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Abstract

Relevant market definition is still a key element of economic analysis of competition in the gasoline market. It is particularly difficult to handle when competition is local and market power is geographically constrained like is the case in the gasoline market. We analyse how the application of the hypothetical monopolist or Small but Significant Non-Transitory Increase in Prices (SSNIP) test performs for defining isochrones using only information on prices and distance among competitors. We conclude that geographic information systems can be very successfully used to define more precisely relevant geographic market in the gasoline retailing. The application to the Spanish gasoline market concludes that geographic relevant market is composed by 5-6 minutes of travel time. Localised market power should be taken into account when analysing the adverse effects of mergers and entry regulations in gasoline retailing. Only drawing small enough isochrones will drive competition in local markets because it is just close rivals that compete effectively with each other.

Keywords: Gasoline, Market definition, Retailing.

JEL Codes: L11, L12, L14, R12.

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1. Introduction

Market definition is a key element for competition policy enforcement in the gasoline market, especially for the retailing segment. Although the use of estimation and simulation techniques allows to study market power directly without imposing any market definition, defining markets and studying the degree of concentration will remain as an important policy tool for long (see Brenkers and Verboven, 2006). Estimation and simulation are still depending too much in the assumptions regarding the demand and supply primitives, and also on the equilibrium condition chosen. Estimations and simulation of market power will be used together with more traditional market definition and concentration analysis for the time to come.

Exists some papers in the economic literature that try to approximate the relevant markets in different industries. Argentesi and Ivaldi (2007) in the printed media or Ivaldi and Lörincz (2011) to the computer servers industry are some examples. However, for the gasoline market we only find papers that analyze the geographic relevant market on the wholesale segment. Spiller and Huang (1986) show like the refineries in the northeast of United States compete in a different relevant market. These refineries that were more isolated can exercise market power. Pinkse et al (2002) analyze the wholesale gasoline market in the U.S. too, through a semiparametric estimator. Results show how do not exist a global market for all the country, but every refinery compete with their neighbours. So, the relevant geographic market is essentially local. Audy and Erutku (2005) apply different price test to define the relevant market in the wholesale gasoline market of Canada. Authors find a market greater than a city but smaller than all the country. In fact results show the existence of more than two markets inside Canada.

Unlike exists a great number of the empirical evidence about the size of the gasoline wholesale market, we have not empirical analysis to measure the size of the relevant geographic markets in the retail segment. The economic intuition suggests that markets may be local, but we know nothing about the size of these. The aim of this paper is measure the size of these markets and proposes economic policy measures to improve the level of competition inside.

To measure the size of the relevant geographic markets in the gasoline retailing we have applied the Small but Significant Non-Transitory Increase in Prices test (SSNIP test). This test is being used by the competition authorities to define markets and makes more explicit the economic fundamentals of the definition of markets. The US and EU merger guidelines are currently using the SSNIP test to define markets. The test measures to what extend a monopolist would be interested significantly increase prices (by at least a 5%) permanently after getting the ownership of rival firms. If this is so, the products or outlets analyzed are in the same relevant market. The aim is to identify the limits within which rivalry has beneficial effects for consumers.

In this paper, we analyse how the application of the SSNIP test performs for defining markets using information on prices and distance among retail outlets. The competition among petrol stations is a paradigmatic case of competition in local markets. It has the common characteristics of competition among retail outlets. There is a growing interest in defining local markets using isochrones of equal distance time to study rivalry in retailing (Office of Fair Trading 2005, Competition Commission 2003 and Baker 1999). The key issue in the study of local competition is to analyse how large isochrones should be to drive competitors in.

We conclude that geographic information systems can be very successfully used to define more precisely relevant geographic markets. Applying the test to petrol stations, we find

that smaller isochrones drive enough competitors in. Local market power is larger than usually thought in competition and retail regulation cases. Results show that the entry of new operators within 5-6 minutes belonging to different existing brands can significantly reduce the price. In cases involving more than one station of the same brand in the relevant market the equilibrium price would be lower if any of the operators change the flag and increase the number of competitors. Therefore, remove any entry barrier that limit the number of operators as well as policies to facilitate the change of flag can increase the level of competition and reduce the price equilibrium.

After this introductory section, section 2 shows the theoretical relationship between the number of participants in the market and price equilibrium. Section 3 describes the data used in the paper to apply this methodology to the case of competition among petrol stations in roads. Section 4 offers the results of the application of the test to the petrol station case. Section 5 concludes.

2. Number of sellers and price equilibrium

In this section we illustrate the possible relationship between the number of sellers and the price equilibrium with a free entry model. We generalized the model of Campbell and Hopenhayn (2005) for a multiseller instead of a single producer. Like in Campbell and Hopenhayn (2005) there are a large number of potential entrants who can choose between several markets to enter. We index markets with i . Markets are distinguished by the number of consumers (S_i), price factors, demographic and other observable market characteristics (X_i) and an error term (U_i). The error term is independent of S_i and X_i and observed by all potential entrants. The variables in X_i and U_i account for differences in cost and demand conditions across markets that are exogenous from the perspective of the industry

under consideration. All parameters describing producers' costs and consumers' demand curves are functions of X_i and U_i .

We assume that each potential entrant can sell in at least one market. To produce in market i , and entrant must incur a fixed cost of entry (ϕ). Thereafter, it sells its own differentiated variety of the industry's product using a technology with constant marginal cost, c . After entry, active producers simultaneously choose prices. If N sellers populate market i , the demand of a producer who sets a price of p while its rivals all charge P is $S_i \times q(p, P, N)$. Here, $q(\cdot)$ is the quantity demanded of the producer by a single consumer, which is decreasing in p given P . We assume that

$$q(p, P, t \times N) = q(p, P, N) / t, t > 0 \quad (1)$$

That is, doubling the number of producers while holding all prices at P cuts each producers' demand by half. This rules out market size effects that are built into the demand system.

A symmetric free-entry equilibrium consists of a price function $P^*(N, S_i)$ and a number of sellers $N(S_i)$ that is equal to the number of rival stores and own brand stores $N = N^r + N^o$; such that:

- i) The price $P^*(N, S_i)$ maximizes the profit of any producer in market i if there are N producers serving that market and each of the others also chooses this price.
- ii) All potential entrants expect to earn exactly zero profit from entering any market. Consider first the determination of $P^*(N, S_i)$. The condition that choosing the price P maximizes each producer's profits conditional on all

others' making the same choice can be written as the familiar inverse demand elasticity-markup rule.

$$\frac{P-c}{P} = \eta^{-1}(p, P, N^r, N^o) \quad (2)$$

On the right-hand side of (2) $\eta(p, P, N^r, N^o)$ is the elasticity of a single producer's residual demand curve. To guarantee that there is a unique solution to (2), we assume that it is continuous and increasing in its first two arguments.

The solution to (2) clearly does not depend on market size, so we henceforth drop S_i from its list of arguments and write it as $P^*(N^r, N^o)$. So that this price is weakly decreasing in N^r , we also assume that if $N^{r'} > N^r$, then

$$\eta(p, P, N^{r'}, N^o) \geq \eta(p, P, N^r, N^o) \quad (3a)$$

And that if $N^{o'} > N^o$

$$\eta(p, P, N^r, N^{o'}) \leq \eta(p, P, N^r, N^o) \quad (3b)$$

These monotonicity assumptions captures the idea that increasing the number of rivals (own) sellers weakly increases (decrease) the substitutability of any one producer's product with those of its rivals, and so increases (decrease) that producer's residual demand elasticity. If (3a) and (3b) is a strict inequality, then increasing the number of competitors (own brand stores) erodes (increase) each seller's market power.

The condition that all entrants earn zero profits following the entry of N sellers is

$$\phi = S_i \times q(P^*(N), P^*(N), N) \times (P^*(N) - c) \quad (4)$$

The right hand side of (4) is strictly decreasing in N , so there is a unique number of active sellers, $N(S_i)$ consistent with symmetric free-entry equilibrium. We denote the price those sellers charge with $P(S_i) \equiv P^*(N(S_i))$

3. Data

The SSNIP test is very intensive in data requirements. We need to know not only the price of a homogeneous enough product sold at different outlets, but also the geographic location of each outlet, the distance time among all them, and which outlets are owned by each competing firm.

We are going to use data from all 590 petrol stations open in the roads (not including stations in highways neither stations in cities and suburbs) of Catalonia, a region in the northeast of Spain with around 7 million of inhabitants that has the size of Belgium or Massachussets. Data on regular gasoline prices (unleaded 95 octane) sold at each outlet was obtained for the week around 31st July 2005 from the Ministry of Industry webpage. All petrol stations were geographically located in a graph, and all time distances by road from one petrol station to all other stations were computed (348,100 time distances in total). We identify the brand of the petrol station: that is, the name of the major petrol firm that owned or served by an exclusivity contract to each petrol station using the information provided in the firms' web pages. All petrol stations that are not branded by any major petrol firm are named independents. We also obtained information on traffic density near each petrol station and information on the population around each station from the Catalan Statistical Office (Idescat).

Table 1 shows the distribution of petrol stations by brand and the mean and standard deviation of prices for each firm.

Table 1. Number of road petrol stations in roads and average prices by firm

Brand	Number of petrol stations	Mean Price (cents of euro)	Standard deviation of prices
Repsol	258	46.962	0.762
Cepsa	84	46.511	0.908
Galp	42	46.646	1.183
Petrocat	35	47.031	0.534
BP	29	46.747	0.600
Shell	14	46.313	1.683
Meroil	14	46.159	1.201
Tamoil	10	46.936	1.217
Saras	7	46.295	0.251
Petromiraller	5	46.962	0.308
ERG	4	45.962	0.896
Supermarkets	3	41.249	2.215
Independents	85	46.324	1.301
Total	590	46.704	1.054

Source: Own calculations from the Ministry of Industry and major petrol firms web pages.

Using this data, we have computed for each petrol station a vector that contains the number of outlets of rival brands with which they compete given any time distance of isochrone going from 1 to 15 minutes. We are assuming that there is not intra-brand competition. We allow competition among any independent petrol station, that is, among any outlet not owned or served under the flag of the big petrol players. It is not clear to what extend stations under an exclusivity contract of the big petrol stations compete with each other. According to Contín et al (1998) most petrol stations under contract usually earn a fixed percentage on final prices set by the provider. Therefore, they have little or not room to alter the prices set in a coordinated fashion for all outlets by the brand owner.

Table 2 shows whether we find rivals when we define isochrones of 1 to 15 minutes of time distance from each petrol station in our database, and the mean number of rivals in the isochrones. Table 2 shows the number of markets in which we do not find rival outlets within the isochrones, and in those cases the number of markets in which there is more than one outlet of the same brand.

**Table 2. Market structure within isochrones
(distance time in minutes)**

Distance time (minutes)	Number of petrol stations with rivals in the isochrone	Mean number of rivals	Mean number of own brand outlets	Number of petrol stations without rivals nor own brand outlets	Number of petrol stations without rivals but with own brand outlets
1	37	1.03	0.22	396	157
2	113	1.15	0.96	311	166
3	174	1.28	1.36	236	180
4	255	1.62	1.84	179	156
5	309	1.95	2.43	142	139
6	362	2.24	3.13	114	114
7	416	2.58	3.88	84	90
8	442	3.10	4.70	65	83
9	466	3.79	5.67	53	71
10	475	4.34	6.79	50	65
11	495	4.98	7.92	44	51
12	509	5.64	9.11	32	49
13	521	6.49	10.48	27	42
14	530	7.27	12.02	22	38
15	538	8.08	13.35	17	35

Source: Authors' calculations.

4. Results

We have estimated 15 linear regressions to infer the impact of rivalry on equilibrium prices, that is the coefficient α_1 in the following equation:

$$P_i = \alpha_0 + \alpha_1 N_i^r + \alpha_2 N_i^o + \alpha_3 N_i^{o^2} + \varepsilon_i \quad (5)$$

where $i=1,2,\dots,590$ petrol stations, N_i^r is the number of rival outlets within the isochrone of 1 to 15 minutes, and $N_i^o, N_i^{o^2}$ is the number of petrol stations of the brand of outlet i within the isochrones and its square.

The number of rivals and the number of outlets of the same brand within the isochrone might not be exogenous because in equilibrium we expect the number of outlets to depend on potential demand (population and traffic) and the number and variety of brands that are already in the market. We have estimated the previous equations using not only OLS but also instrumental variables techniques using the brand of the nearest rivals, the population of the area of each petrol station and the Mean Daily Intensity (MDI) of the traffic in the road as instruments.

The calculation of the population and the IMD allotted to each of the petrol stations deserved an explanation. For the population I was calculated using the census regions of each service station and its surroundings, the number of people living in radius from 1 to 15 minutes around the service station. In this way, it was assigned the population residing in the market according to its definition. Regarding the traffic has been assigned to each service station the nearest traffic measure point of the road.²

Table 3 shows the IV results. In the specification standard errors are robust to heteroskedasticity and correlation clustered geographically around roads.

² The results are not significantly altered if we consider that the traffic can also influence the equilibrium price as a demand factor. If there are barriers to entry that deterrence the entry of new operators when the traffic increase, traffic can be an explanation of prices and not the number of entrants.

Table 3. IV estimates

$$P_i = \alpha_0 + \alpha_1 N_i^r + \alpha_2 N_i^o + \alpha_3 N_i^{o2} + \varepsilon_i$$

Observations: 590

Endogenous regressor: N_i^r, N_i^o, N_i^{o2} . **Instruments:** population, dummy brand of closest rival, IMD.

	1 minute	2 minutes	3 minutes	4 minutes	5 minutes	6 minutes	7 minutes	8 minutes
Constant	46.243*** (0.396)	46.040*** (0.437)	46.323*** (0.312)	46.944*** (0.510)	46.216*** (0.943)	45.946*** (0.749)	46.039*** (0.466)	45.915*** (0.463)
N_rival(.)	3.333 (2.041)	-4.009 (2.940)	-1.418 (1.059)	0.199 (1.068)	-1.240* (0.733)	-1.017** (0.456)	-0.737*** (0.291)	-0.609*** (0.243)
N_own(.)	7.227* (3.768)	3.294 (3.114)	0.256 (1.370)	-1.516 (1.688)	0.733 (1.690)	1.038 (0.979)	0.800 (0.587)	0.767 (0.506)
N_own(.)²	-5.952 (4.341)	-0.269 (1.225)	0.393 (0.473)	0.446 (0.288)	0.076 (0.245)	-0.027 (0.114)	-0.028 (0.065)	-0.029 (0.046)
F(3,172)	3.30** (0.0217)	0.88 (0.4543)	2.27* (0.0817)	3.34** (0.0206)	2.64* (0.0509)	3.20** (0.0246)	3.94*** (0.0095)	5.26*** (0.0017)
Overidentification Hansen J Statistic	4.765 (0.3122)	2.733 (0.6035)	7.150 (0.1282)	9.370* (0.0525)	2.925 (0.5705)	4.052 (0.3991)	3.535 (0.4726)	4.575 (0.3338)

	9 minutes	10 minutes	11 minutes	12 minutes	13 minutes	14 minutes	15 minutes
Constant	45.671*** (0.464)	45.767*** (0.568)	45.628*** (0.589)	45.465*** (0.579)	45.292*** (0.766)	45.500*** (0.666)	45.456*** (0.676)
N_rival(.)	-0.364*** (0.115)	-0.327*** (0.093)	-0.294*** (0.075)	-0.257*** (0.074)	-0.256*** (0.069)	-0.203*** (0.051)	-0.176*** (0.044)
N_own(.)	0.689*** (0.262)	0.553** (0.237)	0.521*** (0.203)	0.494*** (0.156)	0.505*** (0.192)	0.383*** (0.134)	0.330*** (0.119)
N_own(.)²	-0.031 (0.021)	-0.021 (0.016)	-0.017 (0.012)	-0.015** (0.007)	-0.014* (0.007)	-0.009** (0.004)	-0.007** (0.003)
F(3,172)	8.18*** (0.0000)	7.59*** (0.0001)	8.42*** (0.0000)	7.64*** (0.0001)	5.6*** (0.0011)	6.42*** (0.0004)	6.18*** (0.0005)
Overidentification Hansen J Statistic	7.999* (0.0916)	9.210* (0.0561)	7.438 (0.1145)	6.849 (0.1441)	8.120* (0.0873)	8.390* (0.0783)	6.930 (0.1396)

Robust Standard Errors within parenthesis (* 10%, ** 5%, *** 1%).

As shown in the table above, almost all estimates are jointly significant at 1% and the instruments used are valid, as it indicates the Overidentification Hansen J Statistic³.

As expected, the effect of rivals on equilibrium prices is negative and statistically significant at 1% in most cases. Additionally, as the isochrones get larger the effect of an additional competitor is decreasing. This result shows that the effect of having a close competitor is larger than the effect of having it far away.

Additionally, having more outlets of the same brand around has a positive and significant impact on equilibrium prices. As the number of outlets increases, larger is the market power of a brand.

Using the estimates of the impact of rivals on equilibrium prices, we have computed the test of geographic hypothetical monopolist: we compute the likely mean increase in prices that would happen if a rival at different time distance is merged with the hypothetical monopolist. To do this once defined our objective function and estimated:

$$h(N_0^r, N_0^o, N_0^{o2}) = E(p | N_0^r, N_0^o, N_0^{o2}) \quad (6)$$

We get our best price prediction if we convert to own brand pumps all the rivals' gas stations:

$$\hat{h}(N_1^r = 0, N_1^o = N_0^o + N_0^r, N_1^{o2} = N_0^o * N_0^o) \quad (7)$$

In this way we can calculate the price increase that will occur when moving from the current balance to the hypothetical market monopolization when we define the market in the different forms:

³ For a deeply analysis about instruments see Staiger and Stock (1997) and Stock and Yogo (2002).

$$\Delta \hat{p}_1 = \frac{p_0 - \hat{h}(N_1^r = 0, N_1^o = N_0^o + N_0^r, N_1^{o2} = N_1^o * N_1^o)}{p_0} \quad (8)$$

Table 4 show the test results of simulates the prices under monopoly. Column 1 shows the average price existing in the market and column 2 presents the average price equilibrium if one firm monopolize the market. In the column 3 we present the effect of the monopolization in terms of percentage. It is clear that the market for which monopolization causes a Small (of 5%) but Significant and Non-transitory Increase in Prices (SSNIP) is the one defined by an isochrone of 5-6 minutes of distance time.

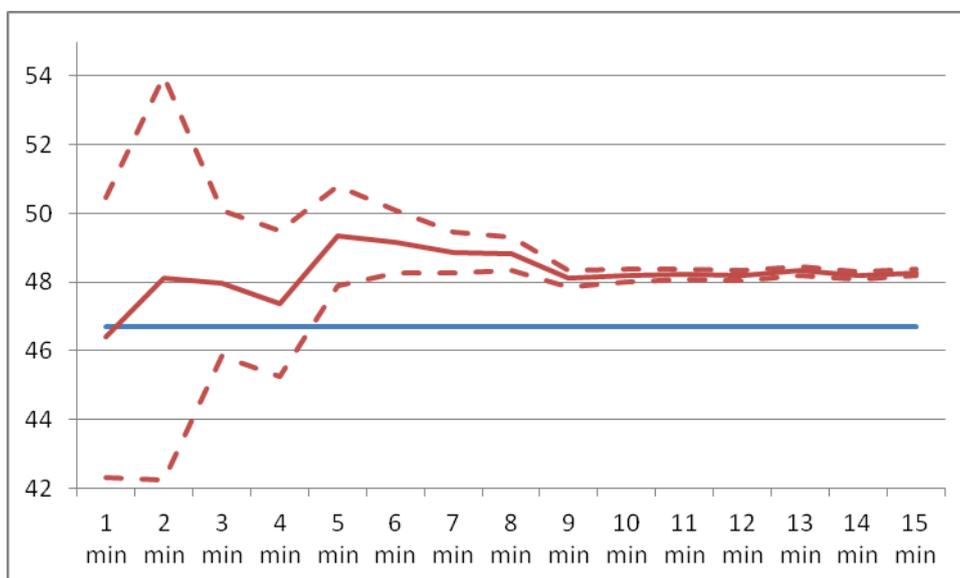
Table 4. Increase in prices by the hypothetical monopolist with MDI as pricing control

Minutes	1 Average price (cents of euro)	2 Simulate average price (cents of euro)	1/2 = 3 Relative price effect of monopolization (%)
1	46.70414	46.39005	-0.7
2	46.70414	48.12614	3.0
3	46.70414	47.96809	2.7
4	46.70414	47.37012	1.4
5	46.70414	49.34349	5.7
6	46.70414	49.16338	5.3
7	46.70414	48.86589	4.6
8	46.70414	48.84147	4.6
9	46.70414	48.10535	3.0
10	46.70414	48.17785	3.2
11	46.70414	48.2289	3.3
12	46.70414	48.17678	3.2
13	46.70414	48.32711	3.5
14	46.70414	48.1992	3.2
15	46.70414	48.2785	3.4

Source: Authors' calculations.

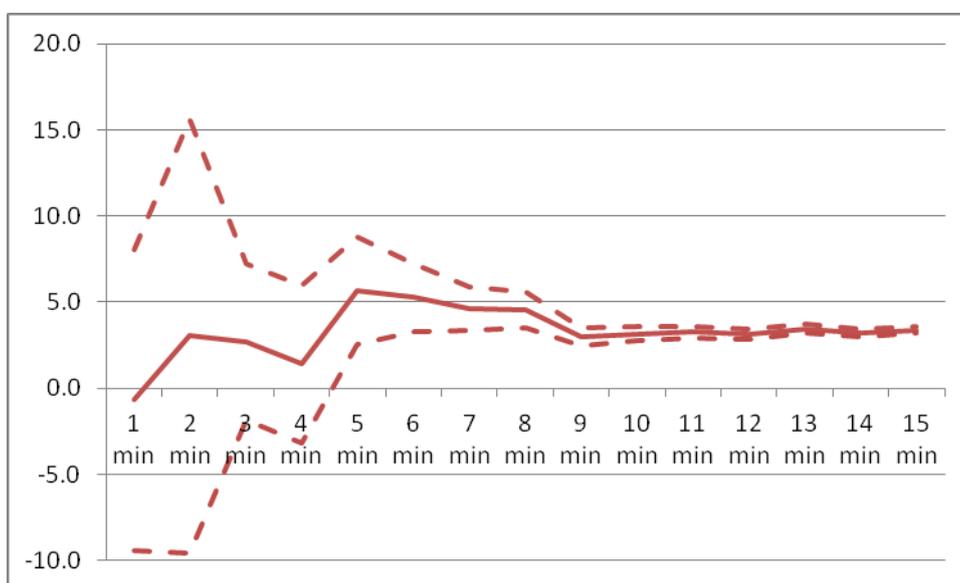
Graphs 1 and 2 show how the effect of monopolization is decreasing as the isochrone grows larger, and it crosses the 5% threshold in 5-6 minutes.

Graph 1. Increase in prices by the hypothetical monopolist in cents of euros (€)



Source: Authors' calculations.

Graph 2. Increase in prices by the hypothetical monopolist in percentage



Source: Authors' calculations.

This result has important policy implications both for the analysis of potential mergers and to implement measures to promote competition.

As regards the analysis of mergers results indicate that the relevant geographic market definition, which is essential to observe the evolution of concentration, must take into account the local nature of gasoline retailing market. Traditionally the definition of gasoline markets has been done ad-hoc and much larger sizes to the results obtained in this investigation. A relevant geographic market definition too wide may cause the actual effect of the merger is not appreciated.

As regards the measures to promote competition should affect the market structure within 5-6 minutes of movement and not across the board. To increase competition are two main measures to be implemented. First facilitating the entry of new operators within the markets of 5-6 minutes of movement of flags other than those already established. To facilitate the entrance you can identify and eliminate potential barriers to entry in the market. This entry would have a greater number of rivals which would increase the level of competition and reduce the level of prices in the market. Second, measures to facilitate the change of flag operators. If a market has more than one gas station with the same flag in 5-6 minutes of displacement change one flag would increase competition and reduce the price level.

In our empirical application of the 590 petrol stations in the sample, 228 do not have any competitor in 6 minutes of travel, allowing them to set prices significantly higher. The entry of new petrol stations of different flags, other than those already established, would increase competition and reduces the level of equilibrium prices. Among the 228 stations with no competitors, 114 stations have some petrol station of the same brand within 6 minutes of travel. For these 114 petrol stations, change the flag of one of them would cause an increased level of competition and reduce the equilibrium price.

5. Concluding remarks

Geographic market definitions in merger and entry regulations tends to be too large to take into account that competition is only effective if it is close enough. Traditional analysis of geographic markets has relied on techniques such as price correlations or chain of substitutions that are not able to spot how interaction among outlets is depleted by distance.

We conclude that geographic information systems can be very successfully used to define more precisely relevant geographic markets. In the case of the petrol stations, we show that relevant markets are those isochrones of only 5-6 minutes car travel around each petrol station. Within each isochrone, without competition it is easy to exert localised market power. Only drawing small enough isochrones will drive competition local markets in because it is just close rivals that compete effectively with each other.

This result may be useful for policymakers. First in merger cases the relevant geographic market definition is crucial. An excessively narrow or broad definition of the market can lead to not finding significant effects and take wrong decisions. Second, if the aim is to introduce measures to increase the level of competition in the markets must take into account the local nature of competition between gas stations. In this sense we conclude that the elimination of potential entry barriers can facilitate the market entry of new operators within 5-6 minutes away, cause an increased level of competition and therefore a reduction in the equilibrium prices. Obtaining lower equilibrium prices can not only get through the entry of more operators. Measures to help retailers that change brand, can also cause an increased level of competition.

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Alcañiz, M. (RISC-IREA); **Costa, A.**; **Guillén, M.** (RISC-IREA); **Luna, C.**; **Rovira, C.**

"Calculation of the variance in surveys of the economic climate"
(Novembre 2006)

CREAP2006-07

Albalade, D. (PPRE-IREA)

"Lowering blood alcohol content levels to save lives: The European Experience"
(Desembre 2006)

CREAP2006-08

Garrido, A. (IEB); **Arqué, P.** (IEB)

"The choice of banking firm: Are the interest rate a significant criteria?"
(Desembre 2006)



CREAP2006-09

Segarra, A. (GRIT); Teruel-Carrizosa, M. (GRIT)

"Productivity growth and competition in spanish manufacturing firms:

What has happened in recent years?"

(Desembre 2006)

CREAP2006-10

Andonova, V.; Díaz-Serrano, Luis. (CREB)

"Political institutions and the development of telecommunications"

(Desembre 2006)

CREAP2006-11

Raymond, J.L.(GEAP); Roig, J.L.. (GEAP)

"Capital humano: un análisis comparativo Catalunya-España"

(Desembre 2006)

CREAP2006-12

Rodríguez, M.(CREB); Stoyanova, A. (CREB)

"Changes in the demand for private medical insurance following a shift in tax incentives"

(Desembre 2006)

CREAP2006-13

Royuela, V. (AQR-IREA); Lambiri, D.; Biagi, B.

"Economía urbana y calidad de vida. Una revisión del estado del conocimiento en España"

(Desembre 2006)

CREAP2006-14

Camarero, M.; Carrion-i-Silvestre, J.LL. (AQR-IREA); Tamarit, C.

"New evidence of the real interest rate parity for OECD countries using panel unit root tests with breaks"

(Desembre 2006)

CREAP2006-15

Karanassou, M.; Sala, H. (GEAP); Snower, D. J.

"The macroeconomics of the labor market: Three fundamental views"

(Desembre 2006)



2007

XREAP2007-01

Castany, L (AQR-IREA); **López-Bazo, E.** (AQR-IREA); **Moreno, R.** (AQR-IREA)

"Decomposing differences in total factor productivity across firm size"

(Març 2007)

XREAP2007-02

Raymond, J. Ll. (GEAP); **Roig, J. Ll.** (GEAP)

"Una propuesta de evaluación de las externalidades de capital humano en la empresa"

(Abril 2007)

XREAP2007-03

Durán, J. M. (IEB); **Esteller, A.** (IEB)

"An empirical analysis of wealth taxation: Equity vs. Tax compliance"

(Juny 2007)

XREAP2007-04

Matas, A. (GEAP); **Raymond, J.Ll.** (GEAP)

"Cross-section data, disequilibrium situations and estimated coefficients: evidence from car ownership demand"

(Juny 2007)

XREAP2007-05

Jofre-Montseny, J. (IEB); **Solé-Ollé, A.** (IEB)

"Tax differentials and agglomeration economies in intraregional firm location"

(Juny 2007)

XREAP2007-06

Álvarez-Albelo, C. (CREB); **Hernández-Martín, R.**

"Explaining high economic growth in small tourism countries with a dynamic general equilibrium model"

(Juliol 2007)

XREAP2007-07

Duch, N. (IEB); **Montolio, D.** (IEB); **Mediavilla, M.**

"Evaluating the impact of public subsidies on a firm's performance: a quasi-experimental approach"

(Juliol 2007)

XREAP2007-08

Segarra-Blasco, A. (GRIT)

"Innovation sources and productivity: a quantile regression analysis"

(Octubre 2007)



XREAP2007-09

Albalate, D. (PPRE-IREA)

“Shifting death to their Alternatives: The case of Toll Motorways”
(Octubre 2007)

XREAP2007-10

Segarra-Blasco, A. (GRIT); **Garcia-Quevedo, J.** (IEB); **Teruel-Carrizosa, M.** (GRIT)

“Barriers to innovation and public policy in catalonia”
(Novembre 2007)

XREAP2007-11

Bel, G. (PPRE-IREA); **Foote, J.**

“Comparison of recent toll road concession transactions in the United States and France”
(Novembre 2007)

XREAP2007-12

Segarra-Blasco, A. (GRIT);

“Innovation, R&D spillovers and productivity: the role of knowledge-intensive services”
(Novembre 2007)

XREAP2007-13

Bermúdez Morata, Ll. (RFA-IREA); **Guillén Estany, M.** (RFA-IREA), **Solé Auró, A.** (RFA-IREA)

“Impacto de la inmigración sobre la esperanza de vida en salud y en discapacidad de la población española”
(Novembre 2007)

XREAP2007-14

Calaeys, P. (AQR-IREA); **Ramos, R.** (AQR-IREA), **Suriñach, J.** (AQR-IREA)

“Fiscal sustainability across government tiers”
(Desembre 2007)

XREAP2007-15

Sánchez Hugalbe, A. (IEB)

“Influencia de la inmigración en la elección escolar”
(Desembre 2007)



2008

XREAP2008-01

Durán Weitkamp, C. (GRIT); Martín Bofarull, M. (GRIT) ; Pablo Martí, F.
“Economic effects of road accessibility in the Pyrenees: User perspective”
(Gener 2008)

XREAP2008-02

Díaz-Serrano, L.; Stoyanova, A. P. (CREB)
“The Causal Relationship between Individual’s Choice Behavior and Self-Reported Satisfaction: the Case of Residential Mobility in the EU”
(Març 2008)

XREAP2008-03

Matas, A. (GEAP); Raymond, J. L. (GEAP); Roig, J. L. (GEAP)
“Car ownership and access to jobs in Spain”
(Abril 2008)

XREAP2008-04

Bel, G. (PPRE-IREA) ; Fageda, X. (PPRE-IREA)
“Privatization and competition in the delivery of local services: An empirical examination of the dual market hypothesis”
(Abril 2008)

XREAP2008-05

Matas, A. (GEAP); Raymond, J. L. (GEAP); Roig, J. L. (GEAP)
“Job accessibility and employment probability”
(Maig 2008)

XREAP2008-06

Basher, S. A.; Carrión, J. Ll. (AQR-IREA)
Deconstructing Shocks and Persistence in OECD Real Exchange Rates
(Juny 2008)

XREAP2008-07

Sanromá, E. (IEB); Ramos, R. (AQR-IREA); Simón, H.
Portabilidad del capital humano y asimilación de los inmigrantes. Evidencia para España
(Juliol 2008)

XREAP2008-08

Basher, S. A.; Carrión, J. Ll. (AQR-IREA)
Price level convergence, purchasing power parity and multiple structural breaks: An application to US cities
(Juliol 2008)

XREAP2008-09

Bermúdez, Ll. (RFA-IREA)
A priori ratemaking using bivariate poisson regression models
(Juliol 2008)



XREAP2008-10

Solé-Ollé, A. (IEB), **Hortas Rico, M.** (IEB)

Does urban sprawl increase the costs of providing local public services? Evidence from Spanish municipalities

(Novembre 2008)

XREAP2008-11

Teruel-Carrizosa, M. (GRIT), **Segarra-Blasco, A.** (GRIT)

Immigration and Firm Growth: Evidence from Spanish cities

(Novembre 2008)

XREAP2008-12

Duch-Brown, N. (IEB), **García-Quevedo, J.** (IEB), **Montolio, D.** (IEB)

Assessing the assignation of public subsidies: Do the experts choose the most efficient R&D projects?

(Novembre 2008)

XREAP2008-13

Bilokach, V., **Fageda, X.** (PPRE-IREA), **Flores-Fillol, R.**

Scheduled service versus personal transportation: the role of distance

(Desembre 2008)

XREAP2008-14

Albalate, D. (PPRE-IREA), **Gel, G.** (PPRE-IREA)

Tourism and urban transport: Holding demand pressure under supply constraints

(Desembre 2008)



2009

XREAP2009-01

Calonge, S. (CREB); Tejada, O.

“A theoretical and practical study on linear reforms of dual taxes”
(Febrer 2009)

XREAP2009-02

Albalate, D. (PPRE-IREA); Fernández-Villadangos, L. (PPRE-IREA)

“Exploring Determinants of Urban Motorcycle Accident Severity: The Case of Barcelona”
(Març 2009)

XREAP2009-03

Borrell, J. R. (PPRE-IREA); Fernández-Villadangos, L. (PPRE-IREA)

“Assessing excess profits from different entry regulations”
(Abril 2009)

XREAP2009-04

Sanromá, E. (IEB); Ramos, R. (AQR-IREA), Simon, H.

“Los salarios de los inmigrantes en el mercado de trabajo español. ¿Importa el origen del capital humano?”
(Abril 2009)

XREAP2009-05

Jiménez, J. L.; Perdiguero, J. (PPRE-IREA)

“(No)competition in the Spanish retailing gasoline market: a variance filter approach”
(Maig 2009)

XREAP2009-06

Álvarez-Albelo, C. D. (CREB), Manresa, A. (CREB), Pigem-Vigo, M. (CREB)

“International trade as the sole engine of growth for an economy”
(Juny 2009)

XREAP2009-07

Callejón, M. (PPRE-IREA), Ortún V, M.

“The Black Box of Business Dynamics”
(Setembre 2009)

XREAP2009-08

Lucena, A. (CREB)

“The antecedents and innovation consequences of organizational search: empirical evidence for Spain”
(Octubre 2009)

XREAP2009-09

Domènech Campmajó, L. (PPRE-IREA)

“Competition between TV Platforms”
(Octubre 2009)



XREAP2009-10

Solé-Auró, A. (RFA-IREA), **Guillén, M.** (RFA-IREA), **Crimmins, E. M.**

“Health care utilization among immigrants and native-born populations in 11 European countries. Results from the Survey of Health, Ageing and Retirement in Europe”

(Octubre 2009)

XREAP2009-11

Segarra, A. (GRIT), **Teruel, M.** (GRIT)

“Small firms, growth and financial constraints”

(Octubre 2009)

XREAP2009-12

Matas, A. (GEAP), **Raymond, J.Ll.** (GEAP), **Ruiz, A.** (GEAP)

“Traffic forecasts under uncertainty and capacity constraints”

(Novembre 2009)

XREAP2009-13

Sole-Ollé, A. (IEB)

“Inter-regional redistribution through infrastructure investment: tactical or programmatic?”

(Novembre 2009)

XREAP2009-14

Del Barrio-Castro, T., **García-Quevedo, J.** (IEB)

“The determinants of university patenting: Do incentives matter?”

(Novembre 2009)

XREAP2009-15

Ramos, R. (AQR-IREA), **Suriñach, J.** (AQR-IREA), **Artís, M.** (AQR-IREA)

“Human capital spillovers, productivity and regional convergence in Spain”

(Novembre 2009)

XREAP2009-16

Álvarez-Albelo, C. D. (CREB), **Hernández-Martín, R.**

“The commons and anti-commons problems in the tourism economy”

(Desembre 2009)



2010

XREAP2010-01

García-López, M. A. (GEAP)

“The Accessibility City. When Transport Infrastructure Matters in Urban Spatial Structure”

(Febrer 2010)

XREAP2010-02

García-Quevedo, J. (IEB), **Mas-Verdú, F.** (IEB), **Polo-Otero, J.** (IEB)

“Which firms want PhDs? The effect of the university-industry relationship on the PhD labour market”

(Març 2010)

XREAP2010-03

Pitt, D., Guillén, M. (RFA-IREA)

“An introduction to parametric and non-parametric models for bivariate positive insurance claim severity distributions”

(Març 2010)

XREAP2010-04

Bermúdez, Ll. (RFA-IREA), **Karlis, D.**

“Modelling dependence in a ratemaking procedure with multivariate Poisson regression models”

(Abril 2010)

XREAP2010-05

Di Paolo, A. (IEB)

“Parental education and family characteristics: educational opportunities across cohorts in Italy and Spain”

(Maig 2010)

XREAP2010-06

Simón, H. (IEB), **Ramos, R.** (AQR-IREA), **Sanromá, E.** (IEB)

“Movilidad ocupacional de los inmigrantes en una economía de bajas cualificaciones. El caso de España”

(Juny 2010)

XREAP2010-07

Di Paolo, A. (GEAP & IEB), **Raymond, J. Ll.** (GEAP & IEB)

“Language knowledge and earnings in Catalonia”

(Juliol 2010)

XREAP2010-08

Bolancé, C. (RFA-IREA), **Alemany, R.** (RFA-IREA), **Guillén, M.** (RFA-IREA)

“Prediction of the economic cost of individual long-term care in the Spanish population”

(Setembre 2010)

XREAP2010-09

Di Paolo, A. (GEAP & IEB)

“Knowledge of catalan, public/private sector choice and earnings: Evidence from a double sample selection model”

(Setembre 2010)



XREAP2010-10

Coad, A., Segarra, A. (GRIT), Teruel, M. (GRIT)
“Like milk or wine: Does firm performance improve with age?”
(Setembre 2010)

XREAP2010-11

Di Paolo, A. (GEAP & IEB), Raymond, J. Ll. (GEAP & IEB), Calero, J. (IEB)
“Exploring educational mobility in Europe”
(Octubre 2010)

XREAP2010-12

Borrell, A. (GiM-IREA), Fernández-Villadangos, L. (GiM-IREA)
“Clustering or scattering: the underlying reason for regulating distance among retail outlets”
(Desembre 2010)

XREAP2010-13

Di Paolo, A. (GEAP & IEB)
“School composition effects in Spain”
(Desembre 2010)

XREAP2010-14

Fageda, X. (GiM-IREA), Flores-Fillol, R.
“Technology, Business Models and Network Structure in the Airline Industry”
(Desembre 2010)

XREAP2010-15

Albalate, D. (GiM-IREA), Bel, G. (GiM-IREA), Fageda, X. (GiM-IREA)
“Is it Redistribution or Centralization? On the Determinants of Government Investment in Infrastructure”
(Desembre 2010)

XREAP2010-16

Oppedisano, V., Turati, G.
“What are the causes of educational inequalities and of their evolution over time in Europe? Evidence from PISA”
(Desembre 2010)

XREAP2010-17

Canova, L., Vaglio, A.
“Why do educated mothers matter? A model of parental help”
(Desembre 2010)



2011

XREAP2011-01

Fageda, X. (GiM-IREA), **Perdiguero, J.** (GiM-IREA)

“An empirical analysis of a merger between a network and low-cost airlines”

(Maig 2011)

XREAP2011-02

Moreno-Torres, I. (ACCO, CRES & GiM-IREA)

“What if there was a stronger pharmaceutical price competition in Spain? When regulation has a similar effect to collusion”

(Maig 2011)

XREAP2011-03

Miguélez, E. (AQR-IREA); **Gómez-Miguélez, I.**

“Singling out individual inventors from patent data”

(Maig 2011)

XREAP2011-04

Moreno-Torres, I. (ACCO, CRES & GiM-IREA)

“Generic drugs in Spain: price competition vs. moral hazard”

(Maig 2011)

XREAP2011-05

Nieto, S. (AQR-IREA), **Ramos, R.** (AQR-IREA)

“¿Afecta la sobreeducación de los padres al rendimiento académico de sus hijos?”

(Maig 2011)

XREAP2011-06

Pitt, D., Guillén, M. (RFA-IREA), **Bolancé, C.** (RFA-IREA)

“Estimation of Parametric and Nonparametric Models for Univariate Claim Severity Distributions - an approach using R”

(Juny 2011)

XREAP2011-07

Guillén, M. (RFA-IREA), **Comas-Herrera, A.**

“How much risk is mitigated by LTC Insurance? A case study of the public system in Spain”

(Juny 2011)

XREAP2011-08

Ayuso, M. (RFA-IREA), **Guillén, M.** (RFA-IREA), **Bolancé, C.** (RFA-IREA)

“Loss risk through fraud in car insurance”

(Juny 2011)

XREAP2011-09

Duch-Brown, N. (IEB), **García-Quevedo, J.** (IEB), **Montolio, D.** (IEB)

“The link between public support and private R&D effort: What is the optimal subsidy?”

(Juny 2011)



XREAP2011-10

Bermúdez, Ll. (RFA-IREA), **Karlis, D.**

“Mixture of bivariate Poisson regression models with an application to insurance”
(Juliol 2011)

XREAP2011-11

Varela-Irimia, X-L. (GRIT)

“Age effects, unobserved characteristics and hedonic price indexes: The Spanish car market in the 1990s”
(Agost 2011)

XREAP2011-12

Bermúdez, Ll. (RFA-IREA), **Ferri, A.** (RFA-IREA), **Guillén, M.** (RFA-IREA)

“A correlation sensitivity analysis of non-life underwriting risk in solvency capital requirement estimation”
(Setembre 2011)

XREAP2011-13

Guillén, M. (RFA-IREA), **Pérez-Marín, A.** (RFA-IREA), **Alcañiz, M.** (RFA-IREA)

“A logistic regression approach to estimating customer profit loss due to lapses in insurance”
(Octubre 2011)

XREAP2011-14

Jiménez, J. L., Perdiguero, J. (GiM-IREA), **García, C.**

“Evaluation of subsidies programs to sell green cars: Impact on prices, quantities and efficiency”
(Octubre 2011)

XREAP2011-15

Arespa, M. (CREB)

“A New Open Economy Macroeconomic Model with Endogenous Portfolio Diversification and Firms Entry”
(Octubre 2011)

XREAP2011-16

Matas, A. (GEAP), **Raymond, J. L.** (GEAP), **Roig, J.L.** (GEAP)

“The impact of agglomeration effects and accessibility on wages”
(Novembre 2011)

XREAP2011-17

Segarra, A. (GRIT)

“R&D cooperation between Spanish firms and scientific partners: what is the role of tertiary education?”
(Novembre 2011)

XREAP2011-18

García-Pérez, J. I.; Hidalgo-Hidalgo, M.; Robles-Zurita, J. A.

“Does grade retention affect achievement? Some evidence from PISA”
(Novembre 2011)

XREAP2011-19

Arespa, M. (CREB)

“Macroeconomics of extensive margins: a simple model”
(Novembre 2011)



XREAP2011-20

García-Quevedo, J. (IEB), **Pellegrino, G.** (IEB), **Vivarelli, M.**

“The determinants of YICs’ R&D activity”

(Desembre 2011)

XREAP2011-21

González-Val, R. (IEB), **Olmo, J.**

“Growth in a Cross-Section of Cities: Location, Increasing Returns or Random Growth?”

(Desembre 2011)

XREAP2011-22

Gombau, V. (GRIT), **Segarra, A.** (GRIT)

“The Innovation and Imitation Dichotomy in Spanish firms: do absorptive capacity and the technological frontier matter?”

(Desembre 2011)



2012

XREAP2012-01

Borrell, J. R. (GiM-IREA), **Jiménez, J. L.**, **García, C.**

“Evaluating Antitrust Leniency Programs”

(Gener 2012)

XREAP2012-02

Ferri, A. (RFA-IREA), **Guillén, M.** (RFA-IREA), **Bermúdez, Ll.** (RFA-IREA)

“Solvency capital estimation and risk measures”

(Gener 2012)

XREAP2012-03

Ferri, A. (RFA-IREA), **Bermúdez, Ll.** (RFA-IREA), **Guillén, M.** (RFA-IREA)

“How to use the standard model with own data”

(Febrer 2012)

XREAP2012-04

Perdiguero, J. (GiM-IREA), **Borrell, J.R.** (GiM-IREA)

“Driving competition in local gasoline markets”

(Març 2012)



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