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Clustering or scattering: the reasons underlying distance regulations between retail outlets*

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Abstract

Concerns on the clustering of retail industries and professional services in main streets had traditionally been the public interest rationale for supporting distance regulations. Although many geographic restrictions have been suppressed, deregulation has hinged mostly upon the theory results on the natural tendency of outlets to differentiate spatially. Empirical evidence has so far offered mixed results. Using the case of deregulation of pharmacy establishment in a region of Spain, we empirically show how pharmacy locations scatter, and that there is not rationale for distance regulation apart from the underlying private interest of very few incumbents.

JEL Codes: L51; K23; H42.

Keywords: distance, location, regulation, retailing.

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1 Introduction

Concerns regarding the clustering of retail outlets and professional services in high streets traditionally underpinned the public-interest rationale in support of distance regulations. However, in recent decades a far-reaching process of deregulation has been set in motion by which not only entry restrictions, but also distance regulations between retail outlets and professional premises have been suppressed.

Indeed, this has been the case in many industries and for many professional services including gas stations, the dentistry profession, and a large number of others offering their goods or services at retail outlets.

Pharmacies are an example of one professional sector in which many entry restrictions continue to operate, above all in Europe: 20 out of 27 EU Member States operate entry restrictions based on geographic and demographic criteria, a situation that contrasts markedly with that in the US and Canada where no restrictions are operative.[1]

Among these 20 EU Member States, there are six that have explicit distance regulations stating that a new pharmacy cannot open if a distance between 150 to 400 meters is not maintained with incumbents. [2] In addition, European entry restrictions are typically coupled with price or retail margin regulations.[3]

In those industries where entry has been deregulated, the rationale supporting such deregulation has hinged more upon theoretical than empirical evidence. Address models tend to suggest that there is a natural tendency for outlets to differentiate spatially, while empirical evidence showing that firms do not cluster together is scarce. As Netz and Taylor (2002) claim, depending on a model's assumptions almost any equilibrium configuration can be obtained, including that of minimum differentiation suggested by Hotelling's (1929) seminal work and maximum differentiation as demonstrated by d'Aspremont, Gabszewicz and Thisse (1979). On balance, theory has tended to be more supportive of differentiation

[1] See ÖBIG (2006) report for the European Commission and COFV & FEFE (2007). In most Member States, the establishment of new pharmacies is restricted based on geographic and demographic criteria. Only in the UK, Ireland and the Netherlands entry is restricted by the contracts with the tax-funded health care organizations. Outside the EU, Mossialos and Mrazek (2003) also report that entry is restricted in Norway.

[2] EU Member States that operate minimum distance regulations are Austria, Greece, Hungary, Portugal, Slovenia and Spain.

[3] ÖBIG (2006) reported to the European Commission that 18 out of 25 Member States set the pharmacy markups by regulation and discounts are not allowed, while the other 7 set maximum markups or fees for services while allowing for free discounts to clients.

than of clustering as highlighted by Netz and Taylor (2002) and by Irmen and Thisee (1998).

By contrast, empirical evidence to date has offered mixed results: contrary to the theoretical predictions, many papers have found that firms do tend to cluster together; a few fail to obtain any clear-cut findings (i.e. Borenstein and Netz, 1999); and just one paper, based on the study of gas stations in California, has shown that retail firms tend to spatially differentiate their product by locating less closely to their competitors (Netz and Taylor, 2002).

In this paper we use the case of the partial deregulation of pharmacies in a region of Spain (Navarra) to show that new pharmacy outlets spatially differentiate by locating at some distance from incumbents and from the downtown. This case is particularly appropriate for identifying and quantifying the impact of competition on location patterns, and for assessing the impact of distance regulations. As we show below, the total number of pharmacies in Navarra almost doubled as regulatory reform provided free market entry (where before it had been restricted) and distance regulations were weakened (with the minimum distance being reduced from 250 to 150 meters).

Given that we are able to describe the dynamics of entry into a set of well-defined local markets, using geocoding routines, we have been able to calculate the distance between all incumbents and new pharmacies open to the public in Navarra before and after partial deregulation. Using this information, we have then been able to estimate the impact of competition on the distance between pharmacy outlets.

We find that regardless of whether there is a National Health System (NHS) health centre in the town or not, pharmacies do not cluster, except in the case of the first or second pharmacies in municipalities with a health centre. This suggests that the principle of maximum differentiation holds for the pharmacy sector. Indeed, our results show that in those municipalities in which there is an NHS health centre two pharmacies tend to cluster around it at a distance near to, but in all instances greater than, the regulated 150-metre minimum. However, with subsequent entries the distance between pharmacies increases well above this minimum distance. By contrast, in municipalities without a health centre, pharmacies locate at a greater distance from each other. As the number of competitors increases, the distance between pharmacies decreases only gradually,

remaining much greater than the minimum regulated distance.

Based on this evidence, the paper argues the rationale for implementing minimum distance regulations. As pharmacies do not generally cluster, there is no public-interest rationale for supporting such a regulation. Only incumbent pharmacies located near to a health centre benefit from distance regulations, as a second pharmacy seeks to locate close to, or even leapfrog, the incumbent by opening an outlet next door to the health centre. This being the case, there is no rationale for imposing distance regulations apart from defending the underlying private interests of a very small number of incumbents.

The rest of this paper is organized as follows. Section 2 reviews the literature on spatial competition and the need for regulation. Section 3 outlines the empirical framework and the particularities of the case we use to identify and quantify the impact of competition on distance between competitors. Section 4 details the empirical results, and section 5 concludes.

2 Literature review

Hotelling's (1929) seminal paper claiming that firms have a tendency to cluster spatially has been followed by a very large body of theoretical literature that shows that spatial competition can render any equilibrium of minimum or maximum differentiation or, indeed, no equilibrium at all.

D'Aspremont, Gabszewicz and Thisse's (1979) paper clearly identified the details of one-dimensional space competition models that lead to a range of outcomes: apart from the difficulties of characterizing the equilibrium, the principle of minimum differentiation as suggested in Hotelling's seminal paper, and as named by Boulding (1948), turned out not to be robust to slight changes in transportation costs.

By allowing transportation costs to be quadratic rather than linear, outlet differentiation is maximum in line with Hotelling. As suggested by Netz and Taylor (2002), the large body of literature on one-dimensional space competition has identified the drivers of equilibrium location: the sprawl of consumers promotes differentiation (Eaton and Lipsey 1976), the elasticity of demand mitigates clustering (Smithies, 1941; Eaton, 1971), non-linear transportation costs promote differentiation (d'Aspremont, Gabszewicz and Thisse,

1979), and consumer heterogeneity promotes clustering (De Palma et al., 1985). Therefore, when analysing empirically the impact of competition on location patterns, we should attempt to control for all these drivers identified in the theoretical literature.

However, when dealing with the pharmacy sector it is difficult to bridge the gap between location theory and empirical analysis. First, we need to take into account that professionals use non-price competition strategies, such as differences in quality of care. Additionally, as stated above, the pharmacy sector is not only characterized by entry and distance regulations, but also by price regulation. Therefore, we need to examine the theory that has analysed not only horizontal but also vertical differentiation, while at the same time considering that which has studied entry and location patterns when price is regulated.

Neven and Thisse (1990), for example, analyse location equilibrium when firms compete in price, location and quality. When the range of quality options is larger than those of location, firms tend to differentiate maximally with respect to quality while clustering in terms of location. By contrast, when the range of quality options is smaller than those of location, firms tend to cluster in quality and differentiate maximally with respect to location. Therefore, when competition is multi-dimensional, the degree of spatial differentiation is dependent also on whether there is differentiation in other dimensions, such as quality of service.

Other relevant studies include Ma and Burguess (1993), who introduce price regulation in a model of vertical differentiation, i.e., a model of competition in quality as opposed to location. Nuscheller (2003) presents a model of vertical (quality) and horizontal (location) differentiation with price regulation. In this paper professionals are allowed to compete in a game in which they first decide whether or not to enter the market, then where to locate, and finally the quality of service they wish to offer given the price set by the regulator. In this model, the closer together two professionals locate, the stiffer the non-price competition and the higher the quality of service they have to offer.

To date, the few empirical papers that have focused their attention on the relationship between competition and differentiation have offered mixed results. Netz and Taylor's (2002) study is perhaps the sole paper to present robust findings to the effect that firms, in this instance gas stations, locate in an attempt to spatially differentiate as market

competition increases.

Prior to Netz and Taylor's paper, most empirical studies suggested that outlets tend to cluster: Pinske and Slade (1998) suggested that gasoline stations with similar characteristics (such as those that have similar contractual agreements with refiners) tend to cluster; and interestingly for our case, Borenstein and Netz (1999) and Salvanes et al. (1997) found that an increase in competition leads to a clustering of airline departure times in the United States and Norway when prices are set exogenously: regulated or allegedly set by a cartel. By contrast, Borenstein and Netz (1999) found mixed results following entry and price deregulation of airlines.

The deregulation of entry in the pharmacy sector in one region of Spain offers us a very convenient setting for studying the impact of competition on the location patterns in a price-regulated environment. Taking into account the prior theoretical discussion, we study the underlying effects of competition on distances between pharmacies. The specific contribution of this paper is its clarification of when the principle of maximum spatial differentiation applies to the pharmacy sector.

3 Empirical Framework

3.1 Background to the policy change

Entry regulations for pharmacies in Spain, pure licensing aside, date back to the 19th century. In 1854, the central government ruled that local governments should guarantee the existence of at least one pharmacy for every given number of inhabitants so as to meet the needs of the poor and to perform certain public health duties. This was a typical public service obligation whereby local governments were obliged to contract out to one particular pharmacy certain specified retail pharmacy services, while the other pharmacies in town were free to enter the market to serve their clients without any contract with the government. The legislation sought to secure a broad, balanced distribution of pharmaceutical services throughout the territory, specifically securing some activities and income to rural pharmacies by contract.

It was not until 1941 that the government limited the number of pharmacies, with entry regulations being made more restrictive in more-populated areas, and less so in

less-populated areas. These entry rules were designed to safeguard the income of senior incumbents in the more-populated urban areas, and to promote the entry of junior professionals in the less-populated rural areas. The new law ruled that there should be no more than one pharmacy for every 5,000 inhabitants in each municipality. It also introduced minimum distance requirements.[4]

Permits became tradable, with the result that senior incumbent pharmacists tended to sell their pharmacy license before the mandatory retiring age, or to transfer them to their own children if they had obtained a degree in pharmacy. Junior pharmacists with professional experience attending rural pharmacies were given priority in the opening of the new pharmacies that were needed to meet the needs of growing urban populations. But junior pharmacists were not given any priority for buying permits from retiring senior incumbents. These entry restrictions were coupled with linear regulated mark-ups for pharmacies. All in all, these regulatory reforms shifted the burden of public service obligations in rural areas from the local public administration to the customers of the pharmacies located in urban areas.[5]

Entry restrictions have changed little since then, although the enforcement of entry regulations was devolved to the regions in the 1980s and 1990s. The current Spanish legislation regulating the establishment of new pharmacies, introduced in 1997, fixes a ratio of one pharmacy per 2,800 inhabitants in each health care zone (although the ratio may be as high as 4,000 inhabitants). [6]

A health care zone is a part of a municipality or group of municipalities in which there

[4]The quantitative limit was more restrictive in more-populated areas: one pharmacy for every 10,000 inhabitants in municipalities with a population greater than 50,000 inhabitants. The distance regulation was also more restrictive in more-populated areas: new pharmacies could only open 250 meters away from existing ones in cities larger than 100,000 inhabitants, 200 meters away in cities with between 50,000 and 100,000 inhabitants and 150 meters away in cities with between 5,000 and 50,000 inhabitants.

[5]Before 1941, local governments in less-populated areas always struggled to meet their public service obligations. This burden shifted back gradually to the central government as it undertook to fund as much as three quarters of the pharmaceutical bill from the late 1980s onwards. Although the main source of income of pharmacies comes from the central government budget, entry regulations continue to safeguard the income of pharmacies in the cities and, eventually, to offer the prospect of opening a pharmacy in a new developed urban site for the junior pharmacists that start their careers attending rural communities at a loss.

[6]The regulation has a non-linearity in the authorization of the second pharmacy in any health care zone. An additional pharmacy can be established whenever the population of the health zone is 2,000 people larger than the number resulting from multiplying the number of pharmacies already open to the public by 2,800. Therefore, a municipality needs a population of 2,800 inhabitants to obtain the permit for the first pharmacy, 4,800 for the second, 7,600 for the third, and 10,400 for the fourth and so on.

should be at least one public, National Health System (NHS), primary health care centre.[7]

The minimum distance between pharmacies is fixed at 250 meters, while the regulated mark-up was fixed at 27.9% of the retail price.

In 2000, the Parliament of the Foral Community of Navarra, a small region in northern Spain, with just over 543,757 inhabitants, challenged these national entry restrictions by introducing a law which reverted to a regulation of minima, i.e., the regional government allowed new pharmacies to open and sought to ensure that there was at least one pharmacy in each health care zone.[8]

The policy shift in Navarra can be seen as a natural experiment, since it was unexpected and undesired. In fact, the sponsor of the legislative proposal, the region's Health Minister, was a doctor whose original intention was to obtain rebates from pharmacies in the distribution of medicines prescribed by doctors working in the public sector. Paradoxically, pharmacy mark-ups are fixed by Spain's central government, while health care is fully managed by the regions.

The aim of Navarra's Health Minister was to change the contract between the pharmacists and the regional government, under whose terms pharmacists would have had to give rebates to the NHS. Given the fierce opposition expressed by incumbent pharmacists to renegotiate the contract, the new bill provided for the unrestricted opening of new pharmacies, which had to accept the rebates as laid down in the contract for the new pharmacies in order to be allowed to provide the prescriptions for public sector doctors. During the passage of the bill through Parliament, confrontations between the regional government and the pharmacists were frequent and often acrimonious. The pharmacists even took strike action, and public health care centres were exceptionally given judicial permission to dispense medicines during the strike action.

The new legislation was finally introduced by the regional parliament, coming into force late in the year 2000. In the end, however, the new law did not change the terms of the contract between the pharmacists and the regional government, but it did partially

[7]Zones vary in population size. For instance, the median health care zone is around 6,100 inhabitants in one region of Spain (Navarra in 2000), while it is 24,000 in another (Andalusia in 2008).

[8]This experiment in partial deregulation ended in December 2008 when the Navarra Parliament passed a new law restricting entry again: the opening of the first pharmacy in each municipality is now without restriction, but authorization to open a second and further pharmacies is only granted if each pharmacy can serve 700 inhabitants in each municipality. However, this entry regulation is still the least restrictive in Spain.

deregulate the opening of new pharmacies. It was widely perceived that the policy changes suggested initially were less likely to be upheld by the Constitutional Court than the eventual modifications.[9]

The new regulation guarantees that there is at least one pharmacy per health care zone and a global maximum for the region so as to avoid excessive region-wide entry (though this has never been binding). The new regulation reduced the minimum distance between incumbent and new businesses from 250 meters to just 150 meters.

By contrast, the other regions of Spain have continued to adhere, more or less, to the national mandate of capping the number of pharmacies and maintaining tight distance regulations of 250 meters.

The legal dispute eventually reached the Constitutional Court in 2004, where it was held that the regional government was respecting the provisions laid down by the constitution and Spain's pharmacies law. The Court recognized that the regions have the duty of guaranteeing a balanced geographic coverage of pharmaceutical services, albeit that the new law was adopting a less interventionist approach. The situation was held to be consistent with EU policy and the case law of only maintaining trade and professional regulations that are non-discriminatory, necessary, adequate and proportional to the public aim they pursue

3.2 Data

Partial deregulation almost doubled the number of pharmacies in the region: the total number of pharmacies increased from 310 in 2000 to 580 in 2008 (an increase of 87%). Following Schaumans and Verboven (2008), we focus our empirical analysis on municipalities with fewer than 15,000 inhabitants and fewer than 800 inhabitants per square kilometre, which we consider to constitute the local market for pharmaceutical services.

By so doing, we focus our attention on what can be assumed to be relatively isolated markets, since pharmaceutical services are overwhelmingly local by nature. The total number of pharmacies included in such a sample rose from 157 in 2000 to 278 in 2008 (an

[9] According to Spanish law, all pharmacies have the right and the duty to provide the medicines prescribed by public and private sector doctors under the terms laid down in central government rules. Although regulations governing the opening of pharmacies have been devolved, the way in which pharmacies enter into contract with the public health system has not.

increase of 77%). . [10]

Table 1 shows the structure of the markets at the municipal level before (2000) and after (2008) deregulation. Almost half the municipalities with fewer than 15,000 inhabitants and fewer than 800 inhabitants per square kilometre had no pharmacy at all before deregulation (44.7%), while among the municipalities with pharmaceutical services, most of them had only one pharmacy (52.7%).

Deregulation increased the number of municipalities without a pharmacy only slightly from 117 to 124, that is from 44.7% to 47.3%.[11]

The number of municipalities with only one pharmacy fell markedly, from 52.7% to just 29.4%. By contrast, the number of municipalities with two or more pharmacies increased even more markedly, from just 2.7% to 23.3%.

Insert table 1 here

Table 2 shows the transition matrix before and after partial deregulation. Entry restrictions were by nature highly arbitrary: in one municipality with no pharmacy, deregulation led to the opening of as many as six pharmacies; while in many municipalities with just one pharmacy, deregulation led to the opening of as many as three or four more pharmacies. By contrast, ten municipalities lost their sole pharmacy

Insert table 2 here

Using geocoding algorithms, we were able to map all pharmacies open to the public in Navarra by mid 2008. The figure shows the geocoding (latitude and longitude) of pharmacies and health centres in Navarra as of July 2008 by year of opening.[12]

[10] In Borrell and Fernandez-Villadangos (2009), we test whether our choice of the municipalities as the relevant markets was correct, since we were able to check whether the unregulated opening of pharmacies in Navarra had any significant effect on the payoff functions of the pharmacies in the municipalities across the border in the region of Euskadi. We did not find any cross border significant effect, and therefore the market definition at the municipal level is the relevant choice for our purposes.

[11] In Borrell and Fernandez-Villadangos (2009), we analyze the effect of entry restrictions on the dynamics of entry across municipalities, and discuss the impact of restraining entry in urban areas to promote (slightly and at a huge distortionary cost) the opening of pharmacies in rural locations.

[12] Based on the name and address information provided by the Navarra Health Department (Section of Pharmacy Regulation and Inspection), we used the web based freeware routine in batchgeocode.com (Phillip Holmstrand) that maps multiple addresses using Yahoo! Geocoding API, and also Google Earth.

The map clearly shows that while on the one hand some new pharmacies locate very close to incumbents and health centres, others choose to serve locations where there were no pharmacies before deregulation. From the picture, it is not possible to tell whether deregulation fosters the clustering or scattering of pharmacy locations.

Insert figure here

In this paper we take advantage of this regional change in pharmacy entry regulations. As explained, it can be considered an experiment in the sense that the shift from full regulation (restricted entry plus a tight 250-meter minimum distance regulation) to partial regulation (free entry and just a 150-metre minimum distance regulation) was unexpected and undesired. We use evidence of the sudden and unexpected variation in the regulatory framework to assess the impact of the number of competitors on the locational pattern of professional retail outlets.

3.3 Method

As there is no theoretical consensus as to the impact of competition on the degree of clustering or spatial differentiation of retail outlets or professional premises, we examine the data in order to identify and quantify this relationship. The policy experiment in Navarra offers a setting in which we can observe the equilibrium outcome of the locational game before and after partial entry deregulation. In this sense, theory does not offer us any preconceptions regarding the relationship between competition and distance between competitors.

As pharmacies compete only in location and non-price variables (quality), according to one-dimensional location games we may find clustering à la Hotelling (1929), or locational differentiation à la d'Aspremont et al. (1979). Additionally, according to Neven and Thisse (1990) we should find spatial clustering when the range of quality options is larger than the range of location choices. Alternatively, we should find locational scattering when the range of locational choices is larger than the range of quality options.

We approach this empirical study of clustering vs. scattering by employing the simple model proposed by Netz and Taylor (2002) in which spatial differentiation is a function of

the degree of competition and a set of control variables related to demand conditions and entry costs. However, as we are able to gather information before and after deregulation, we enrich the model using the techniques proposed in the literature on experimental designs and policy evaluation. Meyer (1995) describes the strengths and weaknesses of using quasi-experiments in economics, but among the good natural experiments he cites those induced by policy changes such as the one that concerns us here, as they allow a researcher to obtain exogenous variation in the main explanatory variables.

In line with Netz and Taylor (2002), we estimate the model at the market level. In the case of pharmacies, as noted above, we have a good definition of the relevant markets. We use two measures of clustering. Distance to the closest pharmacy is our first measure of clustering. We wish to see whether when a new pharmacy opens it tends to cluster together with all the other pharmacies in the average local market, the municipality. We can estimate the following relationship,

$$D^1{}_{it} = f\left(C_{it}, X_{it}, \epsilon_{it}; \theta_1\right),$$

where i represents municipalities and t represents whether we are before or after deregulation. D^1 measures the average distance to the closest pharmacy at the municipality level. The vector C measures competition before and after deregulation, that is the number of pharmacies at the municipal level, and the matrix X contains control variables related to demand and entry conditions at the municipal level. This matrix contains a variable for controlling whether average distance among competitors changes due to the regulatory reform, as minimum distance drops from 250 to 150 meters after partial deregulation. [13]

We also allow the coefficient measuring the impact of competition to differ before and after deregulation, $\beta_t : \beta_{before}, \beta_{after}$ where $\beta_t \in \theta$, as entry is restricted before partial deregulation, and pharmacies might take into account this constraint when deciding were to locate. By contrast, after deregulation, there is free entry. Additionally the impact of competition on average distance may change due to the lowering of the minimum distance regulation.

[13] We model the relationship between distance and competition using a log-linear and a log-quadratic functional form. The model including squared competition takes into account that in any given local area, distance among outlets in the limit should decrease as the number of competitors increases irrespective of the degree of clustering or scattering of the spatial distribution of the outlets before reaching such limit.

Among the municipalities' characteristics, we control for density, the number of towns and suburbs in each municipality, and whether there is a public health centre in the municipality. All strongly impact on the geographical distribution of consumers, which can affect location choices as theory clearly shows. In Spain, around three quarters of prescriptions are filled out by doctors in the public sector healthcare services (National Health System). Therefore, having a public health centre in the municipality can dramatically change the distribution of effective demand and, as we shall see, the equilibrium location of pharmacies.[14]

We also control for additional demographic characteristics affecting demand or costs, including the percentage of population under the age of 14, the percentage over the age of 75, and the percentage of foreigners before and after deregulation (2000 and 2008). We also control as to whether the average distance to the health centre changes after partial deregulation, as free entry and the reduction in the minimum distance may switch the equilibrium outcome of the location game.[15]

The second measure of distance that we use is the average distance of all the pharmacies in each municipality to the health centre (if there is one). We wish to see whether when a new pharmacy opens it tends to cluster around the health centre.

$$D^2{}_{it} = g\left(C_{it}, X_{it}, \epsilon_{it}; \theta_2\right)$$

Using the geocode of each pharmacy, we calculated the Euclidean distance between all pharmacies and health centres. We then computed the distance to the closest pharmacy within the same municipality and to the health centre. And then, we computed the average distance to the closest pharmacy and to the health centre within each municipality among the incumbent pharmacies before the 2000 deregulation, and among all incumbent and new pharmacies open to the public in Navarra between 2000 and mid-2008. Using this

[14] Around a quarter of the population prefer to go to the private primary care sector, although most of this number obtain their prescriptions with very low co-payments from the public health care centers. Co-payments stand at 6% on average: pensioners obtain their medicines free of charge, while the rest of the population pays 40% of the price for acute indications, and a reduced rate of 10% up to a maximum co-payment of 2.64 euros for chronic indications.

[15] Data on demographics at the municipal level are from the Spanish Statistical Office. We have no information on average income at municipal level. We do have information on average education and unemployment only for the 2001 census year. However, we do not use them as controls as remain always not significant when explaining distance measures in any of the functional form specifications.

information we were able to estimate the impact of competition on the distance to the closest pharmacy and on the distance to the health centre.

Competition is measured by the number of pharmacies per municipality. Apart from restrains in the number of entrants, in Spain are also operative pure licensing regulations and restrictions whereby only pharmacists can own pharmacies that open to the public, and also the one-pharmacy per pharmacist rule. These regulations do not allow pharmacy chains to be formed. Therefore, the number of independent pharmacists proxies competition in location with a very small measurement error, except in the case where family ties might exist between pharmacists (for which we have only anecdotal evidence).

4 Results

Tables 3 and 4 show some summary statistics of the data. Table 3 focuses on the municipalities with two or more pharmacies in which our first measure of clustering can be applied: the average distance to the closest pharmacy within the same municipality. We split this sample in three. There were 36 municipalities without a public health centre. In those municipalities the number of pharmacies was always either one or zero before partial deregulation and, as such, they are not relevant for our analysis. Yet, all of them had two or more pharmacies after partial deregulation. Mean distance to the closest pharmacy was 884 metres, and the mean number of pharmacies was 2.50.

Only seven municipalities had either one or two health centres, and also had two or more pharmacies before partial deregulation. In this group, the mean distance to the closest pharmacy was 1,279 metres, and the mean number of pharmacies was 2.57 before partial deregulation. After deregulation the number of municipalities with either one or two health centres, and that had two or more pharmacies, increased to 25. The mean distance between the pharmacies in this group fell to 637 metres, and the mean number of pharmacies rose to 4.12.

Demographics were very similar across the sub-samples, except for density and the percentage of foreigners. A comparison of the before and after sub-samples of municipalities with one or two health centres showed that the increase in these two controls was due to population growth and immigration in the region between 2000 and 2008. Compar-

ing the sub-samples after partial deregulation, as expected municipalities with no health centre recorded lower population densities than municipalities with one or two health centres. Note that health care centres are public facilities set up by the regional government according to social needs, not according to profit considerations.

Insert table 3

Table 4 shows the summary statistics for all the 31 municipalities with just one health centre. All of them had one or more pharmacies before and after partial deregulation. An examination of these municipalities enabled us to assess the impact of competition on the average distance separating pharmacies from the health centre within the municipality. We were primarily concerned in ascertaining whether the mean distance to the health centres fell after partial deregulation, and what the relationship was between mean distance to the health centre and the number of competitors. We wished to determine whether pharmacies cluster or scatter after partial deregulation, and whether pharmacies cluster or spread in municipalities with more competitors. [16]

Before partial deregulation, the mean distance to the health centre was around 2.2 kilometres, and the mean number of pharmacies was just 1.26. After partial deregulation, the mean distance to the health centre rose to just above 3 kilometres while the number of pharmacies rose to 3.23. On average, demographics remained very similar before and after, except for population density and the percentage of foreigners, both of which increased due to population growth and immigration in the region between 2000 and 2008.

Table 5 shows the relationship between the number of competitors and the municipality's demographics on the average distance between retail outlets. The evidence shows that this relationship was markedly different in the case of municipalities without a public health care and those with one or two health centres.

The estimates of the impact of the number of pharmacies on the average distance to the closest competitor are quite precise. All competition coefficients are statistically significant at 5% except two that are significant at 6% and 8% respectively. The relationship appears

[16] We will not include in the sample the municipality with two health centers, as then the average distance to the health centers is not a good measure of clustering as some pharmacies may cluster around one health center, while others around the other while average distance may increase, decrease or stay put.

to be linear or log-linear (the latter is shown in the table, although the former yields very similar results).

In the municipalities with one or two health care centres, pharmacies spread over the territory as the number of competitors increases. And, this scattering effect was stronger before partial deregulation. Additionally, the mean distance to the closest competitor seems to be greater after partial deregulation, although the impact is not statistically significant. By contrast, in the municipalities with no health centre, pharmacies maximize locational differentiation but tend to cluster together as the number of competitors increases.

Insert table 5

Demographics proved to be statistically significant in the case of municipalities without health care centres and where demand was more widely disperse. Higher population density leads to a clustering of outlets, as do higher percentages of elderly population, young population, and foreigners. In municipalities with a larger number of towns and suburbs, the average distance between retail outlets was greater.

Theory suggests that density drives clustering, and the percentages of young and elderly population might reflect the higher transport costs of families and the elderly. The percentage of foreigners might reflect an income-related effect such as lower access to private vehicle transportation.

By contrast, the control variables do not appear to play such a statistically significant role in municipalities that have a health care facility. Although the estimates are less precise, all of them maintain their sign, except for the number of towns and suburbs, which in these municipalities is a driver of the clustering rather than of the scattering of outlets. The town or suburb in which the health centre is located probably acts as a magnet for pharmacies, an effect that becomes even more marked as the number of smaller suburbs within the same municipality increases.

Table 6 presents our best prediction of the estimated relationship between the given market structure and the equilibrium location of retail outlets, while setting the demographics at the average of the respective sub-sample.

When there is no health care centre in a municipality with two pharmacies, after partial deregulation the distance between these outlets is around two kilometres. In municipalities with three pharmacies the distance from their closest competitor is around 1 kilometre. In those with four pharmacies the average distance from each other is 572 metres. Finally, in municipalities with four pharmacies the mean distance from their closest competitor is just 306 metres.[17]

Insert table 6

By contrast, when there is a public health care centre, in municipalities with only two pharmacies both before and after partial deregulation the outlets cluster together near the health centre (at a distance of just some 500 metres from each other). After partial deregulation, the average distance to the closest competitor increases gradually with the number of pharmacies in the municipalities. We predict that municipalities with three pharmacies will have their outlets 528 meters from their closest competitor, 622 metres in the case of four pharmacies, 732 metres in the case of five, 861 meters in the case of six, and so on, until as much as 2.3 kilometres in the case of 12 pharmacies. Thus, the mean distance to the closest competitor rival increases substantially with the number of competitors.

A less gradual increase in scattering with respect to the number of competitors is also observed before partial deregulation in the municipalities with a health centre. Entrants prefer to locate some distance from incumbents when entry is restricted, much further than the restrictive 250-metre minimum regulation.

Additionally, from the location pattern described by pharmacies before deregulation, it is clear that entry regulations constraining the number of pharmacies result in pharmacies differentiating spatially. Distance to the closest rival is greater before partial deregulation for all given market structures. New entrants fill the gaps available between incumbents.

Table 7 shows the relationship, before and after deregulation, between the number of competitors and the demographics on the average distance to the health centre in those

[17]It should be noted that we have computed Euclidean distances, while regulation sets walking distances. Therefore, depending on the street grid regulation may be binding in some municipalities with four pharmacies.

municipalities with one health centre. In this case the relationship appears to be non-linear. We opt for a log-quadratic functional form that appears to fit the data better. As the number of pharmacies increases, the average distance to the health centre first falls before rising again.

Insert table 7

The estimates of the linear and the quadratic impact of the number of competitors on the average distance to the health centre are statistically significant before and after deregulation. They are, however, not so precisely estimated before deregulation. The mean distance to the health centre increases after deregulation, although this estimate is not statistically significant either. Demographics are not quite precisely estimated, except for density. Density appears to have a significant driving effect pushing the pharmacies nearer to the health centre, as theory suggests. All the other demographic covariates present negative signs suggesting that they may also drive the clustering.

Table 8 offers the best prediction of the impact of the number of pharmacies on the average distance to the health centre keeping the demographics at the sub-sample average before and after partial deregulation. Average distance decreases from 1.5 kilometres in the case of one-pharmacy municipalities before partial deregulation, to just 1.4 kilometres in the case of two-pharmacy municipalities, while it rises to 2.7 kilometres in the case of three-pharmacy municipalities, and to as much as 10.9 kilometres in the case of four-pharmacy municipalities. There is no further evidence for municipalities with more pharmacies before deregulation.

Insert table 8

By contrast, the average distance to the health centre appears to increase substantially after partial deregulation. And this swing towards some clustering appears to expand from the municipalities with just one pharmacy to the municipalities with four pharmacies after deregulation. Then we see pharmacies becoming increasingly scattered over the territory in the case of municipalities with four or more pharmacies.

This evidence suggests that, although pharmacies increasingly tend to locate further apart from each other and that the mean distance to the health centre increases substantially after deregulation, the health centre still acts as a magnet for those pharmacies that enter the market first, while it no longer does so when the number of pharmacies reaches a high enough number. Thus, it seems that it is around the health centre that the minimum distance regulation may constrain the locational choices of pharmacies, and protect incumbents from the competitive pressure of newcomers. And restricting the number of entrants, acts as a restraint on the scattering of pharmacies around the territory.

5 Concluding remarks

In short, the evidence from the partial deregulation of entry in the professional pharmacy sector shows that pharmacies do not cluster together except for the case of a rather small number of incumbent pharmacies in those municipalities with a health centre. These findings are consistent with the predictions of d'Aspremont et al. (1979) who conclude that the principle of maximum differentiation holds for the location strategies of firms. At least, the principle holds here for the locational choices of pharmacies in municipalities without a health centre. However, in municipalities with a health centre and just a few pharmacies, some clustering has been identified around the health centre. But new market entrants tend to locate away from the health centre and, hence, at greater distances from competitors, and increasingly so as the number of competitors rises.

Based on these findings, we call into question the need for minimum distance regulations. As pharmacies do not generally tend to cluster, there exists no public rationale for supporting such regulations. Indeed, our results suggest that distance regulations may only have an impact on the very few pharmacies located near a health centre. We have shown that incumbent pharmacies located close to health centres do benefit from distance regulations, as a second pharmacy in any municipality seeks to locate close to, or even leapfrog, the incumbent by opening an outlet next door to the health centre. This being the case, there is no rationale for imposing distance regulations apart from defending the underlying private interests of a very small number of incumbents.

Finally, our evidence not only shows that entry restrictions actually reduce the total

number of pharmacies and, therefore, limit accessibility to their services in some municipalities, but that they also lead the small number of new pharmacies opening to the public to locate at considerable distances from each other and from the health centre. Free-entry regulations encourage the opening of many new pharmacies to make good the existing shortfall in services and the choosing of scattered locations in the gaps left between incumbent pharmacies.

References

[1] d'Aspremont, C.; J. J. Gabszewiczs and J. R. Thisse (1979) 'On Hotelling's Stability in Competition', *Econometrica*, 47, 1145-1150.

[2] Borenstein, S. and J. S. Netz (1999) 'Why do all the flights leave at 8 am? Competition and departure-time differentiation in airline markets', *International Journal of Industrial Organization*, 17(5), 611-640.

[3] Borrell, J. R. and L. Fernandez-Villadangos (2009) 'Assessing the excess profits from different entry regulations', XREAP Working paper, 1-40.

[4] De Palma A.; V. Ginsburgh; Y. Papageorgiou; and J. F. Thisse (1985) 'The Principle of Minimum Differentiation Holds Under Sufficient Heterogenity', *Econometrica*, 53, 767-781.

[5] Eaton, B. C. (1971) 'Spatial Competiton Revisited', *Canadian Journal of Economics*, 5:2, 268-78.

[6] Eaton, B. C. and R. G. Lipsey (1976) 'The Principle of Minimum Differentiation Reconsidered: Some Developments in the Theory of Spatial Competition', *The Review of Economic Studies*, 42, 27-49.

[7] Hotelling, H. (1929) 'Stability in Competiton', *The Economic Journal*, 39, 41-57.

[8] Irmen, A. and J. Thisse (1998) 'Competition in multi-characteristic spaces: Hotelling was almost right', *Journal of Economic Theory*, 78, 76-102.

[9] Ma, C. and J. F. Burgess (1993) 'Quality Competition, Welfare, and Regulation', *Journal of Economics*, 58, 153–173.

[10] Meyer, B. D. (1995) 'Natural and Quasi-experiments in economics', *Journal of Business and Economic Statistics*, 13, 151–61.

[11] Mossialos E. and M. Mrazek (2003) 'The Regulation of Pharmacies in Six Countries', Report Prepared for the Office of Fair Trading, London.

[12] Netz, J. S. and B. A. Taylor (2002) 'Maximum or minimum differentiation? Location patterns of retail outlets', *Review of Economics and Statistics*, 84(1), 162-175.

[13] Neven D. and J. F. Thisse (1990) 'On Quality and Variety Competition', pp. 175–199 in: J. J. Gabszewicz, J.-F. Richard, and L. A. Wosley (eds.), *Economic Decision- Making: Games, Econometrics and Optimisation*, North-Holland: Amsterdam–London–New York–Tokyo.

[14] Nuscheller, R. (2003) 'Physician reimbursement, time, consistency, and the quality of care', *Journal of Institutional and Theoretical Economics*, 159, 302-322.

[15] ÖBIG (2006) 'Surveying, Assessing and Analyzing the Pharmaceutical Sector in the 25 EU Member States', Report Commissioned by the DG Competition - European Commission, Office for Official Publications of the European Communities, Brussels.

[16] Pinske J. and M. Slade (1998) 'Contracting in Space', *Journal of Econometrics*, 85:1, 125-54.

[17] Rodríguez-Nozal R. and A. González-Bueno (2005) *Entre el arte y la técnica. Los orígenes de la fabricación industrial del medicamento*, Consejo Superior de Investigaciones Científicas, Madrid.

[18] Salop, S. C. (1979) 'Monopolistic Competition with Outside Goods', *The Bell Journal of Economics*, 10, 141–156.

[19] Salvanes K. G., F. Steen and L. Sorgard (1997) 'Hotelling in the Air? Flight Departures in Norway', Working Paper Norwegian School of Economic and Business Administration.

[20] Smithies, A. (1941) 'Optimum Location in Spatial Competition', *Journal of Political Economy*, 49:3, 423-39.

Table 1.- Market structures before & after deregulation (n = 262)

# pharmacies per municipality	# municipalities before	# municipalities after	% municipalities before	% municipalities after
0	117	124	44.7%	47.3%
1	138	77	52.7%	29.4%
2	5	25	1.9%	9.5%
3		20		7.6%
4	1	4	0.4%	1.5%
5	1	6	0.4%	2.3%
6		2		0.8%
7		3		1.1%
12		1		0.4%

Table 2. Transition matrix before and after partial deregulation

		# of new pharmacy openings after								
		-1	0	1	2	3	4	5	6	7
# pharmacies per municipality before	0		114	2					1	
	1	10	75	25	20	4	4			
	2					2	1	2		
	4					1				
	5									1
	Total	10	189	27	20	7	5	2	1	1

Table 3.- Summary statistics: Municpalities with 2 or More Pharmacies

	After - Municipalities with no Health Center				
	#obs	Mean	Std. Dev.	Min	Max
distance to closer pharmacy	36	884.08	1,059.81	16.94	3,734.46
#pharmacies	36	2.50	0.70	2.00	5.00
#towns	36	3.39	4.66	1.00	22.00
density	36	85.48	100.12	1.88	565.93
%young	36	0.13	0.04	0.05	0.25
%old	36	0.11	0.04	0.02	0.18
%foreigners	36	0.08	0.04	0.01	0.18
	Before: Municipalities with 1 or 2 Health Centers				
	#obs	Mean	Std. Dev.	Min	Max
distance to closer pharmacy	7	1,278.91	1,118.97	169.47	3,057.78
#pharmacies	7	2.57	1.13	2.00	5.00
#towns	7	1.29	0.76	1.00	3.00
density	7	133.69	94.50	14.38	262.39
%young	7	0.13	0.02	0.08	0.15
%old	7	0.10	0.03	0.07	0.15
%foreigners	7	0.02	0.01	0.01	0.03
	After - Municipalities with 1 or 2 Health Centers				
	#obs	Mean	Std. Dev.	Min	Max
distance to closer pharmacy	25	637.06	668.75	89.17	2,586.44
#pharmacies	25	4.12	2.20	2.00	12.00
#towns	25	2.32	3.13	1.00	13.00
density	25	125.71	132.11	14.02	590.64
%young	25	0.14	0.02	0.09	0.18
%old	25	0.09	0.03	0.03	0.17
%foreigners	25	0.08	0.03	0.02	0.16

Table 4.- Summary statistics: All Municipalities with 1 Health Center

	Before - All Municipalities with 1 Health Center				
	#obs	Mean	Std. Dev.	Min	Max
distance to health center	31	2,200.97	3,155.86	37.85	13,529.86
#pharmacies	31	1.26	0.63	1.00	4.00
#towns	31	3.84	7.63	1.00	40.00
density	31	90.44	108.24	3.63	539.84
%young	31	0.13	0.02	0.08	0.17
%old	31	0.10	0.03	0.03	0.16
%foreigners	31	0.02	0.01	0.00	0.06
	After - All Municipalities with 1 Health Center				
	#obs	Mean	Std. Dev.	Min	Max
distance to health center	31	3,065.47	2,740.10	103.83	13,529.86
#pharmacies	31	3.23	1.87	1.00	7.00
#towns	31	3.84	7.63	1.00	40.00
density	31	103.18	126.06	3.27	590.64
%young	31	0.14	0.02	0.09	0.18
%old	31	0.10	0.04	0.03	0.18
%foreigners	31	0.07	0.05	0.02	0.22

Table 5.- Impact of competition on distance differentiation (municipalities with 2 or more pharmacies)

	Municipalities No HealthCenter						Municipalities 1 or 2 Health Centers					
	Log mean distance (meters)			Log mean distance (meters)			Log mean distance (meters)			Log mean distance (meters)		
	Coeff.	(Std. Err.)	*t-stat*	Coeff.	(Std. Err.)	*t-stat*	Coeff.	(Std. Err.)	*t-stat*	Coeff.	(Std. Err.)	*t-stat*
constant	6.90	(0.67)	*10.27*	13.83	(1.70)	*8.15*	5.18	(0.84)	*6.20*	7.03	(4.04)	*1.74*
after							0.15	(0.90)	*0.17*	0.39	(0.96)	*0.41*
#pharmacies before							0.57	(0.23)	*2.50*	0.46	(0.21)	*2.24*
#pharmacies after	-0.36	(0.25)	*-1.45*	-0.62	(0.27)	*-2.24*	0.15	(0.06)	*2.40*	0.16	(0.07)	*2.24*
#towns				0.075	(0.033)	*2.30*				-0.10	(0.09)	*-1.08*
density				-0.002	0.001	*-1.78*				-0.001	(0.002)	*-0.54*
%young				-24.68	(5.01)	*-4.93*				-8.77	(17.37)	*-0.50*
%old				-27.59	(8.26)	*-3.34*				-0.44	(15.34)	*-0.03*
%foreigners				-2.33	(5.72)	*-0.41*				-6.45	(5.90)	*-1.09*
F test	36			36			32			32		
Observations	2.1			1.18			9.13			7.09		
R square	0.03			0.36			0.21			0.34		

Table 6.- Distance to closer pharmacy (meters) best prediction

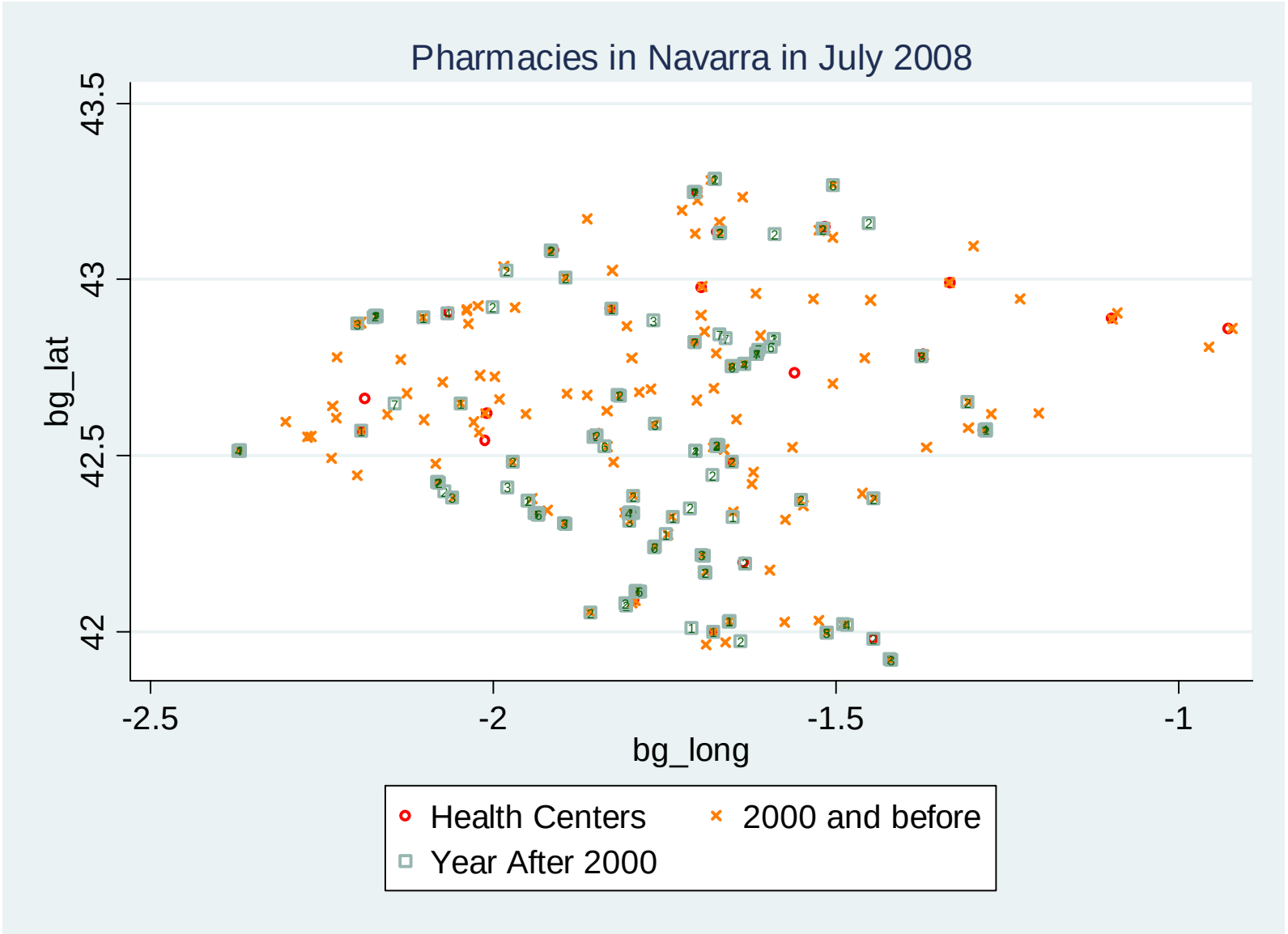
	No Health Center	Health Center	
# of pharmacies	After	Before	After
2	1,962	552	449
3	1,060	878	528
4	572	1,395	622
5	309	2,217	732
6			861
7			1,013
8			1,193
9			1,404
10			1,652
11			1,944
12			2,288
Controls	Yes	Yes	Yes

Table 7.- Impact of competion on distance to health center (all municipaliteis with one health center)

	Log mean distance (meters)			Log mean distance (meters)			Log mean distance (meters)		
	Coeff.	(Std. Err.)	*t-stat*	Coeff.	(Std. Err.)	*t-stat*	Coeff.	(Std. Err.)	*t-stat*
constant	6.32	(0.61)	*10.36*	7.88	(1.24)	*6.33*	9.83	(2.35)	*4.18*
after	1.34	(0.75)	*1.78*	0.81	(1.41)	*0.57*	2.19	(1.57)	*1.39*
#pharmacies before	0.16	(0.32)	*0.51*	-1.76	(1.18)	*-1.49*	-1.14	(1.42)	*-0.80*
#pharmacies after	-0.03	(0.09)	*-0.32*	-0.76	(0.37)	*-2.05*	-1.00	(0.45)	*-2.21*
#pharmacies before^2				0.44	(0.22)	*1.99*	0.36	(0.30)	*1.19*
#pharmacies after^2				0.10	(0.04)	*2.17*	0.14	(0.06)	*2.48*
#towns							-0.021	(0.03)	*-0.81*
density							-0.005	(0.001)	*-4.10*
%young							-4.13	(12.73)	*-0.32*
%old							-14.56	(8.62)	*-1.69*
%foreigners							-5.80	(4.05)	*-1.43*
F test		2.93			2.21			2.12	
Observations		62			62			62	
R square		0.12			0.16			0.29	

Table 8.- Mean distance to health center (meters) best prediction

# of pharmacies	Municipalities with 1 Health Center	
1	1,449	7,088
2	1,373	3,911
3	2,687	2,836
4	10,858	2,702
5		3,383
6		5,566
7		12,032
Impact	Quadratic	Quadratic
Controls	Yes	Yes
Time	Before	After


Pharmacies in Navarra in July 2008
bg_lat
43.5
43
42.5
42
-2.5
-2
-1.5
-1
bg_long
Health Centers
2000 and before
Year After 2000

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