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FUEL PRICES AT PETROL STATIONS IN TOURISTIC CITIES

Abstract

While it may seem obvious from common sense that retail fuel prices should be higher in touristic rather than in non-touristic cities, the related empirical literature has failed either to clearly support this assumption or to qualify and quantify the effect of tourism on retail fuel prices. Using a self-created dataset that includes prices across a large sample of petrol stations located in mainland Spain and the Balearic Islands, we seek to evaluate the effects of tourism on local destination retail petrol prices. The estimations prove three main effects: petrol prices are higher in cities with high levels of tourism, nearby beaches, and/or with the socio-economic influence of a National Park. In fact petrol stations add a margin of around 6.6% and 6.4% for unleaded gasoline 95 and diesel, respectively, in touristic cities. Secondly, the more touristic the city, the higher these prices. Third, in the case of touristic municipalities, the percentage of travelers from abroad and being within the area of influence of a National Park are two of the main drivers that explain this overpricing.

Keywords: petrol market; touristic cities; Spain.

JEL Codes: L13, L40, L83.

1. Introduction

Several authors have shown, both empirically and theoretically, that tourism specialization on the one hand is a key success factor for rapid economic growth (Brau et al. 2007) but, on the other, it may also lead to environmental degradation (Davies and Cahill, 2000, Giannoni and Maupertuis, 2007), thus possibly leading to the stagnation of the tourism destination (Lozano et al. 2008). Therefore in order to avoid or reduce the environmental cost associated with tourism it is necessary to adopt active public policies in the form of, for example, green tourism (Marsiglio, 2015) or controlling tourist flows (Marsiglio, 2017).

In this sense, it is worth noting that tourism is an energy-intensive activity and, to date, highly dependent on the use of fossil fuels, particularly oil. In terms of the relative contribution of the various inputs into tourism to the total consumption of oil, transport related to tourism is by far the largest consumer of oil (Gössling, 2002). Transport is an essential part of tourism either as a utilitarian means for the movement of tourists between origin and destination or within the destination; or as a key element of the tourist experience of travelling on a specific form of transport (Page, 2009).

The most significant forms of tourist transport are highly dependent on fuel consumption. This is the case for road transport, and particularly the car, which is currently the dominant mode of travel for domestic tourism, and also very important for short and medium haul international tourism (Prideaux and Carson, 2003, Connell and Page, 2008).[1] In Spain, for example, the number of tourists who used the car as a means of transport to domestic destinations accounted for nearly 84% (11.71 million trips) of the total number of trips in 2014.[2] Further, a large number of international tourists arrive to Spain by road; representing over 11.9 million tourists in 2014, which accounted for 18.4% of the total.[3] To these, we should also add those tourists who use another mode of transport, but when they arrive at a particular place, they hire a car to move around, or within, their destinations. Indeed, the literature on the subject confirms that the primary mode of transport at tourist destinations is the car (Aguiló et al., 2012; Masiero and Zoltan, 2013).

Spanish tourist destinations are seriously affected by negative externalities generated by the use of cars to visit them, such as air pollution (Rendeiro and Ramírez, 2010; Saenz-de-Miera and Rosselló, 2014),[4] traffic and parking congestion (Saenz-de-Miera and Rosselló,

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[1] It is worth pointing out that recent fuel efficiency improvements have had unintended consequences on road transport leading to an increase in car use (Dimitropoulos et al., 2018) and the shift to bigger and heavier fuel-consuming cars for travelling (Matas et al., 2017); reducing the intended fuel consumption savings that should have arisen from technological progress. Further, the disruptive impact of electric vehicles on the automotive industry is still uncertain since most consumers consider the current electric vehicles unattractive due to their apparent poorer performance standards, regarding price, range or speed. Thus innovations in the automotive industry do not seem likely to significantly reduce road transport's fuel dependence, at least in the short- to medium-term.

[2] Data from the FAMILITUR survey, from the IET (Institute of Tourist Studies).

[3] Data from the FRONTUR survey, from the IET (Institute of Tourist Studies).

[4] There is serious and growing concern about global warming and the emission of "greenhouse gases"

2012; García-Hernández et al., 2017) or car accidents (Rosselló and Saenz-de-Miera, 2011). These problems call for policies to mitigate their effects and determine the extent to which they can be alleviated or even eliminated. A number of authors, including Bakhat and Rosselló (2013), Rendeiro (2015), Hernández and Corral (2016) and Cavallaro et al. (2017), have examined alternative strategies to tackle these negative effects.

In addition to these serious non-economic externalities, tourism also has negative economic externalities, including its incidence on price levels of products and services at host communities. Most studies of tourism that have empirically analyzed general price levels at tourist destinations have been based on surveys of residents' perceptions (see for example, Pizam, 1978; Liu and Var, 1986; Husbands, 1989; Haralambopoulos and Pizam, 1996; or Andereck et al., 2005). These studies indicate that residents perceive an increase in general prices for goods and services because of increases in tourism. While useful, the results obtained in such studies rely on those surveyed to state how tourism affects the prices of goods and services. Thus, it is difficult to know what the respondents' view of higher prices is, and specifically: higher price levels compared to where and to what?

An alternative and complementary approach is to collect data on the actual prices for various goods and services, from different locations and/or at different points of time, and to use this information to empirically estimate the effect of tourism on such prices. Espinet et al. (2011), Campos et al. (2013) and Tkalec and Vizek (2016) follow this approach. While Espinet et al. (2011) do not find significant differences in price levels between tourism and non-tourism jurisdictions, Campos et al. (2013) and Tkalec and Vizek (2016) provide evidence of higher prices in areas where tourism plays a significant role in the economy and especially in those sectors that are closely associated with tourism. However, none of these authors have analyzed the economic impact of tourism on retail fuel prices.

Taking into account the considerable number of tourists who use a car for travelling, it seems reasonable to assume that tourism generates significant additional demand for petrol at touristic destinations. Bakhat and Roselló-Nadal (2011), based on a case study of the Balearic Islands (Spain) and results of dynamic model simulations, estimate that a 10% increase in the tourist population would cause a similar increase of 3.4% in diesel or gasoline consumption during the high season; whilst increases in consumption for diesel and gasoline during the low season would be 1.3% and 1% respectively. Then it should be expected that the greater the number of tourists, and particularly self-drive tourists,[5] choosing a specific destination, the greater the demand for petrol at that destination.

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resulting from transport oil combustion which lead to global climate change (Becken, 2007, Peeters and Dubois, 2010). Davies and Cahill (2000) point out that much of tourism-related air pollution comes from related automobile travel, although is difficult to separate this amount from all automobile travel. A number of authors have proposed a change in the tax regime to discourage tourist activities that are harmful or particularly dangerous to the environment, including suggestions for higher road and air fuel taxation (see, for instance, Rothengatter, 2010 or Rendeiro, 2015).

[5] Self-drive tourism includes tourists using private and rental cars, and recreational vehicles. We argue that although not all tourists self-drive, tourism activities could be a factor that increases the cost of living in touristic destinations and, for this reason, petrol prices would be higher than in non-touristic municipalities. This is the specific relationship we seek to test.

In view of the significance and potential impact of tourists' car use for fuel prices at host communities, it is all the more surprising that the literature does not go into this matter in much depth. In fact, to our knowledge, only a few empirical studies have looked at tourism as an explanatory variable of fuel price levels (Crase and Jackson, 2000; Pennerstorfer and Weiss, 2013). Nevertheless, these papers do not provide conclusive evidence on the relationship between fuel prices and tourism.

Thus, it is necessary, firstly, to provide solid empirical research that clarifies the relationship between tourism and fuel prices, and validate what many would probably say that would be expected, most likely from own observation or perceptual experience, but not yet empirically demonstrated.

The purpose of this paper is to qualify and quantify the induced effect of tourism on the level of retail petrol prices in Spanish municipalities, and to highlight the characteristics of these touristic municipalities that explain price differences. We hypothesized that fuel prices would be higher in touristic municipalities than non-touristic. Further, we expected that the greater the tourism intensity, the higher the fuel prices. Moreover we consider potential differences between unleaded gasoline 95 and diesel prices.

It is worth noting that the present study is based on a very large sample of petrol stations across Spain (excluding the Canary Islands, Ceuta and Melilla). To this end, we previously geo-localized the sampled Spanish petrol stations so as to identify the municipality in which they are located. We then based our study upon a collected dataset over 2013 and 2014, with more than 3.5 million observations daily of diesel and unleaded gasoline 95 prices, and then we obtained an average price to implement a cross-section analysis[6]. As far as we know, this is the first study to provide strong evidence about the impact of tourism intensity on petrol prices at a local level.

From the point of view of consumers' economic welfare, it is important to assess the level of fuel prices at different municipalities since fuel expenditure constitutes a major budget item for many people who use car transport. Spanish households' motor fuel expenditure for the period 2006-2017 represents, on average, more than 2.5 per cent of their total expenditure.[7] Although unfortunately there is no data on this item by cities, previous percentage show the relevance of this expenditure. Fuel prices also impact the prices of all other commodities and services, and therefore the community inflation rate. Thus, if a positive relationship between tourism and fuel prices at local level is demonstrated, it could be said, in general terms, that the greater the intensity of tourism at a particular municipality, the lower the levels of consumers' economic welfare there. The antitrust authorities should be particularly concerned about significant differences among municipalities, mainly on the grounds of the importance of tourism in these local communities, since the ultimate objective of the competition rules is to ensure that consumers do not suffer from artificially high prices.

[6] The estimation of the panel data generates the same results. We prefer the estimation of the cross section specification because the explanatory variables do not change significantly during the period.

[7] Data from the Spanish Household Budget Survey from the INE.

Moreover, if our hypothesis is correct, then tourism, although it might seem paradoxical, would be contributing to further weakening one of the main factors of tourism competitiveness. Indeed, according to the results of the "Travel and Tourism Competitiveness Index" published by the World Economic Forum, tourism price competitiveness is one of the most persistent challenges that faces Spain, due in large part to the fact that its fuel prices are among the highest in the world.[8] Therefore, the characterization and quantification of tourism effects on retail fuel prices may provide an adequate basis for finding solutions to this Spanish challenge.

On the positive side, higher fuel prices at touristic municipalities could discourage car use, which would help to improve their environmental conditions. On the other hand alternative means of transport should be improved to maintain, in a sustainable manner, accessibility to their tourist attractions. This should include further adaptations and economic and technological improvements in order to make the necessary adjustments and transitions possible.

Following this introduction, section two includes a brief revision of the related literature. Section three provides an overview of the database and details all the variables we have considered in our analysis. Section four describes the empirical strategy to estimate the induced effects of tourism on diesel and gasoline prices in Spanish municipalities and highlights the results obtained in the analysis. Finally, conclusions are included in section five.

Our results reveal the effect of tourism on retail prices in the Spanish petrol market, i.e., the greater the importance of tourism, the higher the petrol prices. The percentage of travellers from abroad and the fact that the municipality belongs to the area of socio-economic influence of a National Park are the two main characteristics that explain this effect in touristic municipalities. In order to gain a better understanding of the potential sources of these effects, it is necessary to have regard to the demand and supply specific conditions in the Spanish retail fuel market, as we explain in the next section.

2. Literature review and research gap

There is a broad literature about the positive and negative effects of tourism on the host region or country (Archer et al., 2005). These impacts can be grouped into economic, social, cultural and environmental dimensions and several key outcomes have been identified. However, tourists' high level of oil dependence makes analysis of this relationship especially important.

Such dependence is very pronounced for the dominant modes of transport: air and road travel (Becken et al., 2003). Research on the relationship between tourism and oil is predominantly concerned with the implications of increasing oil prices, along with the

[8] For instance, in 2017 Spain ranked 98th out of 136 countries in fuel price levels (World Economic Forum, 2017).

peaking of oil production, for tourism. Studies on this latter issue highlight the risks associated with 'peak oil', and call for consensus policies on the overall strategy designed to make progress in the transition to less oil-intensive tourism (Becken, 2011).

The outcomes of this important research stream that analyzes the impact of petrol prices on travel behavior are extensive. Corsi and Harvey (1979) and Dan Kamp et al. (1979) point out that higher fuel prices and/or fuel rationing makes people react by shortening their vacations, including possibly cancelling those trips. Similar results have been obtained by other studies in terms of travel time expenditure by car, because travelers would prefer to drive less when faced with increasing fuel prices (Trent and Pollard, 1983, Becken and Schiff, 2011, Yang and Timmermans, 2013). Additionally, the most distant tourism destinations are most likely to be adversely affected by rising oil prices (Lennox, 2012).

Within this research branch, several studies have also focused on travel decisions to visit US national or state parks and find a negative relationship with gasoline prices (Johnson and Suits, 1983, Morgan, 1986). The magnitude of the effects may depend on other explanatory variables such as experience use history, substitutability of the resource and activity, income (Oh and Hammit, 2011, Nerg et al. 2012) or the type of recreational activities in which visitors are involved (Cho et al., 2014).

Some empirical studies have concentrated on the effects of gasoline prices on the demand for a specific travel-related service. Among them are those that demonstrate a significant negative relationship between gasoline prices and the demand for branded hotels within the US (Canina et al. 2003, Walsh et al., 2004).

Other studies address the impact of gasoline price on the amount and composition of visitors' travel expenditure. Steinnes (1988) found a significant negative relationship between monthly tourism expenditures in the city of Duluth (Minnesota), and lagged fuel prices. Bonn and Cho (2012) analyze the spending behavior of auto visitors to the US state of Florida and how they allocate their budgets across different travel-related goods and services in response to increases in gasoline prices. In a more recent study, Bonn et al. (2017) examine the travel expenditure and behavior of in-state and out-of-state auto visitors to Florida, but only for a period characterized by a decrease in gasoline prices. Their results highlight the fact that lower gasoline prices allow auto visitors to experience a greater number of activities that contribute to supporting the local economy through the consequential additional spending on these activities.

Research gap

As stated above, while most studies have focused on the effects of petrol prices on tourists' travel or expenditure patterns, to our knowledge, few papers have analyzed this relationship from the reverse perspective of the effects of tourism on oil or, more specifically, on petrol retail prices.

Crase and Jackson (2000) study retail prices for a set of products in a seasonal tourism destination in Australia. They consider the number of tickets sales at the major tourist attraction as a proxy of the number of visitors. They find a weakly significant positive

correlation between the mean petrol price for four fuel outlets and the number of visitors. Owing to the reduced and restricted nature of their sample, which suffers from a significant number of limitations, the results they obtained could not be extrapolated to other tourism destinations.

Pennerstorfer and Weiss (2013) focus on a sample of gasoline stations located in Austrian municipalities. Their results show that the effect of the share of tourists in the municipality - measured by the ratio of monthly number of tourists' overnight stays to the number of inhabitants in the municipality - on the price of diesel at the gasoline station is not statistically significant, and in the only estimation where this variable shows statistical significance, the impact is negative.

Both previous works draw upon the results put forward by search-theoretic models (see Anderson and Renault, 2018 for a survey of this literature on prices and search costs) and test the hypothesis of a positive relationship between equilibrium prices and consumer search costs. Basically, according to these theoretical models, there exist two types of consumers in the market: informed and uninformed consumers, called "natives" and "tourists" in this literature's terminology. The original terms "natives" and "tourists" are not intended to be taken literally, but as a way of representing the idea that some consumers (natives) know more about some particular issues than others (tourists) and therefore face a lower search cost. The search cost heterogeneity could lead to price dispersion that is reflected in the existence of a share of firms that would specialize in setting low prices, and would be found by lucky "tourists" and all "natives" (also called shoppers), while other firms would specialize in setting high prices, and serving those unlucky "tourists" who come across them first, and for whom search costs are too high to contemplate seeking a lower price.

Following this theoretical prediction, in retail fuel markets, locals are usually more aware than tourists of where to find petrol stations with lower prices, and how to enjoy special discounts and benefits which, in addition, are mostly only available for the country's residents.[9] Moreover, it is generally accepted that tourists are less willing to invest time looking to reduce their costs than local residents. That is because 'search time' implies incurring a significant opportunity cost in terms of tourists' limited leisure time. This would indicate that this specific demand is likely to suffer more acutely from low price sensitivity than the general demand for petrol. Bakhat and Roselló's (2013) analysis assessing the consequences of a seasonal road fuel tax deserves particular attention. These authors, using time series models, estimate price elasticities of the demand for diesel oil and gasoline in the Balearic Islands (Spain). Their results indicate that tourist fuel demand is less sensitive to fuel price changes than resident demand.

It should be recognized that the latest webpages and apps for price searching tend to narrow the search cost differences on fuel prices among locals and tourists, albeit taking account of the aforementioned and intrinsic tourists' opportunity cost, these differences may not be completely removed. In fact, given that petrol stations could benefit by raising

[9] We acknowledge one referee for suggesting this specific question to us.

fuel prices above competitive levels if consumers bore a price search cost, it stands to reason that these firms might have incentives to obfuscate, or make price search harder (see Ellison and Ellison, 2018).[10] This begs the question of whether a higher proportion of tourists, being those most likely to face higher search costs, in a particular locality, would result in a larger number of petrol stations in that locality setting high fuel prices, which would entail a higher average fuel price there than in other localities with a lower proportion of tourists.

As already noted, the previous two works do not support the existence of a clear and positive relationship between fuel prices and tourism importance. We seek to test this hypothesis but, unlike the previous studies, we consider a larger sample size of municipalities, which increase the level of confidence of our sample estimates. Our model takes into account several variables to represent tourism's relevance in the sample municipalities. Based on the information available at municipal level, we also aim to identify the main features of touristic municipalities that might explain the potential overpricing. For instance, since it may be reasonably assumed that search costs are more marked for inbound tourists than domestic tourists,[11] we test if a greater proportion of tourists from abroad over the total number of tourists may have an even more significant and positive impact on fuel prices in touristic municipalities. As far as we know, there are no empirical studies that analyze these questions.

The effect of tourism induced-demand for petrol on retail petrol prices is important not only for tourists' budgets and travel patterns, as the above-mentioned literature highlights, but to the whole economy of the host destination (tourists and residents). High petrol prices lead to high prices for other goods because of an increase in the corresponding transport costs, which means an increase in the cost of living. Of course, there are ways locals may offset tourism's effects on fuel prices but these ways are more likely to exist when local businesses are willing to provide attractive prices and conditions to buy fuel from an own distributor, or a partner sharing this commercial strategy, which may give support to local economies in avoiding high fuel prices. However, little involvement from local businesses in this strategy would lead to consumers' alternatives being restricted still further, and increase the need for locals to adapt to tourism's negative impacts on prices and probably have to travel farther to find better prices.

As regards the response of firms to fuel demand specific conditions, the level of competition that these firms face in these markets plays a crucial role. Several studies in the academic literature, globally as well as in Spain, have tackled the question as to whether petrol prices reflect a competitive or a collusive outcome. The latter is the most common (see Eckert, 2013, for a survey of empirical approaches applied to this sector).

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[10] Moreover, according to some recent studies, it seems that lowering consumer search cost may not lead to lower fuel prices (See Dewenter et al., 2017; and Nishida and Remer, 2018).

[11] Indeed, Crase and Jackson (2000) point out as one of the shortcomings of their study that could explain the weak empirical evidence they obtain is the predominance of domestic tourists in their sample. They state that "put simply, domestic tourists are familiar with domestic prices and this knowledge may act as a constraint on monopoly power".

Since Spain liberalized its retail petrol market twenty years ago, the inquiries conducted by the antitrust authorities and sector regulators, supported by findings in the academic literature, show that effective competition levels have remained very low (see Perdiguero, 2010; CNC, 2012; OECD, 2013; or Perdiguero and Borrell, 2018). So it would be necessary to ascertain whether tourism-induced increases in the demand for petrol results in enhancing the already existing market power of petrol stations and consequently if all consumers in these tourist destinations would find themselves facing higher petrol prices, and see their welfare reduced.

Solid empirical evidence of higher fuel average prices in touristic communities would enable us to state that there are more petrol stations fixing high prices in those communities than in non-touristic ones. Furthermore, the finding of a lower fuel price dispersion within touristic communities could be suggesting more collusive behaviour.

Until the day when road transport become no longer dependent on fuel consumption, the fact that more locals and/or tourists have to travel long distances to reach a petrol station selling at low prices for refuelling, simply because they live or stay at a touristic community, should not be dismissed and should not lead us to accept it as a normal situation. Therefore the assessment of the actual differences in fuel prices between touristic and non-touristic destinations is crucially relevant not only for consumers but also for authorities responsible for public policies that promote solutions to this problem.

3. Database

The empirical analysis carried out in this paper is based upon a price dataset (the endogenous variable) collected from the website of the Spanish Ministry of Industry, Energy and Tourism. It includes a very large sample of petrol stations located in Mainland Spain and the Balearic Islands. Specifically we include information relating to 70% of total diesel prices and 82% of unleaded petrol prices in Spain. These percentages confirm that it is a representative sample.

We calculate the average price between 2013 and 2014 (excluding weekends). This average price contains more than seven thousand observations of diesel and unleaded gasoline 95 daily prices. This cross-section approach is appropriate because municipalities and petrol stations did not change their characteristics over these two years.

Due to our analytical focus on local price effects, La Caixa's Economic Yearbook (*Anuario Económico de La Caixa*) has been selected to provide other explanatory variables. This statistical source provided information about population, vehicles and other local characteristics. It also included a local tourism indicator, which measures the municipality's percentage contribution to the tourism subsection of the national trade tax revenues (*Impuesto de actividades económicas* — IAE) for the year 2005 and 2011.

We use the latest year, although it remains invariable across these two periods. It is important to highlight that although municipal touristic data and petrol prices are not contemporaneous (that is due to there not being recent updates of municipal data in Spain),

data remained stable from 2005 to 2011. For this reason we assume the status quo; a plausible assumption.

The IAE for tourism-related businesses in Spain is determined by three variables: the number of tourist beds, average annual occupation and the category of the establishment. Thus, the amounts originating from each municipality can be used as a proxy for the local tourism supply.

We use the empirical strategy provided by Voltes-Dorta et al (2014), who split their sample into two groups according to the level of tourism specialization. They defined a relative ratio that takes into account both economic and touristic activities for each municipality regarding national average level.

Previous literature on related topics has employed these types of location quotients (*LQ*) in order to identify those regions with above-average concentration of tourism activity (e.g. Thompson, 2007; Gülcan et al., 2009). While detailed data on jobs, hotel beds, or similar variables used in some papers are not available in Spain at municipal level for the whole sample, we can compute a fiscal revenue quotient of municipal tourism intensity (*LQtur*) as follows:

$$LQtur = \frac{\dfrac{\text{local tourism revenue}}{\text{national tourism revenue}}}{\dfrac{\text{local total revenue}}{\text{national total revenue}}} = \frac{\dfrac{\text{local tourism revenue}}{\text{local total revenue}}}{\dfrac{\text{national tourism revenue}}{\text{national total revenue}}} \qquad [1]$$

This variable is calculated as a ratio between the contribution of each municipality to the tourism subsection of IAE tax, and the contribution of all businesses in the municipality to the total national IAE revenue. So it compares the relevance of tourism within each local economic structure with that of the tourism industry at national level.

Other variables considered in the empirical strategy explained below are:

- *Price*$_{im}$.- average price for diesel and unleaded gasoline 95 at petrol station *i* , located at municipality *m*, in daily prices for years 2013 and 2014. Source: own compilation from the official website of the Ministry of Industry, Energy and Tourism of Spain.[12]
- *Touristic municipality*$_m$.- we consider a touristic town to be those where the *LQtur* ratio is higher than 1, i.e., when it exhibits a level of tourism intensity above the national average (this is explained in more detail below). Those municipalities with *LQtur* equal or under 1 are labeled as non-touristic (as in Voltes-Dorta et al, 2014).
- *Tourism intensity*$_m$.- the value of the ratio *LQtur* (equation [1]) for the municipality *m*.
- *Population density*$_m$: total number of residents by km^2 in municipality *m* at the end of year 2012, according to the *Anuario Económico de La Caixa*. This variable allows us to measure potential economies of density (a negative and significant coefficient), diseconomies of density (positive and significant coefficient) or any relation (not significant coefficient).

[12] http://geoportalgasolineras.es/

- *Vehicles per capita*$_m$: the average registered number of vehicles per capita in the municipality *m* using data from years 2013 and 2014. Source: own elaboration from *Anuario Económico de La Caixa*. The higher the registered number of vehicles per capita, the greater the potential demand for gasoline and/or diesel fuel; so it is possible that the pressure of demand results in higher retail fuel prices. Nevertheless, if there is free entry in the market, higher demand would encourage the entry of new petrol stations, and the price might remain unaffected, as Perdiguero and Borrell (2018) point out. Further, it is also possible that this variable does not include all the potential vehicles in circulation in each municipality. It is highly likely that this is the case for touristic municipalities with a very large number of vehicles from other municipalities or rental cars that are not usually registered in those municipalities.

- *Petrol stations per km*^2_m: average density of petrol stations in municipality *m* using data from years 2013 and 2014. Source: own elaboration from the official website of the Ministry of Industry, Energy and Tourism of Spain. The existence of a higher density of petrol stations can lead to a greater supply and more competition in the market (assuming that a larger number of petrol stations will produce a greater number of competitors in the municipality). If so, the price established by petrol stations should be lower, and show a negative coefficient.

- *Beach*$_m$: binary variable that is coded "1" if the municipality *m* has a beach and "0" otherwise. Source: Guide to Spanish beaches, Ministry of Agriculture and Fisheries, Food and Environment of Spain. Beaches are considered to be one of the major attractions of tourism markets (Phillips and House, 2009; Van der Merwe et al., 2011). In particular, beaches are the main attraction for most tourists (both international and domestic) in Spain, providing evidence of the persistence of the traditional "sun and sand" tourism model in this country (Aguiló et al., 2005; Valls et al., 2017). Thus, we construct a variable that reflects the existence of a beach in the municipality to control for other potential effect of tourism on fuel prices.

- *National Park*$_m$: binary variable that is coded "1" if the municipality *m* belongs to the area of socio-economic influence of a Spanish National Park and "0" otherwise.[13] Source: National Parks Network. Ministry of Agriculture, Fisheries and Food and Ministry for the Ecological Transition of Spain. This is another important tourist attraction, especially for "nature tourism". National Parks are generally located in distant and inaccessible areas, where the car is often the only possible means of reaching them (Connell and Page, 2008, Oh and Hammitt, 2011, Nerg et al. 2012). So, we expect a positive and significant relationship between this variable and petrol prices.

- *Province capital*$_m$: binary variable that is coded "1" if the municipality *m* is the capital city of its respective province and "0" otherwise. Source: INE, Spanish National Statistical Institute. Province capitals constitute centers of administrative and economic activities and locations where the demand for products and services is higher within provinces. Principal infrastructure investments in Spain's rail and road transportation network

[13] In Spain there are 15 National Parks; four of which are in the Canary Islands.

have primarily focused on connecting all province capitals (Holl, 2007; Bel, 2011; Albalate et al., 2017), improving their accessibility and attractiveness. Therefore, we expect a positive effect on fuel prices in those municipalities that are the capital of a province.

Table 1a and 1b shows the descriptive statistics for the database. We differentiate between touristic and non-touristic municipalities, by using the *LQtur* variable previously defined.

Table 1a. Descriptive statistics for touristic municipalities

Variable	Obs. (1)	Mean	Std. Dev	Min	Max
Diesel Price per litre	1173	1.3178	0.0995	0.8148	1.4173
Unleaded gasoline 95 Price per litre	1446	1.3420	0.0412	1.0435	1.4282
Petrol Stations per km²	1595	0.2802	0.4188	0.0020	1.8469
Vehicles per capita	1595	0.7391	0.2717	0.4841	6.3412
Population density	1595	2119.736	4008.4	2.4327	16540.23
Beach	1605	0.5975	0.4906	0	1
National Park	1506	0.0790	0.2699	0	1
Province capital	1605	0.2604	0.4390	0	1

Note: Obs.= Observations. (1).- Some petrol stations do not report information on particular days and, for this reason these variables include less observations.
Source: own elaboration

Table 1b. Descriptive statistics for non-touristic municipalities

Variable	Obs. (1)	Mean	Std. Dev	Min	Max
Diesel Price per litre	6690	1.2987	0.1003	0.8007	1.4180
Unleaded gasoline 95 Price per litre	7652	1.3277	0.0429	0.9959	1.4230
Petrol Stations per km²	8480	0.3526	2.1436	0.0008	45.25
Vehicles per capita	8480	0.7344	0.5300	0.0214	28.1693
Population density	8480	1031.669	2124.571	1.6758	21900
Beach	8481	0.1368	0.3438	0	1
National Park	7941	0.0135	0.1153	0	1
Province capital	8481	0.1521	0.3591	0	1

Note: Obs.= Observations; (1).- Some petrol stations do not report information on particular days and, for this reason these variables include less observations.
Source: own elaboration

Descriptive statistics included in Table 1a and 1b show, firstly, that on average prices in touristic municipalities for diesel and unleaded gasoline 95 are higher than in non-touristic towns (1.47% and 1.08% higher, respectively). Fuel price dispersion is lower in touristic municipalities than in non-touristic ones, which may be the result of more collusive behaviour among petrol stations located in those municipalities[14]. Moreover, extreme

[14] For papers that show the relation between price rigidity and collusion in the petrol market see Abrantes-Metz et al. (2006) and Jiménez and Perdiguero (2012).

values show that while maximum prices for each type of fuel are nearly identical regardless of whether the municipalities are touristic or not, minimum price values are clearly higher in touristic municipalities.

Secondly, municipalities that are touristic are more densely populated than those that are not touristic, but they have a lower density of petrol stations. Also, in respect of potential tourist attractions, about 59.7% of touristic municipalities in the sample have a beach, while only about 13.6% of those that are non-touristic have one. Regarding the variable National Park, nearly 8% of touristic municipalities are within the influence area of this tourist attraction, while this percentage is much lower for non-touristic municipalities (1.3% in this case). Further, a little over 26% of touristic municipalities are province capitals, compared to 15.2% of those that are non-touristic.

Table 1c. Welch Test (Touristic vs non-touristic)

Variable	T Student
Diesel Price per litre	-2.1768** (0.0296)
Unleaded gasoline 95 Price per litre	-12.0127*** (0.0000)
Petrol Stations per km^2	2.8347*** (0.0046)
Vehicles per capita	-0.5277 (0.5978)
Population density	-10.5653*** (0.0000)
Beach	-35.9826*** (0.0000)
National Park	-9.2676*** (0.0000)
Province capital	-9.3137*** (0.0000)

Source: own elaboration

The Table 1c includes the Welch test. This is a two-sample location test and is more reliable than Student's t-test when the two samples have unequal variances and unequal sample sizes, as in this case. All differences between touristic and non-touristic variables show statistical significance, with the exception of the variable 'vehicles per capita'.

However, these empirical outcomes do not necessarily imply causal effects and for this reason we try to simultaneously control for all variables that affect average prices at each petrol station.[15]

It should be noted that relevant statistical information about tourism at Spanish municipal level is scarce. Nevertheless we have drawn on the information provided by the Spanish National Statistical Institute in the Hotel Occupancy Survey for "tourist sites"[16] so as to

[15] We should note that, when considering some additional explanatory variables, we have realized that they are either not available at municipal level (marketing and distribution and also the mix of cars and fuel economy standards or requirements) or, since there are no significant differences among municipalities (local taxes and tariffs or the price of crude oil), they would not affect the results.

[16] 'Tourist site' is defined as a municipality where the concentration of tourist amenities is significant. The official terminology in Spanish is "Punto Turístico". This sample includes 120 municipalities that effectively are considered as touristic. Please visit the following official webpage: https://www.ine.es/dynt3/inebase/index.htm?padre=239

analyze which characteristics within a sample of touristic municipalities can explain the presence of higher prices. Thus, in addition to the previous variables, the study incorporated the following variables (they are calculated as the annual average):

- *Average Overnight Stays*$_m$: Average number of nights that a traveler stays at municipality *m*.

- *Occupancy rate*$_m$: The ratio, as a percentage, between the average daily number of rooms occupied in the month and the total number of bedrooms available in the establishments located at municipality *m*.

- *No of establishments*$_m$: Number of establishments in the touristic municipality *m* that offer collective accommodation services for payment, with or without other complementary services (hotel, hotel-apartment or apart-hotel, motel, pension, etc.).

- *% of travelers from abroad*$_m$: The ratio, as a percentage, between the guests residing abroad and the total number of guests.

The following table shows the main descriptive statistics:

Table 1d. Descriptive statistics for tourist sites (a sample of touristic municipality) characteristics

Variable	Obs.	Mean	Std. Dev	Min	Max
Average Overnight Stays$_m$	2164	2.2356	1.0131	1.28	8.0013
Occupancy rate$_m$	2164	46.6680	10.7577	23.6483	75.43
No of establishments$_m$	2164	165.2427	258.8118	14	861
% of travelers from abroad$_m$	2164	0.3533	0.1947	0.0658	0.9493

Source: own elaboration.

We must bear in mind that for these variables we only have information for the tourist site (a sample of touristic municipalities) and, for this reason, it can only be used in a sample of our entire database.

4. Methodology and results

In this section we first present the methodology and the results and analyze the effect of being a tourist municipality on fuel prices. Secondly we present the analysis of the characteristics of these tourist municipalities that generate these higher prices. In both cases we have carried out the econometric estimations for the different price quantiles and thus check if the gas stations with different price levels present significantly different tourism impacts.[17]

[17] Quantile regressions do not provide any kind of joint significance test. Regressions by OLS show significant F-test. Results upon request.

As can be seen in the tables found in Annex 1, in all cases the results show that the higher the price level, the lower the impact of tourism on them. This result holds for all the econometric approaches and for both types of fuels, diesel and unleaded gasoline 95. This result seems coherent, since when the price level is high it is more difficult for gas stations to increase prices due to the effect of tourism.

4.1. The effect of tourism on petrol prices

We considered an empirical model that explained the average price of diesel and unleaded gasoline 95 at petrol station *i,* as a function of being located at a touristic area while simultaneously controlling for other factors that might explain the prices. In general, the price equation estimated for each fuel type is the following:

$$P_{im} = \beta_0 + \beta_1 \text{Touristic Variable}_{im} + \sum_{j=2}^{6} \beta_j X_m + \varepsilon_{im} \qquad [2]$$

Where P_{im} is the respective fuel-type average price at petrol station *i* located at municipality *m*, and depends on the tourist variable considered and a group of explanatory variables (X_m). Due to the difficulty of defining a touristic municipality, we have implemented two complementary empirical strategies, in order to test all results, as a robustness check.

Specifically equation [2] is estimated twice by alternately considering a different touristic variable, and, on a third occasion, by using a sample of touristic municipalities in order to consider some specific variables (see section 4.2), in this order:

i) *Touristic Municipality estimation* - binary variable that takes value 1 if *LQtur* >1 (from equation [1]). In this case our treatment group included 318 municipalities and the control group (i.e., those where the index is lower than one); in total, 2,197.

ii) *Tourism intensity estimation* - we substitute the previous binary variable for the value of the index *LQtur*, in order to control for the real level of tourism activity in the municipality. The classification and number of municipalities considered are the same as in i).

iii) *Tourist site*.- official data on touristic characteristics by municipality is used in order to try to control for specific effects. See section 4.2.

The interpretation of the coefficient for both touristic variables is basically the same. If the coefficient is positive (negative) and shows statistical significance, the result is that prices for diesel, or for unleaded gasoline 95, in touristic municipalities are higher (lower) than in non-touristic ones. Finally, if the coefficient β_1 does not show statistical significance, the result is that touristic municipalities have the same price for these two fuel products as other towns. Furthermore, when we use the variable "Tourism intensity" (estimation ii), we can check if a higher level of tourism intensity generates a greater difference in diesel or gasoline prices between touristic and non-touristic municipalities.

To estimate the equation [2] we use an Ordinary Least Square, robust to heterokedasticity. The relevant covariates in Tables 2 and 3 are in bold and they control for touristic importance of municipality. Econometric results for the estimations that use the binary variable of touristic municipality are included in Table 2.

Table 2. Results of the econometric estimations for Touristic municipality. (Bootstrapped quantile regression).

	Diesel	**Diesel**	**Diesel**	**Diesel**	**Unleaded gas 95**	**Unleaded gas 95**	**Unleaded gas 95**	**Unleaded gas 95**
Constant	1.3340***	1.3358***	1.3331***	1.3333***	1.3396***	1.3418***	1.3398***	1.3397***
	(0.0006)	(0.0040)	(0.0041)	(0.0024)	(0.0006)	(0.0021)	(0.0062)	(0.0029)
Touristic	**0.0154*** **	**0.0161*** **	**0.0102*** **	**0.0094*** **	**0.0110*** **	**0.0118*** **	**0.0093*** **	**0.0080*** **
municipality	**(0.0006)**	**(0.0011)**	**(0.0012)**	**(0.0012)**	**(0.0007)**	**(0.0007)**	**(0.0010)**	**(0.0011)**
Vehicles per capita		-0.0004	-0.0003	-0.0003		-0.0006	0.0005	-0.0005
		(0.0051)	(0.0054)	(0.0030)		(0.0026)	(0.0081)	(0.0036)
Population density		-1.29e-06***	-2.09e-06***	-2.02e-06***		-1.57e-06***	-2.26e-06***	-2.13e-06***
		(2.58e-07)	(2.79e-07)	(2.02e-07)		(1.74e-07)	(2.05e-07)	(1.89e-07)
Petrol Stations per km²		-0.0001	-0.0001	-0.0001		0.0001	0.0001	0.0001
		(0.0002)	(0.0003)	(0.0003)		(0.0002)	(0.0002)	(0.0002)
Beach			0.0106***	0.0100***			0.0065***	0.0063***
			(0.0011)	(0.0012)			(0.0010)	(0.0009)
National Park				0.0074***				0.0105***
				(0.0028)				(0.0027)
Province capital			0.0103***	0.0104***			0.0073***	0.0074***
			(0.0016)	(0.0012)			(0.0009)	(0.0008)
Observations	7593	7006	7006	6585	9098	9088	9088	8532

Note 1: Robust standard errors in brackets. *** (1%), ** (5%), * (10%).
Note 2: Quantile regressions do not provide any kind of joint significance test.

The results show that touristic municipalities have higher prices for both diesel and unleaded gasoline 95 than the other municipalities. More specifically prices of diesel are approximately 1.28 cents of a euro per liter higher in touristic municipalities than in those that are non-touristic (average of four coefficients in the table 2).

Another significant result is that having a beach at the municipality is not a trivial point. In fact, diesel prices are around 1 cent of a euro higher in cities that have beaches. Moreover, we want to highlight the positive effect of in addition being a province capital on fuel prices. Similar results are obtained for the variable linked to the influence of a National Park on the municipality, which generates an increase in prices of around one cent.

Two other variables are significant in our analysis: population density and province capital. In the case of population density the coefficient is negative, which shows the existence of small economies of density; the variable of province capital is positive in all cases probably because these municipalities have a greater level of economic activity and income.[18]

[18] These results are maintained in the estimates by quantiles.

Taking into account that the overall average price of diesel fuel in this period is 1.336 euro per liter, touristic municipalities with a beach (59.7% of touristic municipalities, as we describe above in Table 1a) induce a 1.7% rise in the price of diesel, controlling simultaneously for all covariates and different model estimations. Further, and a more relevant result, is that if we consider a rough estimate of price margin,[19] petrol stations in touristic municipalities would be fixing an additional margin of around 11.5% when compared with the average margin for diesel.

Regarding the prices of unleaded gasoline 95, it is found that they are around 1 cent of a euro per liter higher in touristic municipalities than in other municipalities (average of four coefficients in the table 2), plus 0.65 cents per euro if they also have a beach, and one cent if they have a national park. Similar to the previous calculation, the overall average price of unleaded gasoline 95 during this period is 1.395 euro per liter, and thus, on average, gasoline prices experience an increase of 1.18%, which are driven by tourism activity and having a beach. The additional margin for this fuel type fixed by petrol stations located in touristic municipalities is around 10.85% over the average margin.

As with the variable 'tourism intensity' defined above, we repeat estimations of equation [2] but including this continuous covariate (and its square). Tables 3a and 3b show the results.

[19] We calculated the margin as the final price paid by consumers divided by one plus the indirect tax rate (21%), minus the special tax for carburant (0.331 euros per liter in the case of diesel, and 0.45779 euros per liter in the case of unleaded gasoline 95), minus the average wholesale price in the international market of Rotterdam (0.575 euros per liter for diesel and 0.543 for unleaded gasoline 95).

Table 3a. Results of the econometric estimations (Tourism intensity). (Bootstrapped quantile regression).

	Diesel (1)	**Diesel (2)**	**Diesel (3)**	**Diesel (4)**	**Unleaded gas 95 (1)**	**Unleaded gas 95 (2)**	**Unleaded gas 95 (3)**	**Unleaded gas 95 (4)**
Constant	1.3343***	1.3355***	1.3324***	1.3325***	1.3396***	1.3416***	1.3394***	1.3393***
	(0.0008)	(0.0039)	(0.0053)	(0.0050)	(0.0005)	(0.0023)	(0.0062)	(0.0063)
Tourism intensity	**0.0038*** (0.0007)**	**0.0043*** (0.0008)**	**0.0020*** (0.0004)**	**0.0017*** (0.0006)**	**0.0036*** (0.0005)**	**0.0037*** (0.0006)**	**0.0024*** (0.0007)**	**0.0014*** (0.0004)**
Tourism intensity^2	**-0.0001 (0.0001)**	**-0.0001** (0.00007))**	**-5.21e-06 (0.0001)**	**8.11e-06 (0.0001)**	**-0.0001** (0.00005)**	**-0.00006 (0.00006)**	**-0.00006 (0.00005)**	**0.00002 (0.00004)**
Vehicles per capita		-0.0003	-0.0002	-0.0002		-0.0006	-0.0005	-0.0005
		(0.0056)	(0.0070)	(0.0064)		(0.0031)	(0.0081)	(0.0084)
Population density		-9.99e-07***	-1.98e-06***	-1.98e-06***		-1.60e-06***	-2.06e-06***	-1.93e-06***
		(2.78e-07)	(1.92e-07)	(1.71e-07)		(2.80e-07)	(2.621e-07)	(2.20e-07)
Petrol Stations per km^2		-0.0001	-0.0001	-0.0001		0.0001	0.00009	0.00006
		(0.0005)	(0.0003)	(0.0003)		(0.0002)	(0.0002)	(0.0003)
Beach			0.0121***	0.0115***			0.0073***	0.0076***
			(0.0009)	(0.0009)			(0.0012)	(0.0008)
National Park				0.0120***				0.0116***
				(0.0030)				(0.0017)
Province capital			0.0109***	0.0115***			0.0073***	0.0079***
			(0.0013)	(0.0011)			(0.0009)	(0.0007)
Observations	7636	7006	7006	6585	9098	9088	9088	8532

Note 1: Robust standard errors in brackets. *** (1%), ** (5%), * (10%).
Note 2: Quantile regressions do not provide any kind of joint significance test.

Table 3b shows estimations only for those municipalities where $LQ>0$, i.e., for those touristic municipalities.

Table 3b. Results of the econometric estimations (Tourism intensity). (Bootstrapped quantile regression). Municipalities with *LQ*>0

	Diesel (1)	**Diesel (2)**	**Diesel (3)**	**Diesel (4)**	**Unleaded gas 95 (1)**	**Unleaded gas 95 (2)**	**Unleaded gas 95 (3)**	**Unleaded gas 95 (4)**
Constant	1.3342***	1.3303***	1.3248***	1.3288***	1.3387***	1.3322***	1.3217***	1.3288***
	(0.0009)	(0.0112)	(0.0100)	(0.0083)	(0.0009)	(0.0087)	(0.0090)	(0.0094)
Tourism intensity	**0.0038*** (0.0008)**	**0.0038*** (0.0006)**	**0.0020*** (0.0005)**	**0.0017*** (0.0005)**	**0.0041*** (0.0007)**	**0.0036*** (0.0005)**	**0.0026*** (0.0008)**	**0.0019*** (0.0006)**
Tourism intensity²	**-0.00008 (0.00007)**	**-0.00009 (0.00006)**	**-8.25e-06 (0.00004)**	**4.98e-06 (0.00002)**	**-0.0001** (0.00006)**	**-0.0001** (0.00005)**	**-0.0001 (0.0001)**	**-0.00002 (0.00005)**
Vehicles per capita		0.0077	0.0099	0.0044		0.0115	0.0212*	0.0117
		(0.0155)	(0.0138)	(0.0119)		(0.0117)	(0.0120)	(0.0130)
Population density		-8.56e-07**	-1.91e-06***	-1.90e-06***		-1.07e-06***	-1.78e-06***	-1.81e-06***
		(3.68e-07)	(3.09e-07)	(2.49e-07)		(2.71e-07)	(2.12e-07)	(2.54e-07)
Petrol Stations per km²		-0.0003	-0.00009	-0.0001		5.56e-06	0.0001	0.00009
		(0.0005)	(0.0003)	(0.0002)		(0.0001)	(0.0001)	(0.0002)
Beach			0.0124***	0.0118***			0.0089***	0.0085***
			(0.0011)	(0.0009)			(0.0011)	(0.0007)
National Park				0.0137***				0.0124***
				(0.0017)				(0.0020)
Province capital			0.0113***	0.0116***			0.0089***	0.0090***
			(0.0012)	(0.0012)			(0.0012)	(0.0009)
Observations	5823	5823	5823	5477	7522	7522	7522	7067

Note 1: Robust standard errors in brackets. *** (1%), ** (5%), * (10%).
Note 2: Quantile regressions do not provide any kind of joint significance test.

Likewise, Tables 3a and 3b also highlight a positive relationship between fuel prices and the variable that measures the level of tourism intensity. Moreover, the squared variable shows a quadratic relationship only for unleaded gasoline, i.e., the higher the tourism intensity, the lower the increase in prices.

We can see that as the rate of tourism intensity increases by one, the prices for both diesel and gasoline charged by service stations increase between 0.17 and 0.43 cents in diesel, and between 0.14 and 0.37 cents in unleaded gasoline 95 (see table 3a). This outcome implies that the higher the level of tourism in a municipality, the greater the difference in prices between touristic and non-touristic municipalities. It is worth noting that our estimations show similar results for both diesel and gasoline prices.

As in previous estimations (Table 2), the variable for population density is significant, and the negative sign of the coefficient is consistent with the potential existence of economies of density. Higher population density enables fuel distribution companies to incur lower infrastructure costs for providing their products, and then might also have the potential to decrease the price of these fuel products. The other three significant variables are *Beach, Province capital* and *National Park;* which are all positive. So, the coefficients for the other control variables are very similar to the results of table 2.

4.2. Characteristics of the tourist sites and petrol prices

Next, we analyze how different characteristics of tourist municipalities affect the price level of fuels. However as we have mentioned above, we have to reduce the sample used by using data on tourist sites, i.e., we are considering a sample of touristic municipalities (see footnote 11). Specifically this subsample includes about 14% of all petrol stations in Spain.

The empirical approach also follows the equation [2] but in this case the price of fuel depends not only on the variables already included in the previous analysis (vehicles per capita, population density, petrol stations per km^2, and the binary variables about having a beach and being a capital province), but also on the "average stay", the "Occupancy rate", the "Number of establishments", the "percentage of travelers from abroad" and belonging or not to an influence area of a "National Park". The econometric results are shown in Table 4.

Table 4. Econometric results. Effect of tourist site characteristics on petrol prices (a subsample of tourist municipalities) (Bootstrapped quantile regression)

	Diesel	**Diesel**	**Diesel**	**Unleaded gas 95**	**Unleaded gas 95**	**Unleaded gas 95**
Constant	1.3277***	1.2672***	1.2635***	1.3344***	1.2703***	1.2682***
	(0.0050)	(0.0155)	(0.0157)	(0.0040)	(0.0164)	(0.0144)
Average stay	0.0005	-0.0018	-0.0035**	0.0009	-0.0008	-0.0028***
	(0.0008)	(0.0011)	(0.0018)	(0.0007)	(0.0010)	(0.0010)
Occupancy rate	0.0001	0.0003**	0.0004***	0.00005	0.0003**	0.0004***
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
No of establishments	-0.00002***	-0.00002***	-0.00001***	-0.00002***	-0.00002***	-0.00001***
	(1.96e-06)	(3.25e-06)	(3.48e-06)	(2.86e-06)	(3.12e-06)	(4.02e-06)
% of travelers from abroad	**0.0386*** (0.0053)**	**0.0267*** (0.0055)**	**0.0189*** (0.0064)**	**0.0317*** (0.0047)**	**0.0172** (0.0072)**	**0.0128*** (0.0045)**
National park	**0.0161*** (0.0016)**	**0.0138*** (0.0028)**	**0.0118*** (0.0024)**	**0.0144*** (0.0013)**	**0.0130*** (0.0013)**	**0.0119*** (0.0014)**
Vehicles per capita		0.0861***	0.0954***		0.0847***	0.0897***
		(0.0188)	(0.0237)		(0.0210)	(0.0183)
Population density		-9.42e-07	-9.18e-07		-1.44e-06**	-1.43e-06*
		(6.94e-07)	(6.36e-07)		(7.21e-07)	(7.41e-07)
Petrol Stations per km^2		0.0189***	0.0189***		0.0244***	0.0244***
		(0.0059)	(0.0064)		(0.0059)	(0.0056)
Beach			0.0029**			0.0014
			(0.0013)			(0.0013)
Province capital			-0.0056***			-0.0053***
			(0.0020)			(0.0011)
Observations	1464	1464	1464	1838	1838	1838

Note 1: Robust standard errors in brackets. *** (1%), ** (5%), * (10%).
Note 2: Quantile regressions do not provide any kind of joint significance test.

As can be seen in the previous table, the sign and the level of the coefficients are very similar in both types of fuel. The variable average stay in negative and significant only in the third column of every type of fuel. This result shows that the more days that tourists spend in a place, the lower the price of fuels. This may be because when tourists spend more days in a certain municipality their search costs are reduced, which in turn limit the

capacity of gas stations to increase price. The occupation rate on the other hand shows a positive and significant relationship with the price of fuels. This result indicates that the more tourists come to the municipality, the greater the pressure on demand and, therefore, the higher the prices established.

The number of establishments presents a negative relation with respect to the price of fuels. One possible reason is that since there is a greater number of tourist establishments, the distance between these establishments and the petrol stations is reduced, so the search cost for tourists would be lower. Once the search cost was reduced, the petrol stations would have a lower capacity to increase the price of fuels.

Another two significant variables are the percentage of travelers from abroad and the municipality being within the influence area of a National Park. Regarding the percentage of travelers from abroad, the result coincides with that obtained by Bakhat and Roselló (2013), and confirms that the high cost of searching for this type of tourism means that service stations can increase the price. The latter, i.e. the presence of a National Park in the municipality, is also a logical result, since visiting this tourist attraction would usually require traveling by car, which increases the demand for fuels and positively impacts on the price of fuel.

5. Discussion, conclusions and future research

Tourism, and most tourism-related transport activity, is currently highly dependent on fuel consumption. This is the case for road transport, and particularly the car, which is one of the most, if not the most, commonly used modes of tourist transport. Thus, tourism is likely to create significant additional demand for car fuel in touristic destinations such as those located in Spain. Moreover, car-based tourists, due to the limited time and information available to them, are less sensitive to fuel price than other customers. These facts suggest that the petrol market outcome, in terms of prices and quantity traded, may be different depending on the importance of tourism in the analyzed area.

This paper deals with the question of whether retail prices for diesel and gasoline in touristic municipalities are the same, lower or higher than in those that are non-touristic, and what characteristics of these touristic municipalities affect petrol prices. For this purpose, we built our own-elaborated database that contains average daily prices over two years (2013 and 2014) for a very large sample of petrol stations in mainland Spain and the Balearic Islands (more than 70% of petrol stations for diesel and 82% for unleaded gasoline 95). This is, as far as we know, the first time that a microeconometric approach has been implemented in order to test this causal effect of tourism on retail prices.

The empirical strategy has consisted in estimating a relation where the retail price of each fuel type (diesel and unleaded gasoline 95) is explained by variables selected alternately to appropriately represent municipalities' tourism significance, as well as by a group of explanatory variables. Our empirical results, using different econometric approaches to ensure robustness, leads to the same conclusion: prices for both diesel and gasoline are higher in touristic municipalities than in non-touristic ones. Furthermore, the results

suggest that the greater the reliance on tourism, the greater the negative impact of higher fuel prices on the touristic municipality.

Using a subsample of the database we can use official data on touristic municipalities' characteristics. In this case, results highlight that the two main characteristics of these touristic municipalities that explain these higher prices are the percentage of travelers from abroad and belonging to a National Park's influence area.

It is worth stressing the principal significance of these results for tourism in Spain. Assuming that petrol price affects travel costs, when faced at destination with high petrol prices, tourists are usually more prone to reduce their demand for travel-related expenditures and, ultimately, change their travel plans. Although, as the literature points out, these changes may be evident in different ways and at different intensity levels depending upon the specific travel experiences and destinations.

Moreover, the adverse effects of higher petrol prices in touristic cities are not limited to a reduction in the welfare and satisfaction of tourists, particularly those that are car-based, and of the competitiveness of the tourism industry at the host community. It also increases the cost of living for local residents and the costs for all kinds of (mainly local) businesses that need to stop at high price petrol stations located in these touristic cities or, as an alternative, to travel long distances to reach a low price petrol station for refueling; in which case residents must ask themselves whether it is really worth doing. Hence the greater market power exerted by petrol stations driven by the specific characteristics of touristic demand for petrol does not discriminate its effects on consumers, whether they be tourists or residents, nor are its effects confined to the tourism sector.

These negative effects are of particular concern to the economies that depend on tourism as their major source of income. Therefore this situation requires the special attention of competition and regulatory authorities to address this problem.[20] As we have previously indicated, markets with significantly higher prices and with smaller standard deviations, as observed in touristic municipalities, may be a sign of collusive behavior in the market. The antitrust authorities should analyze in more detail the possible existence of collusive agreements, tacit or explicit.

In addition to the action of the antitrust authorities, it is worth mentioning other public policy recommendations that can reduce this impact of tourism on fuel prices. One possibility is to improve and increase the use of public transport. A reduction in the use of the private vehicle would help reduce the demand for fuel and therefore the equilibrium price in the market. Another possibility is to promote the use of electric vehicles, an aspect that in addition to reducing dependence on fossil fuel, would have important positive

[20] In this respect, it is particularly important that, on 18 February 2000, the European Parliament adopted a resolution on the Communication from the Commission: enhancing tourism's potential for employment & follow-up to the conclusions and recommendations of the High Level-Group (COM(1999) 205 & C5-0112/1999 & 1999/2115(COS)) in which it called on "*the Commission to ensure that the rules on competition are properly applied in sectors which are closely linked to tourism, with a particular view to combating distortions, monopolies and oligopolies which imperil the hundreds of small and medium-sized businesses operating in the sector*". OJ C 339, 29.11.2000, pp. 292–296.

externalities on the environment. However, we must bear in mind that these measures are medium and long term so, in the short term, municipalities might consider limiting access to the most polluting and high fuel consuming vehicles.

Limitations and future research lines

One of the main limitations of this study is the absence of more information at the municipal level. Unfortunately, the amount of information available at the municipal level is limited, so we cannot include variables that might be interesting (average income, number of rent cars,...) or we are forced to reduce the database only to tourist municipalities. To solve this limitation in future research, the most aggregated geographical analysis could be performed, an aspect that could allow us to obtain a greater amount of information. Another possibility would be conducting surveys on a small sample of municipalities, an aspect that would significantly reduce the sample but would increase the amount of data available for each municipality.

Related to the availability of data, including the information available at the municipal level, the data series are short, which prevents dynamic effects being analyzed, as well as other aspects, such as the adoption of new technologies, like electric vehicles.

A last limitation of this study is that, unfortunately, we do not have cost data for the different gas stations or for the different municipalities, which makes it impossible to analyze whether the tourism municipalities have a greater or lesser cost of distributing the fuel to non-tourist municipalities. In any case, we believe that this fact has not biased our results since we assume that there are tourist municipalities with both high distribution costs and reduced distribution costs.

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Annex 1. Econometric results by quartiles

Table A1. Results of the econometric estimations for Touristic municipality by quartiles (Diesel).

	Diesel (0.25)	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**
Constant	1.3011***	1.3340***	1.3535***	1.3020***	1.3358***	1.3539***	1.2987***	1.3331***	1.3490***	1.2983***	1.3333***	1.3509***
	(0.0011)	(0.0006)	(0.0003)	(0.0012)	(0.0057)	(0.0040)	(0.0022)	(0.0054)	(0.0061)	(0.0023)	(0.0016)	(0.0042)
Touristic municipality	**0.0244*** (0.0032)**	**0.0154*** (0.0007)**	**0.0093*** (0.0005)**	**0.0247*** (0.0018)**	**0.0161*** (0.0010)**	**0.0107*** (0.0009)**	**0.0149*** (0.0037)**	**0.0102*** (0.0014)**	**0.0091*** (0.0008)**	**0.0127*** (0.0029)**	**0.0094*** (0.0013)**	**0.0088*** (0.0005)**
Vehicles per capita				0.0007	-0.0004	-0.0005	0.0009	-0.0003	0.0041	0.0009	-0.0003	0.0015
				(0.0009)	(0.0081)	(0.0054)	(0.0019)	(0.0071)	(0.0080)	(0.0022)	(0.0017)	(0.0055)
Population density				-2.99e-07	-1.29e-06***	-5.84e-07***	-1.08e-06***	-2.09e-06***	-9.12e-07***	-9.80e-07***	-2.02e-06***	-9.37e-07***
				(2.89e-07)	(2.07e-07)	(1.66e-07)	(3.57e-07)	(2.89e-07)	(1.50e-07)	(2.91e-07)	(1.91e-07)	(1.90e-07)
Petrol Stations per km²				-0.0013*	-0.0001	-0.0004	-0.0011*	-0.00004	-0.0002	-0.0011*	-0.0001	-0.0002
				(0.0007)	(0.0003)	(0.0003)	(0.0007)	(0.0003)	(0.0003)	(0.0007)	(0.0005)	(0.0003)
Beach							0.0176***	0.0106***	0.0046***	0.0178***	0.0100***	0.0036***
							(0.0020)	(0.0011)	(0.0008)	(0.0033)	(0.0010)	(0.0005)
National Park										0.0174***	0.0074**	0.0066***
										(0.0060)	(0.0032)	(0.0016)
Province capital							0.0116***	0.0103***	0.0044***	0.0119***	0.0104***	0.0049***
							(0.0023)	(0.0015)	(0.0010)	(0.0030)	(0.0011)	(0.0006)
Observations	7593	7593	7593	7006	7006	7006	7006	7006	7006	6585	6585	6585

Table A2. Results of the econometric estimations for Touristic municipality by quartiles (Unleaded gasoline 95).

	Unleaded gas 95 (0.25)	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**
Constant	1.3106***	1.3396***	1.3554***	1.3111***	1.3418***	1.3537***	1.3089***	1.3398***	1.3511***	1.3083***	1.3397***	1.3526***
	(0.0005)	(0.0007)	(0.0002)	(0.0005)	(0.0013)	(0.0023)	(0.0009)	(0.0051)	(0.0051)	(0.0013)	(0.0027)	(0.0044)
Touristic municipality	**0.0172*** (0.0017)**	**0.0110*** (0.0009)**	**0.0083*** (0.0007)**	**0.0192*** (0.0026)**	**0.0118*** (0.0008)**	**0.0091*** (0.0007)**	**0.0109*** (0.0021)**	**0.0093*** (0.0010)**	**0.0086*** (0.0008)**	**0.0112*** (0.0025)**	**0.0080*** (0.0012)**	**0.0083*** (0.0010)**
Vehicles per capita				0.0004	-0.0006	0.0027	0.0005	-0.0005	0.0050	0.0006	-0.0005	0.0030
				(0.0007)	(0.0016)	(0.0029)	(0.0009)	(0.0066)	(0.0065)	(0.0009)	(0.0035)	(0.0059)
Population density				-7.18e-07**	-1.57e-06***	-4.44e-07***	-1.10e-06***	-2.26e-06***	-8.56e-07***	-1.16e-06***	-2.13e-06***	-9.60e-07***
				(2.84e-07)	(2.20e-07)	(1.13e-07)	(3.06e-07)	(2.16e-07)	(1.21e-07)	(2.58e-07)	(1.81e-07)	(1.86e-07)
Petrol Stations per km²				0.00004	0.0001	0.0001	0.0002	0.0001	0.0002*	0.0002	0.0001	0.0002
				(0.0008)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0004)	(0.0003)	(0.0002)
Beach							0.0138***	0.0065***	0.0030***	0.0134***	0.0063***	0.0019**
							(0.0019)	(0.0008)	(0.0006)	(0.0020)	(0.0006)	(0.0008)
National Park										0.0160***	0.0105***	0.0070***
										(0.0049)	(0.0029)	(0.0017)
Province capital							0.0069***	0.0073***	0.0039***	0.0079***	0.0074***	0.0052***
							(0.0016)	(0.0010)	(0.0010)	(0.0015)	(0.0010)	(0.0009)
Observations	9098	9098	9098	9088	9088	9088	9088	9088	9088	8532	8532	8532

Table A3. Results of the econometric estimations for Tourism intensity by quartiles (Diesel).

	Diesel (0.25)	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**
Constant	1.3003***	1.3343***	1.3530***	1.3011***	1.3355***	1.3535***	1.2978***	1.3324***	1.3511***	1.2976***	1.3325***	1.3515***
	(0.0014)	(0.0009)	(0.0004)	(0.0015)	(0.0018)	(0.0024)	(0.0016)	(0.0034)	(0.0044)	(0.0014)	(0.0030)	(0.0039)
Tourism intensity	**0.0078*** **	**0.0038*** **	**0.0033*** **	**0.0073*** **	**0.0043*** **	**0.0038*** **	**0.0038*** **	**0.0020*** **	**0.0032*** **	**0.0033*** **	**0.0017*** **	**0.0032*** **
	(0.0011)	**(0.0007)**	**(0.0003)**	**(0.0012)**	**(0.0007)**	**(0.0004)**	**(0.0009)**	**(0.0004)**	**(0.0003)**	**(0.0011)**	**(0.0004)**	**(0.0004)**
Tourism intensity²	**-0.0003*** **	**-0.0001**	**-0.00005*** **	**-0.0003*** **	**-0.0001** **	**-0.00007*** **	**-0.0001**	**-5.21e-06**	**-0.00006*** **	**-0.00005**	**8.11e-06**	**-0.00005*** **
	(0.0001)	**(0.0001)**	**(0.00001)**	**(0.0001)**	**(0.0001)**	**(0.00001)**	**(0.0001)**	**(1.83e-07)**	**(0.00001)**	**(0.00007)**	**(0.00002)**	**(0.00001)**
Vehicles per capita				0.0008***	-0.0003	-0.0010	0.0010	-0.0002	0.0008	0.0009***	-0.0002	-0.0001
				(0.0001)	(0.0020)	(0.0032)	(0.0007)	(0.0046)	(0.0059)	(0.0002)	(0.0040)	(0.0052)
Population density				-2.08e-07	-9.99e-07***	-3.00e-07	-7.72e-07*	-1.98e-06***	-9.21e-07***	-7.47e-07**	-1.98e-06***	-8.99e-07***
				(4.79e-07)	(2.08e-07)	(2.15e-07)	(4.06e-07)	(1.83e-07)	(1.82e-07)	(3.60e-07)	(1.93e-07)	(1.89e-07)
Petrol Stations per km²				-0.0013	-0.0001	-0.0005*	-0.0013***	-0.0001	-0.0003	-0.0010	-0.0001	-0.0003
				(0.0009)	(0.0004)	(0.0003)	(0.0004)	(0.0005)	(0.0002)	(0.0009)	(0.0004)	(0.0002)
Beach							0.0178***	0.0121***	0.0037***	0.0178***	0.0115***	0.0028***
							(0.0024)	(0.0008)	(0.0005)	(0.0026)	(0.0010)	(0.0004)
National Park										0.0173***	0.0120***	0.0075***
										(0.0043)	(0.0025)	(0.0012)
Province capital							0.0114***	0.0109***	0.0043***	0.0117***	0.0115***	0.0051***
							(0.0026)	(0.0010)	(0.0010)	(0.0021)	(0.0010)	(0.0008)
Observations	7636	7636	7636	7006	7006	7006	7006	7006	7006	6585	6585	6585

Table A4. Results of the econometric estimations for Tourism intensity by quartiles (Unleaded gasoline 95).

	Unleaded gas 95 (0.25)	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**
Constant	1.3090***	1.3396***	1.3547***	1.3093***	1.3416***	1.3538***	1.3082***	1.3394***	1.3523***	1.3076***	1.3393***	1.3529***
	(0.0006)	(0.0006)	(0.0002)	(0.0009)	(0.0025)	(0.0026)	(0.0020)	(0.0092)	(0.0049)	(0.0019)	(0.0065)	(0.0041)
Tourism intensity	**0.0071*** **	**0.0036*** **	**0.0032*** **	**0.0071*** **	**0.0037*** **	**0.0034*** **	**0.0037*** **	**0.0024*** **	**0.0029*** **	**0.0035*** **	**0.0014** **	**0.0031*** **
	(0.0012)	**(0.0006)**	**(0.0003)**	**(0.0011)**	**(0.0005)**	**(0.0003)**	**(0.0009)**	**(0.0004)**	**(0.0004)**	**(0.0008)**	**(0.0006)**	**(0.0004)**
Tourism intensity²	**-0.0003*** **	**-0.0001** **	**-0.00006*** **	**-0.0003*** **	**-0.0001** **	**-0.00006*** **	**-0.0001**	**-0.00006**	**-0.00005*** **	**-0.0001**	**0.00002**	**-0.00005*** **
	(0.0001)	**(0.0006)**	**(0.00001)**	**(0.0001)**	**(0.00006)**	**(0.00001)**	**(0.0001)**	**(0.00004)**	**(0.00001)**	**(0.0001)**	**(0.00004)**	**(0.00002)**
Vehicles per capita				0.0006***	-0.0006	0.0015	0.0006	-0.0005	0.0031	0.0006	-0.0005	-6.34e-07***
				(0.0001)	(0.0033)	(0.0034)	(0.0025)	(0.0122)	(0.0064)	(0.0022)	(0.0087)	(1.83e-07)
Population density				-4.94e-07***	-1.60e-06***	-3.26e-07***	-1.08e-06***	-2.06e-06***	-6.26e-07***	-1.05e-06***	-1.93e-06***	0.0020
				(1.32e-07)	(2.71e-07)	(1.36e-07)	(2.53e-07)	(3.54e-07)	(2.07e-07)	(2.19e-07)	(2.34e-07)	(0.0055)
Petrol Stations per km²				0.00009	0.0001	-8.32e-06	0.0002	0.00009	0.0001	0.0003	0.00006	0.0001
				(0.0006)	(0.0001)	(0.0002)	(0.0006)	(0.0002)	(0.0001)	(0.0005)	(0.0002)	(0.0001)
Beach							0.0133***	0.0073***	0.0015*	0.0129***	0.0076***	0.0006
							(0.0025)	(0.0011)	(0.0009)	(0.0022)	(0.0009)	(0.0006)
National Park										0.0145***	0.0116***	0.0074***
										(0.0049)	(0.0022)	(0.0014)
Province capital							0.0072***	0.0073***	0.0040***	0.0085***	0.0079***	0.0049***
							(0.0020)	(0.0011)	(0.0008)	(0.0015)	(0.0009)	(0.0008)
Observations	9098	9098	9098	9088	9088	9088	9088	9088	9088	8532	8532	8532

Table A5. Results of the econometric estimations for Tourism intensity (Municipalities with *LQ*>0) by quartiles (Diesel).

	Diesel (0.25)	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**
Constant	1.3025***	1.3342***	1.3524***	1.3034***	1.3303***	1.3454***	1.2988***	1.3248***	1.3401***	1.2988***	1.3288***	1.3409***
	(0.0017)	(0.0009)	(0.0004)	(0.0033)	(0.0075)	(0.0037)	(0.0031)	(0.0090)	(0.0051)	(0.0035)	(0.0077)	(0.0055)
Tourism intensity	**0.0067*** **	**0.0038*** **	**0.0035*** **	**0.0064*** **	**0.0038*** **	**0.0035*** **	**0.0037*** **	**0.0020*** **	**0.0028*** **	**0.0030*** **	**0.0017*** **	**0.0029*** **
	(0.0013)	**(0.0007)**	**(0.0004)**	**(0.0012)**	**(0.0007)**	**(0.0005)**	**(0.0008)**	**(0.0003)**	**(0.0003)**	**(0.0010)**	**(0.0004)**	**(0.0003)**
Tourism intensity²	**-0.0002** **	**-0.0001**	**-0.00006*** **	**-0.0002*** **	**-0.0001**	**-0.00007*** **	**-0.0001**	**-8.25e-06**	**-0.00004*** **	**-0.00004**	**4.98e-06**	**-0.00005*** **
	(0.0001)	**(0.0001)**	**(0.00001)**	**(0.0001)**	**(0.0001)**	**(0.00002)**	**(0.0001)**	**(0.00002)**	**(0.00001)**	**(0.00007)**	**(0.00003)**	**(0.00001)**
Vehicles per capita				0.0007	0.0077	0.0101*	0.0009	0.0099	0.0150**	0.0009	0.0044	0.0138*
				(0.0039)	(0.0111)	(0.0052)	(0.0044)	(0.0128)	(0.0067)	(0.0047)	(0.0105)	(0.0075)
Population density				-4.18e-07	-8.56e-07***	-8.00e-08	-9.41e-07***	-1.91e-06***	-6.27e-07**	-9.26e-07**	-1.90e-06***	-6.32e-07***
				(5.66e-07)	(2.95e-07)	(1.75e-07)	(3.56e-07)	(2.88e-07)	(2.46e-07)	(3.91e-07)	(2.64e-07)	(2.07e-07)
Petrol Stations per km²				-0.0013	-0.0003	-0.0005***	-0.0011	-0.0001	-0.0004***	-0.0009	-0.0001	-0.0004**
				(0.0009)	(0.0004)	(0.0001)	(0.0008)	(0.0003)	(0.0001)	(0.0007)	(0.0004)	(0.0002)
Beach							0.0181***	0.0124***	0.0041***	0.0176***	0.0118***	0.0033***
							(0.0022)	(0.0006)	(0.0007)	(0.0019)	(0.0008)	(0.0008)
National Park										0.0211***	0.0137***	0.0075***
										(0.0036)	(0.0023)	(0.0027)
Province capital							0.0107***	0.0113***	0.0054***	0.0111***	0.0116***	0.0057***
							(0.0022)	(0.0012)	(0.0009)	(0.0026)	(0.0011)	(0.0010)
Observations	5823	5823	5823	5823	5823	5823	5823	5823	5823	5477	5477	5477

Table A6. Results of the econometric estimations for Tourism intensity (Municipalities with *LQ*>0) by quartiles (Unleaded gasoline 95).

	Unleaded gas 95 (0.25)	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**
Constant	1.3091***	1.3387***	1.3542***	1.3093***	1.3322***	1.3482***	1.3070***	1.3217***	1.3436***	1.3077***	1.3288***	1.3446***
	(0.0008)	(0.0008)	(0.0003)	(0.0028)	(0.0083)	(0.0038)	(0.0059)	(0.0117)	(0.0050)	(0.0059)	(0.0094)	(0.0031)
Tourism intensity	**0.0070*** **	**0.0041*** **	**0.0035*** **	**0.0069*** **	**0.0036*** **	**0.0034*** **	**0.0040*** **	**0.0026*** **	**0.0031*** **	**0.0035*** **	**0.0019*** **	**0.0031*** **
	(0.0011)	**(0.0007)**	**(0.0003)**	**(0.0012)**	**(0.0009)**	**(0.0004)**	**(0.0006)**	**(0.0005)**	**(0.0003)**	**(0.0009)**	**(0.0006)**	**(0.0004)**
Tourism intensity²	**-0.0003*** **	**-0.0001*** **	**-0.00007*** **	**-0.0003** **	**-0.0001***	**-0.00007*** **	**-0.0001** **	**-0.00007***	**-0.00006*** **	**-0.0001**	**-0.00002**	**-0.00006*** **
	(0.0001)	**(0.00005)**	**(0.00001)**	**(0.0001)**	**(0.00007)**	**(0.00001)**	**(0.00006)**	**(0.00004)**	**(9.67e-06)**	**(0.0001)**	**(0.00004)**	**(0.00001)**
Vehicles per capita				0.0009	0.0115	0.0084	0.0017	0.0212	0.0134**	0.0005	0.0117	0.0119***
				(0.0033)	(0.0114)	(0.0053)	(0.0075)	(0.0157)	(0.0067)	(0.0080)	(0.0128)	(0.0043)
Population density				-4.30e-07	-1.07e-06***	-9.02e-08	-1.00e-06***	-1.78e-06***	-4.50e-07**	-9.90e-07***	-1.81e-06***	-4.45e-07***
				(2.90e-07)	(3.03e-07)	(1.87e-07)	(2.71e-07)	(3.42e-07)	(2.03e-07)	(2.68e-07)	(3.40e-07)	(1.71e-07)
Petrol Stations per km²				-0.0004	5.56e-06	-0.00008	-0.0002	0.0001	4.86e-06	-0.0002	0.0001	0.00002
				(0.0011)	(0.0003)	(0.0002)	(0.0007)	(0.0002)	(0.0001)	(0.0007)	(0.0004)	(0.0002)
Beach							0.0131***	0.0089***	0.0022***	0.0134***	0.0085***	0.0012
							(0.0026)	(0.0008)	(0.0006)	(0.0023)	(0.0008)	(0.0008)
National Park										0.0167***	0.0124***	0.0078***
										(0.0045)	(0.0015)	(0.0018)
Province capital							0.0074***	0.0089***	0.0049***	0.0085***	0.0090***	0.0056***
							(0.0019)	(0.0010)	(0.0009)	(0.0017)	(0.0008)	(0.0010)
Observations	7522	7522	7522	7522	7522	7522	7522	7522	7522	7067	7067	7067

Table A7. Econometric results. Effect of tourist sites characteristics on petrol prices (a subsample of tourist municipalities) by quartiles (Diesel)

	Diesel (0.25)	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**	**Diesel (0.25)**	**Diesel (0.5)**	**Diesel (0.75)**
Constant	1.2934***	1.3277***	1.3423***	1.2569***	1.2672***	1.3431***	1.2822***	1.2635***	1.3385***
	(0.0107)	(0.0061)	(0.0055)	(0.0132)	(0.0202)	(0.0168)	(0.0135)	(0.0208)	(0.0180)
Average stay	0.0027	0.0005	0.0020	-0.0004	-0.0018*	0.0018	-0.0038	-0.0035**	0.0022
	(0.0032)	(0.0011)	(0.0013)	(0.0027)	(0.0011)	(0.0016)	(0.0045)	(0.0016)	(0.0018)
Occupancy rate	-0.0001	0.0001	0.0001	-0.0002	0.0003**	0.00005	-0.00003	0.0004***	0.0001
	(0.0003)	(0.0002)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0004)	(0.0001)	(0.0001)
No of establishments	-9.96e-06	-0.00002***	-0.00003***	-5.84e-06	-0.00002***	-0.00003***	-2.87e-06	-0.00001***	-0.00003***
	(7.12e-06)	(1.69e-06)	(1.92e-06)	(7.52e-06)	(3.66e-06)	(3.39e-06)	(9.83e-06)	(4.48e-06)	(3.63e-06)
% of travelers from abroad	**0.0681*** (0.0191)**	**0.0386*** (0.0050)**	**0.0272*** (0.0074)**	**0.0844*** (0.0149)**	**0.0267*** (0.0057)**	**0.0250*** (0.0067)**	**0.0790*** (0.0187)**	**0.0189*** (0.0048)**	**0.0201*** (0.0063)**
National park	**0.0252*** (0.0054)**	**0.0161*** (0.0016)**	**0.0059* (0.0031)**	**0.0158*** (0.0056)**	**0.0138*** (0.0022)**	**0.0080*** (0.0031)**	**0.0260*** (0.0055)**	**0.0118*** (0.0028)**	**0.0084** (0.0035)**
Vehicles per capita				0.0690**	0.0861***	0.0028	0.0418*	0.0954***	0.0082
				(0.0276)	(0.0282)	(0.0268)	(0.0240)	(0.0293)	(0.0271)
Population density				-1.62e-06*	-9.42e-07	1.13e-07	-1.67e-06	-9.18e-07	3.49e-07
				(8.43e-07)	(6.98e-07)	(4.05e-07)	(1.66e-06)	(7.13e-07)	(4.10e-07)
Petrol Stations per km²				0.0078	0.0189***	0.0050	0.0114	0.0189***	0.0048
				(0.0071	(0.0060)	(0.0034)	(0.0120)	(0.0064)	(0.0039)
Beach							0.0036	0.0029	-0.0030*
							(0.0059)	(0.0021)	(0.0016)
Province capital							-0.0109*	-0.0056***	-0.0009
							(0.0061)	(0.0019)	(0.0024)
Observations	1464	1464	1464	1464	1464	1464	1464	1464	1464

Table A8. Econometric results. Effect of tourist sites characteristics on petrol prices (a subsample of tourist municipalities) by quartiles (Unleaded gasoline 95)

	Unleaded gas 95 (0.25)	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**	**Unleaded gas 95 (0.25)**	**Unleaded gas 95 (0.5)**	**Unleaded gas 95 (0.75)**
Constant	1.3012***	1.3344***	1.3447***	1.2544***	1.2703***	10.3414***	1.2723***	1.2682***	1.3365***
	(0.0077)	(0.0047)	(0.0028)	(0.0081)	(0.0122)	(0.0130)	(0.0084)	(0.0114)	(0.0119)
Average stay	0.0027	0.0009	0.0024**	0.0022	-0.0008	0.0020**	-0.0027	-0.0028*	0.0027
	(0.0023)	(0.0007)	(0.0011)	(0.0027)	(0.0009)	(0.0009)	(0.0038)	(0.0015)	(0.0017)
Occupancy rate	0.00003	0.00005	0.0001	-6.02e-06	0.0003**	0.0001	0.00004	0.0004***	0.00008
	(0.0003)	(0.0001)	(0.00009)	(0.0003)	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)
No of establishments	-0.00001***	-0.00002***	-0.00003***	-6.28e-06*	-0.00002***	-0.00003***	-4.71e-06	-0.00001***	-0.00003***
	(4.11e-06)	(1.60e-06)	(2.94e-06)	(3.78e-06)	(2.59e-06)	(2.35e-06)	(5.33e-06)	(2.95e-06)	(2.47e-06)
% of travelers from abroad	**0.0420****	**0.0317*****	**0.0248*****	**0.0371****	**0.0172*****	**0.0166*****	**0.0502*****	**0.0128*****	**0.0167*****
	(0.0171)	**(0.0052)**	**(0.0035)**	**(0.0148)**	**(0.0067)**	**(0.0043)**	**(0.0139)**	**(0.0046)**	**(0.0061)**
National park	**0.0301*****	**0.0144*****	**0.0054*****	**0.0218*****	**0.0130*****	**0.0077****	**0.0244*****	**0.0119*****	**0.0073****
	(0.0037)	**(0.0012)**	**(0.0017)**	**(0.0048)**	**(0.0009)**	**(0.0039)**	**(0.0027)**	**(0.0010)**	**(0.0031)**
Vehicles per capita				0.0744***	0.0847***	0.0079	0.0649***	0.0897***	0.0168
				(0.0121)	(0.0156)	(0.0180)	(0.0141)	(0.0155)	(0.0163)
Population density				-6.41e-07	-1.44e-06**	2.19e-07	-1.15e-06	-1.43e-06**	4.44e-07
				(7.87e-07)	(6.58e-07)	(2.49e-07)	(9.07e-07)	(6.04e-07)	(4.33e-07)
Petrol Stations per km²				0.0177**	0.0244***	0.0061***	0.0175***	0.0244***	0.0058*
				(0.0074)	(0.0058)	(0.0024)	(0.0068)	(0.0057)	(0.0031)
Beach							0.0045	0.0014	-0.0033**
							(0.0050)	(0.0018)	(0.0016)
Province capital							-0.0096***	-0.0053***	-0.00006
							(0.0032)	(0.0016)	(0.0018)
Observations	1838	1838	1838	1838	1838	1838	1838	1838	1838