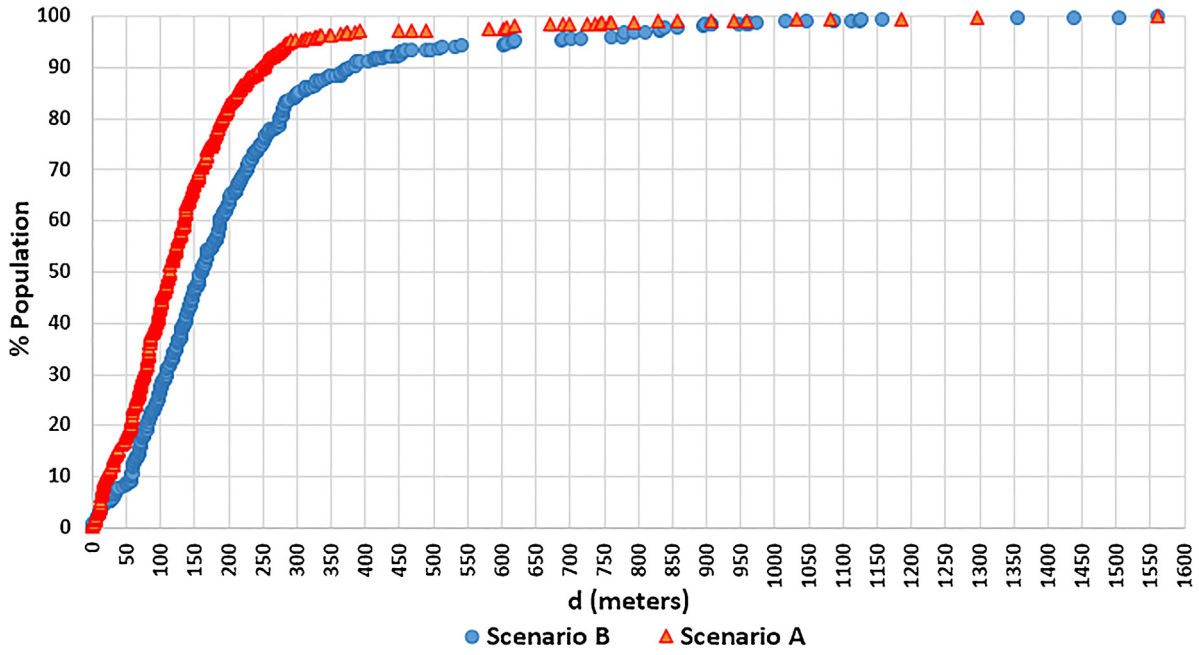

Fig. 2. Comparison of accessibility function between the two scenarios (Pamplona).

scious that the interaction between users and facilities depends also on other variables, but in this case the goal is to evaluate, cetaeris paribus, the potential market share that the competitors may capture by adopting certain location decisions. In other words, it has to be intended as a reference value, that may be then increased or reduced by acting on other competitive leverages.

In order to represent how the total market is distributed among the potential facilities, we adopted the Lorenz curve, typically used to represent the income distribution in an economy. If we list, for each scenario, the facilities according to the increasing order of their captured market share (i.e., such that: $MS_j \leq MS_{j+1}$) on the x-axis, while, on the y-axis we indicate the total market share captured by the first j facilities ($TMS_j = \sum_{k=1,j} MS_k$), the Lorenz curve represents the actual distribution of market share, while the line at 45° shows a perfectly equal market distribution. In order to evaluate how the analyzed distribution differs from the perfect equality condition, we calculate the Gini coefficient as *equity indicator*, which is equal to the area between the actual market share distribution curve and the line of perfect equality, scaled to a number between 0 and 100.

4. Analysis of the results

We compared the two scenarios on the basis of the introduced indicators. Fig. 2 shows the accessibility curves $\alpha(d)$, corresponding to the two analysed scenarios (A and B). Obviously, scenario A is characterized by a better accessibility situation, due to the higher number of located facilities. However, considering the striking increase in the number of facilities, a more significant improvement could be expected. For instance, while the percentage of population within a maximum distance of 200 m significantly increased (passing from 63.36% to 82.76%), the accessibility for users in the worst condition did not substantially change: in particular, the percentage of population at a pedestrian distance over 1000 m passed from 0.92% to 0.64%.

This circumstance is due to the fact that the new facilities were mainly located in the central part of the city or close to existing pharmacies, with the main result of subtracting market shares to existing competitors without producing benefit for disadvantaged users.

It is also interesting to analyze how the entry process modified the interaction among competitors. We first calculated some *dispersion indexes* on the basis of the mutual distances among pharmacies, in order to analyze their initial and final distributions in the location space. In particular, Table 1 reports the absolute and relative number of facilities having at least one competitor within given threshold distances (150, 250, 500 m). In particular, as concerns Scenario B, we considered the distances among the pharmacies already located before the reform (J_B vs.J_B), while as concerns Scenario A, we considered not only the whole set of existing pharmacies (J_A vs.J_A) but also the distances of the new pharmacies from the old ones ($J_A - J_B$ vs.J_B), from the whole set of facilities in the Scenario A ($J_A - J_B$ vs.J_A) and among themselves ($J_A - J_B$ vs.$J_A - J_B$), in order to better analyze their positioning strategy.

By comparing the two scenarios (J_B vs.J_B and J_A vs.J_A), it is possible to see, as expected, that the concentration of competitors increases; for example, the pharmacies having at least one competitor within 250 m increases from 68 to 143. By analyzing the positioning strategy of the entry pharmacies ($J_A - J_B$), it is possible to notice that the new pharmacies tend to locate closer to the old pharmacies rather than among themselves. Indeed, the percentage of the new pharmacies which has at least one old pharmacy (J_B) within 250 m is 49% while the percentage that, within the same distance, has at least another new pharmacy ($J_A - J_B$) is only 22%. And this dominance holds for all the other considered distances.

We verified also if the location choices of new pharmacies are influenced by the socio-economic characteristics of the sub-areas within the study region. At this aim, we analysed the distribution of the following three available indicators across the TUs and the eight districts within the city (Censo de Población y Viviendas – Instituto Nacional de Estadística - INE 2001 and 2011):

- **Ageing Index**, i.e. the ratio of the number of elderly (aged 65 and over) to the number of young (from 0 to 14) persons. It is a proxy of the potential demand for pharmaceuticals, that generally increases with the density of aged population because of the high impact of the chronic diseases;

Table 1
Dispersion Indicators: Number and percentage of pharmacies with at least one competitor within a given distance.

		Scenario B		Scenario A							
		J_B vs. J_B		J_A vs. J_A		$(J_A - J_B)$ vs. J_B		$(J_A - J_B)$ vs. $(J_A - J_B)$		$(J_A - J_B)$ vs. J_A	
		Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Distances	150 m	21	18%	38	19%	7	8%	2	2%	8	10%
	250 m	68	57%	143	71%	41	49%	18	22%	47	57%
	500 m	112	94%	196	97%	71	86%	69	83%	75	90%
Total		119		202		83		83		83	

Table 2
Density of drugstores per districts and their related socio- economic characteristics.

	ID	Population		Drugstores		Drugstores per inhabitant		Ageing Index		% Population owning a 2nd house		Educational Level	
		2001	2011	2001	2017	2001	2017	2001	2011	2001	2011	2001	2011
Districts	**2**	21.160	16.775	24	26	1,13	1,55	2,26	2,03	0,22	0,18	3,10	3,28
	1	11.180	9.839	14	14	1,25	1,42	2,02	1,08	0,13	0,10	2,96	3,18
	3	39.040	33.795	26	43	0,67	1,27	1,32	2,46	0,21	0,21	3,02	3,14
	5	14.371	13.570	6	15	0,42	1,11	2,02	1,73	0,15	0,12	2,75	3,00
	4	37.229	35.410	24	35	0,64	0,99	1,09	2,46	0,23	0,18	3,04	3,14
	7	31.436	50.000	17	43	0,54	0,86	0,91	0,57	0,13	0,11	2,71	2,94
	8	9.994	12.035	5	8	0,50	0,66	0,10	0,21	0,11	0,16	3,22	3,12
	6	18.976	19.675	10	13	0,53	0,66	1,96	1,58	0,14	0,12	2,63	2,82

- **Percentage of population owning a second house**, as a proxy of wealth index and the household expense for pharmaceuticals;
- **Educational Level**, i.e. the average level of studies, ranging between 0 (person who doesn't know to write nor read) and 4 (university degree). This indicator is intended as a proxy of the propension of population to take care of their health conditions.

From data reported in Table 2, in which districts have been ordered according to the decreasing density of pharmacies (i.e. number of drugstores per inhabitant), it can be noticed that even if the density becomes more balanced in 2017, the gap among districts does not depend on their socio-economic characteristics. At level of single TUs, the correlation of socio-economic indicators with the density of drugstores is negligible, being in each case lower than 0,03.

Finally, from the analysis of the Lorenz curves in the two scenarios (Fig. 3a), it emerges that the distribution of market shares is quite comparable and unequal in both scenarios; indeed, the presence of new competitors determines only a slight variation of the Gini coefficient, that passed from 0.377 to 0.368. In particular, in both cases, almost the 70% of pharmacies capture almost 40% of the market while the remaining share is distributed among the other 30% of big drugstores.

Fig. 3b compares the market shares initially gained by the pharmacies of the set J_B with the ones still captured after the entry of new competitors. With this representation, points on the line at 45° represent facilities that did not suffer any variation in their market share, while points below the bisector indicate facilities that lost some users. The segment parallel to the y-axis, linking each point to the bisector, indicates the intensity of such a loss. Obtained results highlight the presence of remarkable variations, with some facilities particularly affected by this process.

5. Discussion

Drawing on an in-depth analysis performed through the use of GIS and quantitative indicators, the illustrated case study gives evidence of the effects produced by a relaxation of the location restrictions in an urban area.

The study confirms some conclusions emerged by the literature, according to which deregulation provides a general improvement of the accessibility even if this does not involve users in more disadvantaged conditions. In particular, in the case under analysis, considering the striking number of new facilities, the effects produced in terms of accessibility improvement are to be considered quite poor. In order to confirm this conclusion, a comparative analysis with the city of Sabadell is provided. As explained in Section 2, despite the cities of Pamplona and Sabadell are similar from a demographic point of view, they belong to different Autonomous Communities (Navarre and Catalonia, respectively), which adopted very different regulatory policies. As a result, Sabadell currently counts only 68 pharmacies while Pamplona has almost the triple of them (202). In Fig. 4, the representation of the two accessibility functions is reported. As expected, the accessibility curve related to the Pamplona case dominates the other one; this means that, for each distance value, the percentage of population living within that distance is higher in Pamplona than in Sabadell. However, while this difference is more evident for short distances, it becomes negligible for distances over 600 m. Considering the remarkable difference in the number of operating pharmacies in the two markets, the distance among the two curves appears to be very limited, especially for more disadvantaged users, i.e. those located at a distance from the closest pharmacy over the 95th percentile of the distribution.

The analyzed case study gives also evidence of the fact that the increasing competition may produce unbalanced distribution of the market shares among competitors. This circumstance may have twofold consequences. A benefit is certainly represented by the fact that, in a more competitive environment, pharmacies are constrained to offer comparable service quality standards, in order to maintain their own market shares. On the other hand, a remarkable reduction of the market shares and, consequently, of the profits may also foster an opposite effect due to the need of reducing costs.

Without taking side with supporters or opponents of deregulation reforms in the sector of the retail pharmacies, the lesson that can be learned by the analysis of this case study is that, as usual in these contexts, more balanced solutions can result beneficial. A relaxation of entry restrictions, in fact, produces the undeniable

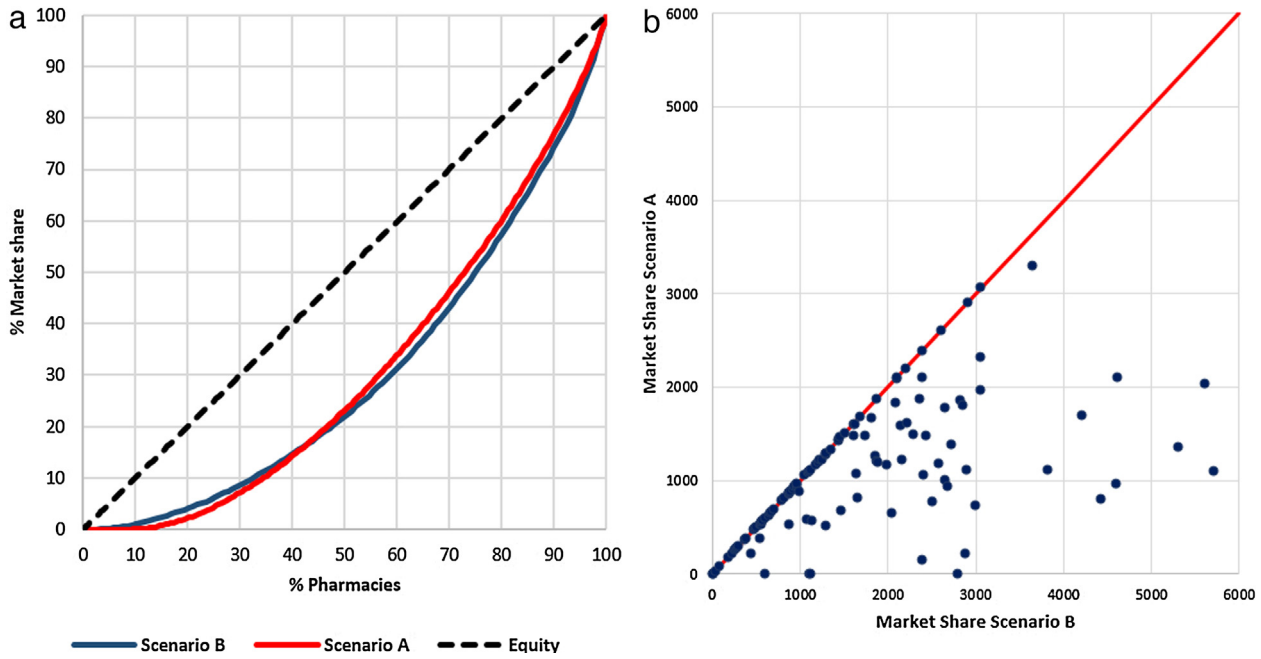

Fig. 3. Comparison of market share distributions between the two scenarios (Pamplona), a) Lorenz curves, b) Variation of market shares captured by old pharmacies.

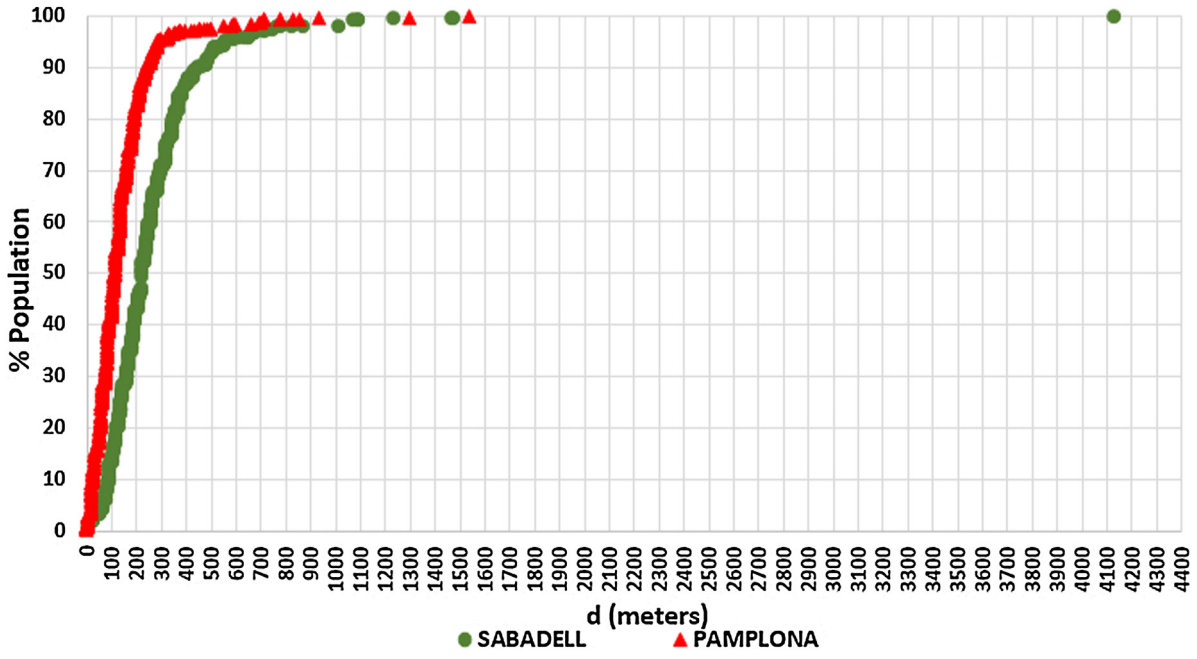

Fig. 4. Comparison of accessibility functions related to the cases of Sabadell (Catalonia) and Pamplona (Navarre) – Year 2017.

advantage to gain more competition on the market, that may provide an improvement of the users' accessibility. However, if the entry mechanism is left uniquely to the free choice of those who want to enter into the market, the improvement of accessibility is poor and, in particular, the conditions of more disadvantaged users remain low; in addition, the effect of cannibalization may also produce a run to the cost reduction with consequent deprivation of the average quality of service. For this reason, alternative regulatory policies, including measures for the governance of the geographical aspects of the entry process, would be beneficial. For instance, in a context in which a relaxation of ownership and demographic constraints is proposed, it would be useful to drive the choice of the new competitors, opportunely designing geographical zones where they are free to choose the best locations. This mechanism could provide a better equality in the access to the service and, at the same time, in the market share distribution, thus reducing the investment risks. A similar mechanism has been introduced in Italy, within the Law Decree n.1/2012, whose actual effects, however, are still to be evaluated.

6. Conclusions

In this paper we illustrated a case study of the retail pharmacy market in the city of Pamplona, capital of the Spanish Autonomous Community of Navarre, where a significant deregulation process in the field of the pharmaceutical retail sector was introduced by the

Ley Foral 12/2000, thus stimulating a striking increase in the number of pharmacies in the city. The phenomenon was observed in the period 2000–2017 and analyzed through the use of GIS and the introduction of quantitative indicators. Contrary to the expected goals, our analysis shows that there is a limited effect on users' accessibility as new drugstores tend to position in the areas of the city with an already high density of existing retailers, thus producing a moderate average reduction in the distance of most disadvantaged consumers from the closest store. The comparison of the accessibility indicators with the case of a second city, i.e. Sabadell, located in a different region with more restrictive regulations, i.e. Catalonia, confirms the general conclusion drawn for the analysis of Pamplona. Indeed, even if in Sabadell the number of pharmacies is remarkable lower than in Pamplona (less than one third), the difference in the shape of the accessibility functions is comparatively modest. This suggests that the regulation change in Navarre has an increase in cannibalization with a limited effect on the increase in accessibility, especially for the most disadvantaged consumers.

Further development of the work may concern the extension of the analysis to whole regions, in order to compare the effects produced on rural and urban parts and to evaluate whether significant differences may be observed. Moreover, a similar study may be conducted in order to analyse the cases in which different regulatory mechanisms are adopted. Finally, a further research direction to be exploited could be represented by the development of effective decision support tools, basing on the use of appropriate methodologies (i.e., optimization models, simulation approaches, etc), aimed at testing different regulation mechanism, in order to provide policy makers the possibility to forecast the effect produced on the main stakeholders and to take more informed decisions.

Declaration of Competing Interest

None.

References

[1] Hood C. A public management for all seasons? Public Administration 1991;69(1):3–19.
[2] Osborne SP, Radnor Z, Nasi G. A new theory for public service management? Toward a (public) service-dominant approach. The American Review of Public Administration 2013;43(2):135–58.
[3] Hughes CM, Hawwa AF, Scullin C, Anderson C, Bernsten CB, Björnsdóttir I, et al. Provision of pharmaceutical care by community pharmacists: a comparison across Europe. Pharmacy World & Science 2010;32(4):472–87.
[4] Purcell D. Competition and regulation in the retail pharmacy market. Policy Institute at Trinity College Dublin; 2004.
[5] Mossialos E, Mrazek MF. The regulation of pharmacies in six countries: Report prepared for the Office of Fair Trading; 2003.
[6] ÖBIG. Community pharmacy in Europe. Vienna: Austrian Health Institute (commissioned by PGEU – Pharmaceutical Group of European Union); 2006.
[7] ECORYS. Study of regulatory restrictions in the field of pharmacies. In: Report for the internal market and services DG. European Commission; 2007.
[8] Almarsdóttir AB, Morgall JM, Björnsdóttir I. A question of emphasis efficiency or equality in the provision of pharmaceuticals. The International Journal of Health Planning and Management 2000;15(2):149–61.
[9] Almarsdóttir AB, Morgall JM, Grímsson A. Cost containment of pharmaceutical use in Iceland: the impact of liberalisation and user charges. Journal of Health Services Research & Policy 2000;5(2):109–13.
[10] Anell A. Deregulating the pharmacy market: the case of Iceland and Norway. Health Policy 2005;75(1):9–17.
[11] Rudholm N. Entry of new pharmacies in the deregulated Norwegian pharmaceuticals market – consequences for costs and availability. Health Policy 2008;87(2):258–63.
[12] Lluch M, Kanavos P. Impact of regulation of Community Pharmacies on efficiency, access and equity. Evidence from the UK and Spain. Health Policy 2010;95(2-3):245–54.
[13] Gorecki PK. Do you believe in magic? Improving the quality of pharmacy services through restricting entry and aspirational contracts, the Irish experience. The European Journal of Health Economics 2011;12(6):521–31.
[14] Garattini L, van de Vooren K, Curto A. Will the reform of community pharmacies in Italy be of benefit to patients or the Italian National Health Service? Drugs & Therapy Perspectives 2012;28(11):23–6.
[15] Vogler S, Habimana K, Arts D. Does deregulation in community pharmacy impact accessibility of medicines, quality of pharmacy services and costs? Evidence from nine European countries. Health Policy 2014;117(3):311–27.
[16] Balgård M. The new pharmacy market in Sweden. European Journal of Hospital Pharmacy: Science and Practice 2012;19(1):23–5.
[17] Neutens T. Accessibility, equity and health care: review and research directions for transport geographers. Journal of Transport Geography 2015;43:14–27.
[18] Apparicio P, Gelb J, Dubé AS, Kingham S, Gauvin L, Robitaille É. The approaches to measuring the potential spatial access to urban health services revisited: distance types and aggregation-error issues. International Journal of Health Geographics 2017;16(1):32.
[19] Bruno G, Diglio A, Piccolo C, Cannavacciuolo L. Territorial reorganization of regional blood management systems: evidences from an Italian case study. Omega 2018.
[20] Kilinc MS, Milburn AB, Stamm JLH. Measuring potential spatial accessibility of home healthcare services. Socio-Economic Planning Sciences 2017;59:13–25.
[21] Lin Y, Wan N, Sheets S, Gong X, Davies A. A multi-modal relative spatial access assessment approach to measure spatial accessibility to primary care providers. International Journal of Health Geographics 2018;17(1):33.