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Online platform price parity clauses: Evidence from the EU Booking.com case☆

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A R T I C L E   I N F O

A B S T R A C T

Online platforms often impose Price Parity Clauses to prevent sellers from charging lower prices on alternative sales channels. We provide quasi-experimental evidence on the full removal of Price Parity Clauses in France in 2015 for hotels listed on *Booking.com*. Our analysis reveals significant price decreases in the short run, but a more limited effect in the medium run. However, hotels characterized by a more complex organizational structure decreased their prices more substantially. Overall, the intervention appears to have benefited a subset of consumers using *Booking.com*.

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1. Introduction

Online platforms are under strict scrutiny in many countries for their dominant position and the use of controversial practices, notably the imposition of Price Parity Clauses. These clauses, which are widespread in many industries such as entertainment, insurance, digital goods, and payment systems, prevent a seller from offering the same product on other platforms or alternative sales channels for a lower price.

Price Parity Clauses raise consequential concerns as they can reduce price competition, incite high agency fees, and set off potential market foreclosure effects (Baker and Scott Morton, 2018; Fletcher and Hviid, 2017). Nonetheless, they are still generally legal in many countries, although in some, antitrust interventions have begun to prohibit them on an *ad hoc* basis that targets specific industries or platforms. So far, no compelling evidence exists on how the removal of these contractual restrictions have affected the pricing behavior of sellers operating on a platform.

Our analysis considers the lodging sector and exploits a particular policy change that affected online travel agencies (OTAs) in 2015. We gather a large and detailed dataset on room level prices from hotels listed on *Booking.com*, the leading OTA in the EU. This allows us to provide quasi-experimental evidence on the short- and medium-run price effects of the Macron Law, which removed Price Parity Clauses in France in 2015. In particular, we perform a difference-in-differences (D-in-D) analysis based on comparing prices posted on *Booking.com* by hotels in the neighboring Mediterranean islands of Corsica (France) and Sardinia (Italy), before and after the policy intervention.

The short-run analysis indicates a significant response of hotel prices on *Booking.com*. In particular, we find a price reduction of 2.6%, and this is noteworthy as it occurred after only a few weeks from the legislative change. Our findings are less pronounced in the medium run, i.e., one year after the Macron Law. In fact, hotels reduced their prices on *Booking.com* by only 1.6%. A possible explanation could be the difficulty of renegotiating contractual agreements with dominant OTAs such as *Booking.com*, which also introduced novel practises in response to the policy intervention.

A more positive response is borne out when considering highly rated and chain hotels. These establishments displayed a more pronounced price reduction, albeit not always statistically significant, both in the short and in the medium run. This could be explained by different factors, including the use of more distribution channels (European Competition Network, 2017), and a higher reputation and contractual power (Kosová and Lafontaine, 2012; Hollenbeck, 2017). Remarkably, hotel prices on *Booking.com* dropped by approximately 12% for 3 star hotels, one year after the Macron Law. This effect indicates that, in the season after the law was introduced, tourists lodging in Corsica in the 3 star hotels of our sample could have saved between 11.17 and 13.03 million euros.

Price Parity Clauses, a particular type of "Most Favored Nation" vertical restraints, are usually divided into two types (Wang and Wright, 2020). In the context of the lodging sector, a "wide" Price Parity Clause requires that the price charged by hotels on OTAs cannot be reduced when selling via alternative channels, including direct selling (e.g., the hotel website). A "narrow" Price Parity Clause is less rigid, as it allows hotels to lower the price when selling through rival OTAs, but not when selling directly through their website, unless the discount is part of a loyalty program.

The narrow version may represent a compromise between increasing competition in the sector and rewarding OTAs for the service they provide (Ezrachi, 2015). In absence of any form of price parity, consumers would simply consult OTAs to compare prices, and then book through direct channels if these offer better deals, a phenomenon called "showrooming". However, narrow price parities may have similar anti-competitive effects as wide ones. Hotels, in fact, may not want to offer a room on their website at a higher price than on one of the OTAs they use. This point is supported by the Bundeskartellamt (the German antitrust authority), according to which narrow Price Parity Clauses do not provide sufficient incentives for hotels to price differentiate across sales channels.

Both types of parity clauses have therefore raised serious anti-competitive concerns. In response, antitrust authorities and policy makers have suggested that only their full elimination may enhance competition in a sector characterized by high concentration.[1] For this reason, we study the price effects of the legislative intervention banning every type of Price Parity Clauses in France (Macron Law, August 2015). We do so by focusing on a large sample of hotels listed on *Booking.com* in Corsica and Sardinia. These regions are geographically close and represent comparable alternatives for potential visitors.[2] Prices and detailed room level characteristics are available before and after the event.

Gathering empirical evidence on the effects of eliminating Price Parity Clauses is particularly important as there is no current international consensus on the need to intervene. For example, antitrust authorities in the EU have brought cases against Amazon, prompting the company to drop these clauses in 2017. In the US, Amazon was compelled to do the same in 2019, but only as a result of political pressure, as no formal investigation was opened. Nevertheless, unlike the European experience, a recent complaint against OTAs in the US was dismissed without even addressing the question of whether or not Price Parity Clauses harm competition.[3]

Legal and economic scholars are, however, taking a firm stand on this issue. Fletcher and Hviid (2017) and Baker and Scott Morton (2018) reiterated that prices are bound to increase due to platform Most Favored Nation clauses. The latter also stress that antitrust enforcement against parity clauses should be a priority in the US. Jean Tirole, in a recent interview, criticized these clauses, arguing that "if the platform is guaranteed the lowest price, there is no incentive for you to look anywhere else; you have become a 'unique' customer, and so the platform can set large fees to the merchant to get access to you".[4]

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[1] *Booking.com* dominates the European OTA market with a 65.6% market share, as of 2017. Including Expedia and HRS, the aggregate market share is about 86%. Source: HOTREC, available at: https://www.hotrec.eu/european-hotel-distribution-study-2018/.

[2] These islands attract similar types of tourists not only for the beauty of their beaches, but also for their ancient culture, art, architecture, and for their cuisine, which is rooted in the traditional and distinct flavours and foods of the Mediterranean. The Mediterranean diet, for example, is part of the "Intangible heritage" protected by UNESCO.

[3] Online Travel Co. Hotel Booking Antitrust Litig., 997 F. Supp. 2d 526 (N.D. Tex. 2014).

[4] Econ Focus, Fourth Quarter 2017, available at: https://www.richmondfed.org/publications/research/econ_focus/2017/q4/interview.

The rest of the article is structured as follows. Section 2 reviews the related literature to highlight both the conceptual underpinnings of our analysis (2.1) and the available empirical evidence in order to better position our contribution (2.2). Section 3 illustrates the main cases involving *Booking.com* in the EU. Section 4 presents the data used in this study. Section 5 explains our empirical strategy. Section 6 considers the price effects of the Macron Law in the short run, whereas Section 7 focuses on its effects in the medium run. Section 8 concludes and draws the policy implications of our analysis.

2. Related literature and contribution

2.1. Theoretical background and predictions

Price Parity Clauses are applied on platforms where the contractual relationship usually follows the "agency model": sellers decide the final price on the platform, which charges a commission rate per transaction. As per *Booking.com*, the commission percentage usually ranges between 15 and 25%, depending on property type, location, and ancillary services offered by the OTA. The growing attention to the economic effects of Price Parity Clauses within agency models has attracted a large body of recent theoretical research, which provides the underpinning of our empirical analysis.

Boik and Corts (2016) set up a model with elastic demand and linear fees, in which a unique supplier reaches consumers through two platforms. Johnson (2017) considers instead inelastic demand and revenue-sharing with multiple suppliers and platforms. Both articles find that Price Parity Clauses soften competition between retailers and lead to higher commission fees and prices. Johansen and Vergé (2017) consider two platforms, several suppliers and consumers with elastic demand. A key element of their analysis is the interplay between suppliers' substitutability and their possibility to also sell directly, which imposes a limit to the fees platforms can charge. When competitive pressure on the supplier side is relatively intense, higher fees and final prices do not necessarily result from the imposition of Price Parity Clauses.

Edelman and Wright (2015) examine consumers' decision to either purchase directly or through platforms. Price Parity Clauses harm consumers by diverting them from direct channels, thereby increasing the final prices and leading to excessive investment in ancillary benefits provided by the platform. Wang and Wright (2020) propose a model related to Edelman and Wright (2015) in which platforms provide both search and intermediation. Consumers positively value these services, but can decide to free-ride if direct purchasing is allowed. In this context, wide Price Parity Clauses prevent a showrooming behavior but hamper competition among platforms. On the contrary, narrow Price Parity Clauses may preserve competition, while at the same time avoiding free-riding on the platforms' search services.

Importantly for the ensuing analysis, a common trait of this literature is that prices are expected to decrease, both on the direct channels and on the platforms, following the removal of Price Parity Clauses. This can be the result of different factors, that are highly intertwined. The elimination of restrictive price clauses should enhance price competition among sales channels, especially for those hotels that were listed on multiple platforms and already used a direct channel. These hotels may also be able to successfully renegotiate their contracts with OTAs to obtain a reduction of the commission fees, paving the way for further price adjustments in the medium run.

In this perspective, we can identify specific hotels' characteristics that may lead to a prompter and more intense response to the elimination of Price Parity Clauses. For instance, chain affiliation may provide hotels with informational and reputational advantages (Baum and Ingram, 1998; Hollenbeck, 2017), rendering therefore these hotels less reliant on OTAs. Similarly, a higher star rating may signal better managerial practices, including revenue management (Hollenbeck, 2017) and active pricing (Melis and Piga, 2017). Finally, larger-size hotels may enjoy economies of scale in information gathering and processing (Abrate and Viglia, 2016), and benefit from competitive strength to effectively adjust prices (Baum and Ingram, 1998). Notably, all these characteristics are usually associated with establishments that successfully manage direct channels, which become an even more credible alternative to OTAs when price parities are removed.

2.2. Empirical work and contribution

Recent empirical research has tried to overcome the dearth of data in order to shed more light on the complex issues raised by the agency model. De los Santos and Wildenbeest (2017) focus on the competitive effects of different supplier-platform vertical relationships in the US e-books sector.[5] The authors employ a D-in-D strategy to investigate the impact on retail prices of the switch from the agency to the wholesale model and document sharp price decreases. As the OTA sector is characterized by the agency model, our analysis focuses more specifically on removing Price Parity Clauses and we provide a first assessment of the short- and medium-run price effects of such a provision.

Hunold et al. (2018) use metasearch data of more than 30,000 hotels in different countries collected from Kayak from January 2016 to January 2017. Their study focuses on hotels in Germany, a country that *fully abolished* price parities early in 2016. They find the elimination of these clauses incentivized hotels to expand room availability on OTAs and increased the number of sales channels. Interestingly, they also show that especially chain hotels charged the lowest price on the direct channel more often in Germany than in countries that did not abolish such clauses. Ennis et al. (2020) consider proprietary

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[5] Following the entry of Apple, US publishers switched to the agency model, in an attempt to retain control on prices and ease the downward pricing pressure exerted by Amazon. Interestingly, Apple imposed a platform Price Parity Clause, which was suspended after a Department of Justice legal suit; publishers were forced to revert to the wholesale model by which final prices are set by the distributing platforms.

Table 1

Main decisions on Price Parity Clauses (PPCs) in the EU, 2015-17.

Apr 2015	Decisions by the French, Italian and Swedish competition authorities:
	Booking.com commits to switch from wide to narrow PPCs
Jul 2015	*Booking.com*'s commitment comes into effect in the EU;
	Macron Law adopted by the French National Assembly
Aug 2015	**Macron Law promulgated in France: all PPCs prohibited**
Oct 2015	Italian Parliament proposes a law to eliminate all PPCs
Dec 2015	Bundeskartellamt prohibits *Booking.com* from applying PPCs
No. 2016	Austrian Parliament approves a law eliminating all PPCs
Aug 2017	Italian Parliament approves Liberalization Law: all PPCs prohibited
No. 2017	Belgian Government proposes to outlaw all PPCs

hotel-level data for 2014 and 2016, for a group of hotel chains both in the EU and around the world. Their evidence suggests that the EU *switch from wide to narrow* price parities was associated with a price decrease on direct channels, especially for more expensive hotels. They interpret this finding in the light of the fact that chain hotels have recognized direct sales channels where they can offer loyalty programs' discounts, that were allowed in the EU under the commitment to switch to narrow price parities.

This empirical literature suggests that more complex organized units were better able to exploit the policy changes. Chain hotels, for instance, are more likely than independent hotels to use a direct channel (European Competition Network, 2017), which represents a credible substitute to OTAs, especially after the removal of price restrictions. Lu et al. (2015) find that introducing a new online direct sales channel led to a significant reduction of hotel prices at physical travel agents. Cazaubiel et al. (2020) use proprietary booking level data in order to estimate the substitution between OTAs and the direct channel. Their findings hint to a strong loyalty of consumers to the chosen OTA and to a higher substitutability across hotels than across sales channels. Nevertheless, they also confirm that the direct channel is a credible alternative to OTAs.

Our paper both differs and complements the empirical analysis carried out in the literature. We focus exclusively on prices directly scraped from *Booking.com*. However, our data are extremely detailed, thus allowing for a precise matching of hotel rooms by type, characteristics, and quality. Furthermore, we can evaluate the behavior of prices before and after the policy changes and implement a fully fledged D-in-D analysis. Importantly, we go beyond the price leadership of the direct channel and investigate the *price effects* of removing price parities from Europe's most used OTA platform. Notwithstanding the different samples and approach, our results are coherent with the findings of the aforementioned studies. Indeed, we do find significant price reductions on *Booking.com*, especially in the short run, and particularly for highly rated and chain hotels. These results, combined with the documented increased channel substitution (Hunold et al., 2018) and lower transaction prices offered by a group of chain hotels (Ennis et al., 2020), help putting together an overarching analysis of the effect of removing Price Parity Clauses on all the different sales channels.

We also contribute to recent empirical evidence on the impact of regulation on platform pricing. Chen and Liu (2011) investigate the effects of Most-Favored Customer clauses on price competition among major electronics retail platforms, and find that prices diminished after adopting these clauses.[6] Ater and Rigbi (2019) evaluate the impact of a price transparency regulation imposed on Israeli supermarkets. Using a D-in-D approach, they document a price drop resulting from mandatory online disclosure.

3. The EU *Booking.com* case

In the period 2015-17, several important events occurred in the EU regarding the use of Price Parity Clauses. Table 1 briefly summarizes the main decisions, with a particular focus on those related to *Booking.com*.

Following the complaints filed by trade groups representing hotel owners, national competition authorities opened inquiries on *Booking.com* and other dominant OTAs. In Germany, the Bundeskartellamt prohibited HRS (Hotel Reservation Service) from using Price Parity Clauses and, in December 2015, it reached a similar decision against *Booking.com*. In April 2015, the French, Italian and Swedish competition authorities accepted *Booking.com*'s commitment to switch from wide to narrow Price Parity Clauses. The commitment came into effect across all EU countries on July 1st, 2015.[7]

Crucially for our analysis, France went even further, and on July 9th, 2015, the Parliament passed the Macron Law (Law on Economic Growth and Activity no. 2015-990), according to which *all* Price Parity Clauses were banned. The provision was promulgated on August 6th, 2015. This event enables our experimental design as it differently impacts the regions we consider. For this reason, it will be the main focus of our empirical analysis. Similar laws were enacted in Austria in November 2016 and in Italy in August 2017. This latter episode (Italy's Liberalization Law no. 124/2017) will also be analyzed in relation to its short-run price effects, despite taking place long after the 2015 main events (see Appendix F).

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[6] These clauses guarantee refunds to buyers in case future discounts by the same retailer become available on the product they purchased.

[7] Other countries participating at some stage to the EU investigation were Belgium, the Czech Republic, Germany, Hungary, Ireland, the Netherlands, and the UK.

Fig. 1. Western Mediterranean Islands.

A first-hand evaluation, mainly focusing on the removal of wide Price Parity Clauses in the EU, was provided by the European Competition Network (2017). The analysis was based upon a survey filled out by 16,000 hotels in ten member countries, complemented by data on hotel room prices from metasearch websites. The report monitored price differentiation and room availability among sales channels. Its findings point towards: (i) a scarce propensity of hoteliers to charge different prices on alternative sales channels; (ii) a limited awareness of the policy changes that affected the sector; (iii) only minor changes in the commission fees following the major decisions. Finding (i) suggests that hotels were reluctant to price differentiate. In France and Germany, however, an increased probability of price reductions was documented for chain hotels, in line with Hunold et al. (2018). Our article adds to this evidence by providing a fully fledged identification of the price effects on *Booking.com* of the complete removal of price parities.

4. Data

The empirical analysis is based on data retrieved from *Booking.com* before and after the main events of the 2015-17 period in France and Italy, as described in Table 1. The data cover two tourist regions in the Mediterranean: Corsica (France) and Sardinia (Italy). These regions consist of islands that have fairly similar characteristics and use the same currency (the Euro), thereby representing comparable alternatives for potential visitors. Fig. 1 shows that the regions are all located in the Western Mediterranean, and are only separated by a narrow strait.

Of particular interest for our analysis, the regions belong to countries that have been affected by the European inquiries on *Booking.com* and its successive developments, though at different times. In particular, France removed all types of Price Parity Clauses in August 2015, while Italy did the same only in August 2017.

The data were retrieved using a "web crawler", designed to connect automatically to *Booking.com*. The crawler launched queries to book accommodation in all the lodging establishments in the two regions. It then saved information about the posted prices, together with the characteristics of the rooms available at each establishment.

The crawler operated on a daily basis, retrieving room prices for the following stay dates: from June 1st to November 30th 2014, from March 17th to November 30th 2015, from August 31st to November 30th 2016, and the entire month of September 2017. Room prices refer to a specific product identified by the combination of hotel, room type and date of stay; prices were tracked during the booking period, i.e., *in advance* of the stay date, so that we were able to observe whether room prices changed after the policy measure was implemented.

More precisely, for each stay date, the crawler issued queries starting from 70 days prior to and up to one day before the stay. The frequency of the queries was every five to ten days. Within the last fortnight, the query frequency intensified to track more closely the room pricing as the stay date approached. Overall, the crawler gathered information on 3,948,414 price points on 1,097,426 hotel rooms.

We verified the *Booking.com*'s server did not alter prices in response to a high number of queries or based on their geographical origin (the UK). To this purpose, we regularly checked that the prices collected by the crawler were identical to those obtained from queries by a computer located outside the UK, and not routinely used for data collection. Hence, we did not find evidence of geo-discrimination or dynamic updating of prices, in line with Cavallo (2017) and Gorodnichenko and Talavera (2017), among others.

Table 2
Hotel characteristics.

	Corsica			Sardinia		
	Obs	Mean	StdDev	Obs	Mean	StdDev
Number of rooms	343	28.90	28.73	465	37.91	52.70
Star rating	258	2.97	0.75	316	3.45	0.69
Chain affiliation	343	0.07	0.26	465	0.04	0.20
Users' rating	343	7.98	0.75	457	8.31	0.74
Number of reviewers	342	270.04	218.22	457	202.61	259.49
On Booking.com since	343	07Aug2011	797.31	465	29May2011	869.89

Finally, we also retrieved data on the characteristics of the lodging establishments (e.g., type of establishment, total number of rooms, stars, users' ratings). For the purpose of our analysis, we focus only on establishments listed as hotels.[8]

The estimation samples comprise a total of 808 establishments registered on *Booking.com* as hotels: 343 in Corsica and 465 in Sardinia.[9] Table 2 presents the characteristics of these hotels, showing that they are rather homogeneous in the two regions. In fact, the average size varies between 28 and 38 rooms, and hotels also have similar experience using the platform, having started on average between May and August 2011.

Notice that between 4 and 7% of hotels in Corsica and Sardinia are affiliated with a chain. Importantly for the ensuing analysis, Corsica has 25 chain hotels and Sardinia 20, respectively 12.75 and 12.89% of the rooms in our samples. The two islands have a similar average hotel quality, as proxied by both review scores on *Booking.com* (7.98 in Corsica and 8.31 in Sardinia) and star rating (2.97 and 3.45, respectively).

Fig. 2, panel (a), presents a graphical overview of prices in 2015. The focus is on the mean price of a double room, the most common in our sample, for stay dates from April to October, aggregated at weekly level. The figure shows that seasonal variability is well captured by our data, and the peak prices are obviously registered in August in both regions. The solid vertical line is set on the date in which the Macron Law was promulgated, corresponding to week 32. The dashed line refers instead to the date in which this law was passed, corresponding to week 28.

Finally, Fig. 2, panel (b), displays airport arrivals (number of passengers) in the regions under study, a proxy for tourist flows for the period between January 2014 and January 2017. Also in this figure it is evident that a seasonal trend characterizes the islands of our study. A similar seasonal pattern is also displayed by both Google Trends search activities for hotels and hotel availability at town level. We will further discuss these variables in Section 5 and use them as controls in the ensuing empirical analysis.

5. Empirical strategy

We aim to evaluate the causal effect of the legislative ban of Price Parity Clauses in France on hotel prices posted on *Booking.com*. The event is the Macron Law, that was adopted on July 9th, and then officially came into force on August 6th, 2015.[10] We mainly focus on the promulgation of the law but also consider the impact of its adoption.

Our data have a panel structure. A panel identifier defines a *unique product*, s, which is the combination of room type r, date of stay t, and hotel i of region j, $j = 1, 2$. The temporal dimension of the panel is denoted by the number of days d ahead of stay. For example, the posted prices of a double room with no breakfast and free cancellation for September 10th, 2015 at Hotel Olimpia in Baja Sardinia (Sardinia, Italy) are tracked between 70 days and the last day before the stay, (i.e., September 9th, 2015) a period long enough to include observations before and after the implementation of the Macron Law.

Given this panel structure, we use different empirical models to estimate the causal effect of removing Price Parity Clauses on hotel prices. The outcome variable, $\ln p_{sd} \times 100$, is the natural logarithm of the price of product s, d days ahead of stay, multiplied by 100 for an easier interpretation of the results. The specification underlying our graphical analysis of common trends is:

$$\ln p_{sd} \times 100 = \alpha_s + \sum_{k=-t_1}^{t_2} \beta_{jk} \, Treated^*D_k + \theta \, Z_{sd} + \sum_{j=1}^{2} \eta_j \, d \,^*R_j + u_{sd} \tag{1}$$

where s identifies a unique product (room/stay date/hotel) and d the number of days ahead of stay. The variable *Treated* is a dummy that takes value 1 if the room s is in the "treated" region (Corsica). D represents a set of weekly dummy variables, switching on if the event under study is k periods away (e.g., the variable D_{-2} switches on for observations collected two weeks before August 6th, 2015). The time span covers t_1 weeks before and t_2 weeks after the event. The parameters β_{jk} capture the percentage price difference in region j, k weeks away from the event.

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[8] Data on apartments, villas and other lodging establishments tend to be more "noisy". Indeed, many of these are small family-run businesses or private properties rented for the summer period. Their listing and pricing strategies are likely to be affected by a high number of factors (e.g., recurring consumers visiting every year in the same period), the clauses imposed by *Booking.com* being only one of them. Finally and most importantly, in contrast to aparthotels and B&Bs, hotels are more likely to have a direct sales channel.

[9] For the locations in each region of the sample, the data are highly representative of the market as most hotels are listed on *Booking.com*.

[10] In Appendix F we analyze Italy's Liberalization Law, a similar intervention that banned all types of Price Parity Clauses in 2017.
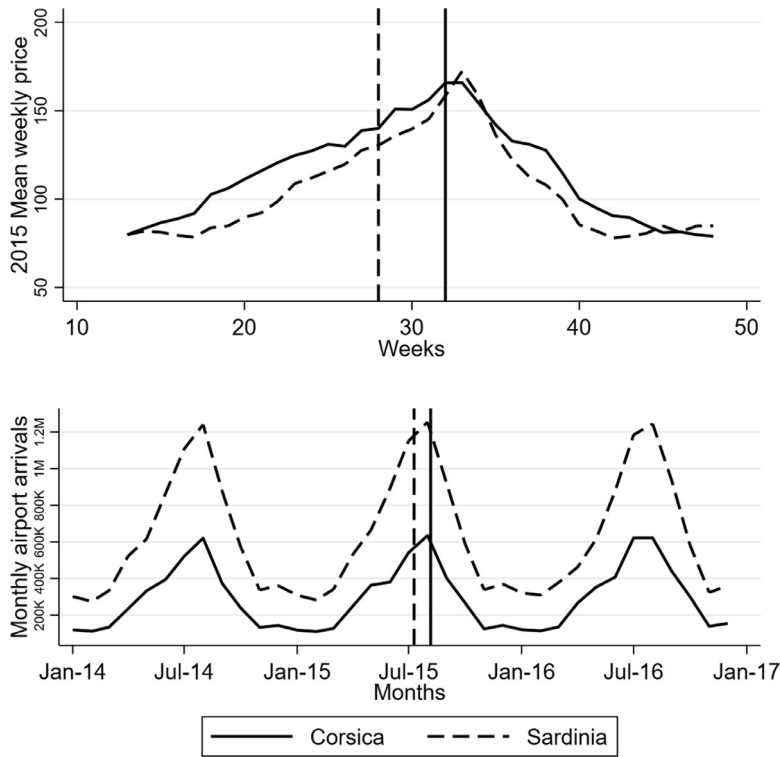
Fig. 2. (a) Weekly mean price in Euros of a double room on *Booking.com* in 2015. Vertical lines: Macron Law's adoption (week 28) and promulgation (week 32).

To control for possible different patterns throughout the booking period, Eq. (1) includes a booking time trend for panels in each region R_j. Furthermore, we introduce a vector of controls, Z, which takes care of potential "local" demand shocks. We incorporate Google Trends search activities for hotels in Corsica and Sardinia. We also add an indicator of hotel availability at town level. Both these controls are further discussed below. Finally, α_s is a product level fixed effect capturing potential time invariant unobservables (e.g., hotel or room specific shocks) that may bias the estimates.

Our baseline specification is a variant of a D-in-D model with fixed effects to establish the average impact of the policy changes. The outcome variable is again $\ln p_{sd} \times 100$, i.e., the natural logarithm of the price of product s, d days ahead of stay, multiplied by 100. We focus on rooms for stay dates after the event and exploit price variations along the booking period, before and after the promulgation of the Macron Law.

In particular, in our baseline D-in-D analysis, we adopt the following specification:

$$\ln p_{sd} \times 100 = \alpha_s + \beta_1 \; PostLaw + \beta_2 \; Treated^*PostLaw + \theta \; Z_{sd} + \sum_{j=1}^{2} \eta_j \; d \; {}^*R_j + u_{sd} \tag{2}$$

where s identifies a unique product (room/stay date/hotel) and d the number of days ahead of stay. The variable *Treated* is a dummy that takes value 1 if the room s is in Corsica; *PostLaw* denotes a dummy variable that switches on for room prices posted after the legislation comes into force (e.g., observations collected after August 6th, 2015).

The main parameter of interest is β_2, which captures the D-in-D effect of the legislative intervention. This coefficient represents the difference between the average percentage price variation before and after the Macron Law, for hotel rooms in Corsica *vis-à-vis* hotel rooms in Sardinia. As in (1), we control for possible different trends throughout the booking period and potential local demand shocks (Google Trends search activities and town level hotel availability). We also include a product level fixed effect.

Identification of causal effects through model (2) requires a common pre-treatment trend. This drove us to choose Sardinia as the control group. The two regions, in fact, are geographically very close (Fig. 1) but institutionally separated, i.e., subject to French and Italian legislation, respectively. Moreover, these regions experienced similar patterns in tourism flows in the period of study, as confirmed by Fig. 2, panel (b). Their hotels also have relatively similar structural characteristics (Table 2), as compared to other Mediterranean islands.[11] Further evidence to establish common pre-trends will be provided using the event study specification (1).

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[11] For example, in the Balearic Islands large and chain hotels are more common. During the period of our study, hotels listed on *Booking.com* had on average 100 rooms and 33% were affiliated with a chain.
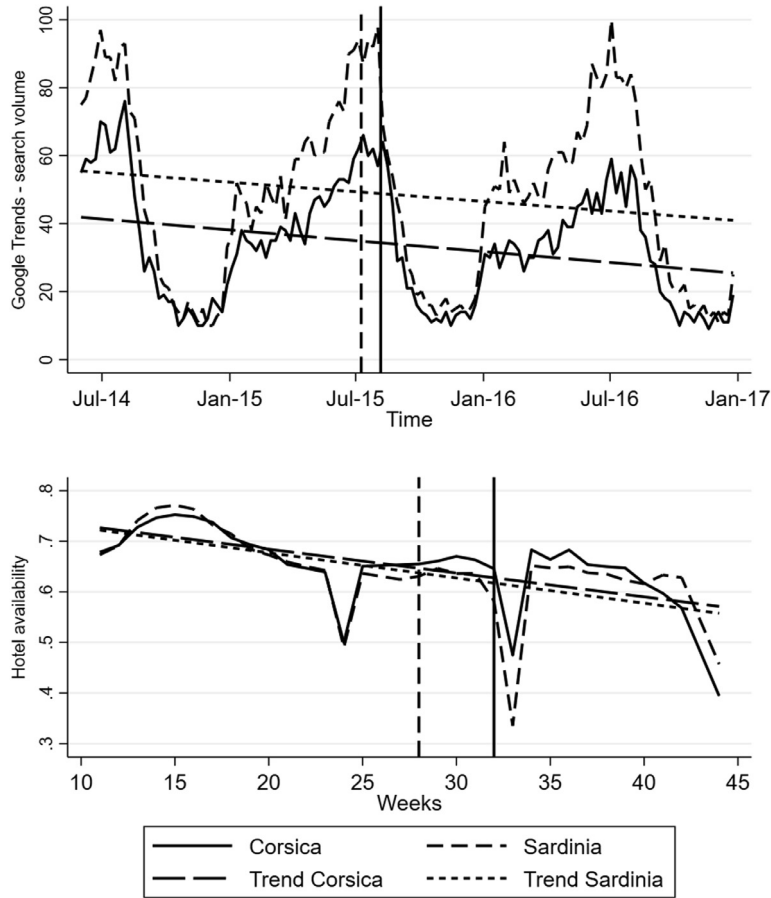
Fig. 3. (a) Google searches for "Hotel in Corsica" and "Hotel in Sardinia": Google Trends weekly data and linear time trends. Vertical lines: Macron Law. Google Trends measures are normalized by the maximum search volume and scaled between 0 and 100.

An underlying assumption of the D-in-D analysis is that hotel prices on *Booking.com* in Sardinia are independent from those in Corsica. This is supported by all demand proxies employed in our analysis, indicating limited tourism shifts between the two destinations, both in the short and medium run. In particular, Google Trends online searches should capture major changes in tourist interest following the legislative intervention. Yet, Fig. 3, panel (a), shows that searches for both Corsica and Sardinia followed a very similar trend, both before and after the promulgation of the Macron Law. As a consequence, we rule out a possible competitive reaction by Sardinian hotels on *Booking.com*.

Given common pre-trends and independence, our research design would still be invalid if local shocks systematically affected hotel prices. Fig. 3, panel (b), points to a common pattern in tourism flows as measured by the availability of hotels at town level. This is relevant as it supports the view that the two regions are subject to similar shocks.

The specification in Eq. (2) focuses on the price effect of the policy change on the average hotel. Moreover, as discussed in Section 2.1, there exist specific characteristics that are likely to affect hotels' propensity to react to the policy changes. In particular, we focus on the following three typologies. First, we distinguish hotels based on whether or not they are affiliated to a chain. Second, hotels are categorized by star rating, as reported on *Booking.com*. Lastly, hotels are divided into three groups according to their size: hotels with less than 25 rooms are defined as Small, those with a number of rooms between 25 and 99 are Medium, and hotels featuring more than 99 rooms are Large.

In order to test for these *heterogeneous effects*, we interact the *Treated *PostLaw* terms with hotels grouped by chain affiliation, star rating, and size. The triple interaction model specification is then:

$$\ln p_{sd} \times 100 = \alpha_s + \beta_1 PostLaw + \beta_2 Treated^*PostLaw + \sum_{g=1}^{G} \gamma_g \ Treated^*PostLaw^*Group_g + \theta \ Z_{sd} + \sum_{j=1}^{2} \eta_j \ d \ ^*R_j + u_{sd}$$

(3)

The parameters of interest are γ_g, which capture the triple interaction effect of the legislation in the treated region on hotels in *Group g*, $g = 1, \dots, G$. A similar triple interaction model is used to enrich the event study specification (1).
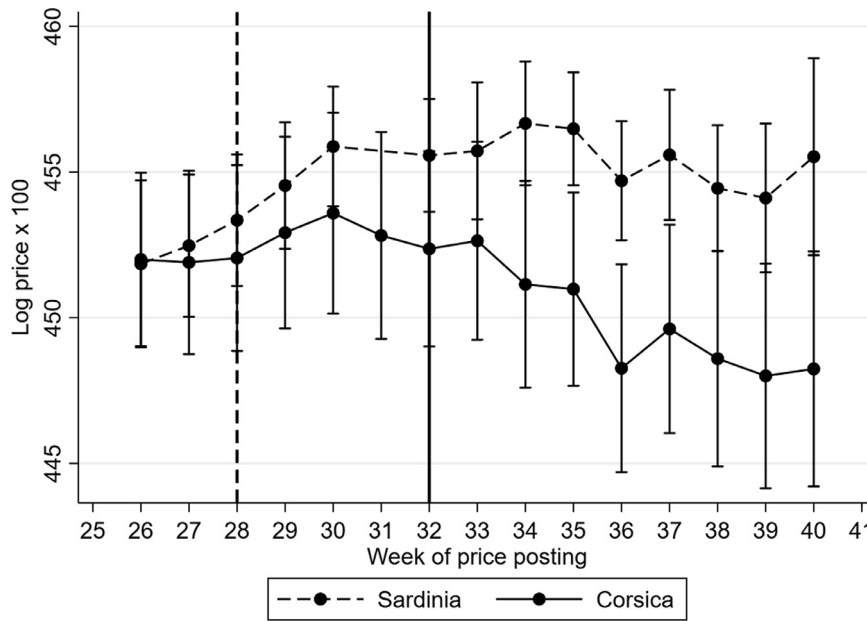
Fig. 4. Event study of prices before and after the Macron Law: Corsica vs Sardinia.

Furthermore, given the well-known problems of biased standard errors in D-in-D models (Bertrand et al., 2004), we follow the suggestion by Angrist and Pischke (2008) to cluster standard errors on a higher level of aggregation, which in our case is the hotel.

6. Short-run effects of eliminating Price Parities in France

6.1. Event study

We start our analysis of the short-run price effects of the Macron Law by plotting in Fig. 4 the predicted values of the event study from Eq. (1).[12] These values refer to dates of stay between September 1st and October 20th, 2015. Hence, we study prices posted within two and a half months from the promulgation of the law: this characterizes our definition of short run. Moreover, in an effort to keep a relatively balanced panel, we consider three observations before and after the event, when available: the first, the last and the median observation of each panel. As a result of this strategy about 50% of the observations fall within a window of twenty days before and after the Macron Law, and more than 90% within a window of thirty days.[13]

The estimated prices indicate a slight but insignificant divergence before the policy change. Notice that this price gap starts when the law was adopted (July 9th, dashed line in the figure), as some hotels may have started reducing their prices right after. This possible "anticipation effect" will be further discussed below.

6.2. D-in-D evidence

While we use the graphical representation of the event study specification to establish common trends, we then employ the baseline D-in-D model to estimate the average effect of the policy change on hotel prices on *Booking.com*. We apply the same window of dates and balancing of observations as in the event study.

Column (1) of Table 3 reports the estimated coefficients of Eq. (2). The D-in-D coefficient of interest (*PostLaw*Treated*) indicates that hotel prices in Corsica decreased relatively to those in Sardinia after the Macron Law. The estimated effect is 2.583% and it is statistically significant. This is in line with the predictions of the theoretical models reviewed in Section 2.1. Notice that such pro-competitive price effect occurred relatively quickly, only few weeks from the legislative intervention.

Moreover, the coefficients for the number of days before the stay (*Days*Corsica* and *Days*Sardinia*) demonstrate the importance of controlling for different trends throughout the booking period. Consistently with intuition, Google Search activities positively affect the room price: higher expected demand, as proxied by potential guests' interest, is associated with higher prices. Furthermore, hotel availability in town affects negatively and significantly the price of a room: lower demand is associated to lower prices.

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[12] Similar figures for event studies by star rating, size, and chain affiliation are reported in Appendix A.

[13] Additional information on distribution of the width of the windows can be found in Appendix B.

Table 3

Removing Price Parity Clauses: the short-run effect of the Macron Law. D-in-D and Triple interaction specifications.

Variables	(1) D-in-D Corsica v Sardinia	(2) Triple interaction Chains	(3) Triple interaction Star rating	(4) Triple interaction Size
PostLaw*Treated	−2.583***			
	(0.859)			
PostLaw*Treated*NoChain		−2.500***		
		(0.872)		
PostLaw*Treated*Chain		−6.104		
		(3.982)		
PostLaw*Treated*1Star			2.063	
			(2.911)	
PostLaw*Treated*2Stars			−2.371	
			(1.710)	
PostLaw*Treated*3Stars			−3.811**	
			(1.519)	
PostLaw*Treated*4Stars			−6.253***	
			(2.244)	
PostLaw*Treated*5Stars			1.153	
			(5.955)	
PostLaw*Treated*SmallSize				−0.726
				(1.112)
PostLaw*Treated*MediumSize				−4.108***
				(1.583)
PostLaw*Treated*LargeSize				−3.999
				(2.768)
Days*Corsica	−0.0224	−0.0225	−0.0223	−0.0230
	(0.0181)	(0.0180)	(0.0181)	(0.0180)
Days*Sardinia	−0.0840***	−0.0829***	−0.0829***	−0.0813***
	(0.0229)	(0.0228)	(0.0227)	(0.0225)
Google Searches	0.101***	0.101***	0.101***	0.101***
	(0.0174)	(0.0173)	(0.0174)	(0.0174)
Hotel availability	−5.075***	−5.046***	−5.351***	−5.206***
	(1.658)	(1.650)	(1.654)	(1.649)
Constant	453.8***	453.8***	454.0***	453.9***
	(1.776)	(1.770)	(1.769)	(1.771)
Observations	78,825	78,825	78,825	78,825
R-squared	0.951	0.951	0.951	0.951

Notes. Dependent variable: Logarithm of room price × 100. Stay dates: 1 September to 20 October 2015. Treated: Corsica; Control: Sardinia; PostLaw: dates after 6 August 2015. Robust standard errors in parentheses, clustered at hotel level. *** p<0.01, ** p<0.05, * p<0.1.

We then investigate if specific hotel characteristics have an impact on price adjustments. On the basis of the discussion in Sections 2.1 and 5, we focus on chain affiliation, star rating and hotel size. Columns (2)–(4) of Table 3 show the triple interaction coefficients for the Macron Law. Column (2) focuses on chain affiliation, and it confirms the results of the D-in-D analysis for independent hotels (*PostLaw*Treated*NoChain*). Moreover, the legislative intervention led to more substantial price decreases in hotels affiliated with chains (approximately 6%), compared to the control group. Notice, however, that this effect is not statistically significant and, *a fortiori*, not significantly different from the effect on independent hotels (F=2.35, p=0.126).

Column (3) reports the results for star rating, and it indicates significant and more pronounced price decreases for 3 and 4 star hotels. Also 2 star hotels lowered their price, but in line with the overall average effect of Column (1). This effect is, however, not significant. The effects for 2, 3, and 4 star hotels are not statistically different from each other. Column (4) additionally shows that size plays a role: medium- and large-size hotels in Corsica lowered their prices by about 4% after the Macron Law, but only the first result is statistically significant. Whereas the effect for large and small hotels is not statistically different (F=2.09, p=0.149), the difference between medium and small hotels is highly significant (F=6.74, p=0.009).[14]

Overall, Columns (2)–(4) display systematic price reductions, between 2 and 6%, although not always statistically significant. The large standard errors can be related to the relatively small number of hotels in some of the groups considered. For example, in our sample there are 25 hotels affiliated with chains in Corsica and 20 in Sardinia. This may affect the statistical power of our tests, but not invalidate the estimated effects.

The above finding is obtained by considering the actual promulgation of the law (August 6th, 2015). However, Fig. 4, together with the evidence in Appendix A, hints at a possible anticipation effect following the adoption of the law (July 9th, 2015). For instance, some hotels in Corsica might have started to offer cheaper prices already in July on their direct

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[14] All the results of the statistical test of each effect are reported in Appendix C.

Table 4

Removing Price Parity Clauses: the short-run effects for hotel categories anticipating the promulgation of the Macron Law. Triple interaction specifications.

	(1) Anticipation Chain hotels	(2) Anticipation 4 Star Hotels	(3) Anticipation Medium Size Hotels	(4) Anticipation Large Size Hotels
Triple interaction effect	−6.232*	−8.010***	−2.334	−6.909**
	(3.189)	(2.350)	(1.466)	(3.059)
Observations	82,922	82,922	82,922	82,922
R-squared	0.962	0.962	0.962	0.962

Notes. Dependent variable: Logarithm of room price × 100. Stay dates: 20 July to 1 September 2015. Treated: Corsica; Control: Sardinia; PostLaw: dates after 9 July 2015. Robust standard errors in parentheses, clustered at hotel level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

channels, not fearing consequences from *Booking.com*. The increased competition could have led hotels to reduce prices also on the platform. In order to test this hypothesis, we ran our D-in-D specification, focusing on the four weeks separating the adoption and the promulgation of the law as the post intervention period.

The results, reported in Appendix D, Table D.1, only partially support a significant price reduction before the promulgation. Indeed, the impact on the average hotel was minor and not significant, which leads us to rule out a widespread anticipation effect. However, in line with the graphical evidence of the event study, some groups of hotels started to decrease their prices on *Booking.com* right after the adoption of the law: these are hotels affiliated to chains, 4 star rated hotels, medium- and large-size hotels.

As anticipation constitutes a threat to the correct estimate of the magnitude of the short-run price effects, we complement the results in Table 3 with an analysis of the triple interaction effects for the groups identified above, setting the date of the event on July 9th, 2015. Table 4 confirms that the magnitude of the effect on chain hotels is similar to what previously estimated, but it is now weakly significant. When allowing for anticipatory responses, the effect decreases for medium-size hotels, whereas it increases for 4 star and large hotels. Overall, anticipation effects do not substantially change the picture emerging from Table 3.

There are several reasons which can explain an heterogeneous short-run response of hotels. For instance, chain affiliation usually provides hotels with informational advantages (Baum and Ingram, 1998), which helps them to understand the pricing implications of the policy changes. This may explain why chains decreased their prices by more than double with respect to independent hotels. Similarly, more complex organizational units such as 3 and 4 star hotels, or medium and large establishments, are likely to enjoy better managerial practices (Hollenbeck, 2017) and economies of scale in information processing (Abrate and Viglia, 2016). The competitive strength of these organizations may have triggered a more prompt and intense response to the elimination of Price Parity Clauses.

Another relevant point is related to the propensity for more structured hotels to engage in direct selling. Chain hotels, for example, were already using their direct sales channel more than independent hotels prior to the policy changes, as reported by the European Competition Network (2017). Hunold et al. (2018) found that the chain hotels in their sample use on average more distribution channels, are of larger size, and also of higher quality. These hotels are therefore more likely to benefit from the ban of all types of price parities, as this may allow them to increasingly use their direct channel to post better offers than on OTAs. Consequently, this can increase competition across sales channels, in turn contributing to lowering prices also on *Booking.com*.

To sum up, we can state the following:

Finding 1. In the short run, the elimination of all Price Parity Clauses in France in 2015 brought about a 2.6% decline on the average hotel price on *Booking.com* in Corsica. More substantial price reductions, albeit in some cases not significant, were detected for hotels affiliated with chains, 3 and 4 star hotels, medium and large size hotels.

6.3. Robustness

Next, we evaluate the robustness of Finding 1. First, if there is a limited number of hotels, the inclusion of the town level hotel availability as a regressor may be potentially endogenous. However, given the characteristics of tourism in the regions of our study, most hotels are competing not only with other hotels in the same town (which in some cases can be only a few), but more generally with the hotels in the local area (coastal area, sub-region). In Table E.1 we present the D-in-D and triple interaction results obtained by omitting this control from the analysis. All the main findings are confirmed in both the magnitude and significance of the estimated coefficients.

Second, the low power of our previous tests may depend on some nonlinear temporal variation in prices captured by the errors in estimating Eqs. (2) and (3). We include in our specification the lag dependent variable in order to better account for the temporal variation in prices throughout the booking period. Moreover, we relax our selection of only three observations before and after the event to address the endogeneity of the lagged dependent in panel data models: longer panels reduce the likelihood of biased estimates (Reimers and Waldfogel, 2020). Table E.2 presents the results of such estimation. Both
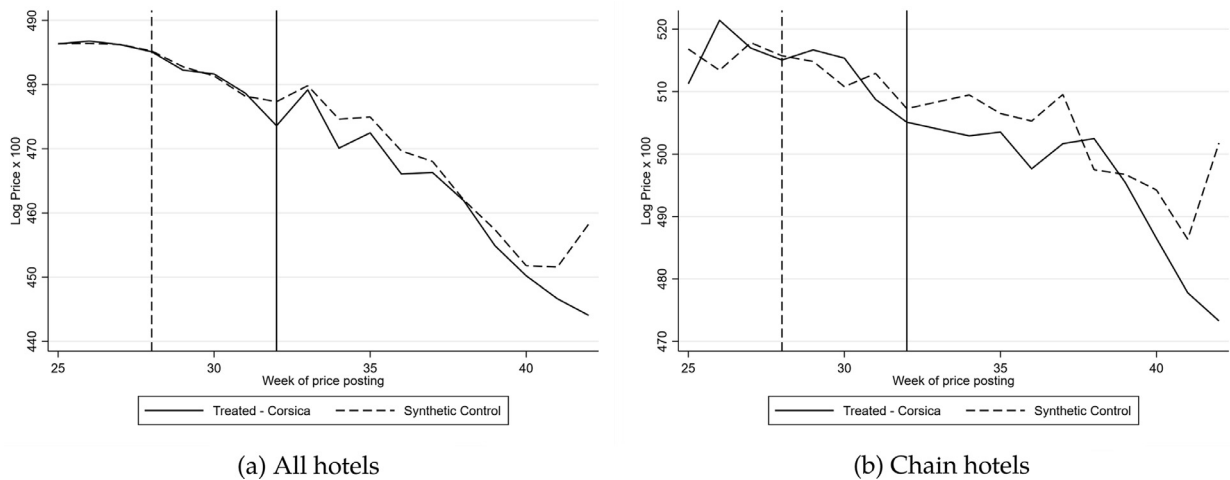
(a) All hotels

(b) Chain hotels

Fig. 5. Synthetic controls and hotel prices. Vertical lines: Macron Law.

Table 5
Implied short-run price effects of the promulgation of the Macron Law.

	All	Chain	2 Stars	3 Stars	4 Stars	5 Stars	Medium	Large
D-in-D	−2.583	−6.104	−2.371	−3.811	−6.253	1.153	−4.108	−3.999
Event study	−3.982	−5.351	−2.392	−4.171	−6.613	1.533	−4.534	−4.537
Synthetic controls	−3.212	−7.471						

Notes. The implied price effects for the D-in-D and event study specifications are obtained in Stata using the "margins" post-estimation command. For Synthetic controls, the implied price effects are manually computed as the difference in the predicted outcome variable for the treated unit and the synthetic control unit, pre and post the Macron Law.

the D-in-D (Column (1)) and the triple interaction specifications (Columns (2)-(4)) display slightly lower effects in terms of magnitude, but largely confirm our findings in Table 3 and their statistical significance.

Finally, a potential concern of the previous analysis is the sensitivity of the identified effects to the choice of the control group. In order to tackle this issue, we perform a synthetic control group analysis (Abadie and Gardeazabal, 2003; Abadie et al., 2010). This method relies on a weighted average of control firms (synthetic control) that is as similar as possible to the treated hotels regarding the pre-treatment prices on *Booking.com*. The benefits of building this synthetic control group is that the characteristics of the treated hotels before the regulatory change can be better approximated by a combination of untreated lodging establishments rather than by an unweighted group of hotels (see Fig. 4). This methodology has been recently applied in the context of platforms also by Calzada and Gil (2020) and De los Santos and Wildenbeest (2017).

We implement the synthetic control analysis by collapsing our search observations data (room-date of stay-days ahead of stay level) into group-week for a clearer visualization of the results. We define our groups by region, hotel size (Small, Medium, and Large) and by the presence of add-ons (breakfast and free cancellation). This categorization enables us to create a synthetic control group for the average treated hotel and six potential controls. The program creates optimal weights using the logarithm of *Booking.com*'s prices for the pre-treatment period and a number of other co-variates.

A graphical representation of the main results can be found in Fig. 5a and b. In both panels, the synthetic control appears to provide a good fit for the treated units in the pre-treatment period. The evidence confirms a short-term price response to the policy change by hotels in Corsica. Prices tend to diminish in comparison to the synthetic units, particularly towards the end of the time horizon that we consider.

6.4. Summary of the short-run findings

Table 5 summarizes the main results of the different methodologies that we adopted to evaluate the short-run price effects of the Macron Law. Our benchmark D-in-D specification and the event study provide highly comparable estimates. With the exception of chain hotels, the event study displays slightly larger effects of the policy change, which may be due to the fact that it better captures seasonal variations (week dummies in Eq. (1)). The results based on synthetic controls confirm the sign of the effects, and also their magnitude is comparable to the D-in-D and event study specifications. However, the implementation of this method requires aggregating data in few categories and therefore it does not allow to address the effect of star rating and size. To sum up, there is substantial agreement between the three methods employed in our analysis.

Table 6
Removing Price Parity Clauses: the medium-run effect of the Macron Law. D-in-D and Triple interaction specifications.

Variables	(1) D-in-D Macron Law	(2) Triple interaction Chains	(3) Triple interaction Star rating	(4) Triple interaction Size
PostLaw*Treated	−1.631			
	(1.645)			
PostLaw*Treated*NoChain		−1.306		
		(1.779)		
PostLaw*Treated*Chain		−10.84*		
		(6.090)		
PostLaw*Treated*1Star			0.0567	
			(5.375)	
PostLaw*Treated*2Stars			−0.0319	
			(9.321)	
PostLaw*Treated*3Stars			−12.13**	
			(5.443)	
PostLaw*Treated*4Stars			−9.937	
			(7.312)	
PostLaw*Treated*5Stars			−11.48	
			(8.487)	
PostLaw*Treated*SmallSize				0.920
				(2.247)
PostLaw*Treated*MediumSize				−5.115
				(3.619)
PostLaw*Treated*LargeSize				−3.194
				(6.623)
Days*Corsica	−0.0332	−0.0336	−0.0316	−0.0339
	(0.0234)	(0.0232)	(0.0234)	(0.0233)
Days*Sardinia	−0.141***	−0.139***	−0.137***	−0.139***
	(0.0334)	(0.0332)	(0.0332)	(0.0332)
Google Searches	0.0760***	0.0774***	0.0739***	0.0759***
	(0.0240)	(0.0238)	(0.0239)	(0.0241)
Hotel availability	−7.806***	−8.336***	−8.236***	−7.677***
	(2.389)	(2.361)	(2.413)	(2.469)
Constant	461.2***	461.0***	457.1***	457.4***
	(2.161)	(2.229)	(6.661)	(2.472)
Observations	86,589	86,589	86,589	86,589
R-squared	0.847	0.847	0.847	0.847

Notes. Dependent variable: Logarithm of room price × 100. Treated: Corsica; Control: Sardinia; PostLaw: dates after 6 August 2015. Robust standard errors in parentheses, clustered at hotel level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

7. Medium-run effects of eliminating Price Parities in France

Our short-run findings were based on a narrow window of dates in the vicinity of the Macron Law. For this reason, in this section we extend our empirical analysis to gauge evidence for the medium-run price effects of eliminating Price Parity Clauses. It is conceivable, in fact, that a full price adjustment can take some time.

In order to study the medium-run price impact on *Booking.com*, we track the hotels in the year following the policy change. During this period it is unlikely that drastic changes to the competitive scenario faced by the hotels in our sample may have occurred, such as a noticeable building activity of competing establishments. In fact, both islands have highly advanced territorial planning regulations that forbid, for instance, building within 300 metres of the coastline (Piga, 2003).

More precisely, as in the short-run analysis, we use a window of dates from September 1st to October 20th. This enables us to compare exactly the same type of room for the corresponding stay date both in 2015 and 2016.[15] The 2015 observations were gathered before the implementation of the Macron Law (from July 2nd to August 5th). In terms of Eqs. (2) and (3), the variable *Treated* is a dummy that takes value 1 if the room *s* is in Corsica and *PostLaw* is active for observations gathered in 2016.

Given the new panel structure described above, we implement D-in-D and triple interaction models with fixed effects, by estimating (2) and (3). We argue that common pre-trend applies, as illustrated by Fig. G.1 in Appendix G. Moreover, region specific shocks and/or competitive reactions related to the elimination of price parities may hinder the identification of causal effects. Hence, controlling for town-level availability of hotels and Google Search activities is even more crucial in the medium run.

Table 6 presents the results of our medium-run analysis. The estimated coefficients of Eqs. (2) and (3) are reported in Columns (1)-(4), respectively. Column (1) considers the D-in-D effect and it shows that prices decreased on average by about 1.6% in Corsica relative to Sardinia. Contrary to our expectations, the average price change is not only lower than in

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[15] To ensure full comparability, our matching procedure is based on fixing exactly the same day of the week and week of the month (for example, September 5, 2015 is matched with September 3, 2016; remember that 2016 was a leap year).

the short run, but it is also not statistically significant. Column (2) shows the triple interaction effect on independent and chain hotels. As in the short-run, the effect of the policy change for independent hotels (*PostLaw*Treated*NoChain*) is in line with the overall average. Chain hotels in Corsica are more responsive to the legislative change also in the medium run. The price reduction with respect to their Sardinian counterparts is larger than in the short run (*PostLaw*Treated*Chain*, about 11%) and it is significantly different from both zero and from the one for independent hotels.

Column (3) shows that the Macron Law had relatively large effects on highly rated hotels. Whereas only the price reduction for 3 star hotels (about 12%) is statistically significant, also 4 and 5 star hotels have registered important price drops, not significantly different from the former. Column (4) indicates that medium- and large-size hotels in Corsica decreased their prices on *Booking.com* of about 5 and 3%, respectively. These effects are in line with the short run in terms of magnitude, but none of them is statistically significant (see also Appendix H). To sum up, the following can be stated:

Finding 2. In the medium run, the elimination of all Price Parity Clauses in France in 2015 brought about limited and not statistically significant changes on the average hotel price on *Booking.com* in Corsica. Substantial price reductions, albeit in some cases not significant, were detected for hotels affiliated with chains, 3, 4 and 5 star hotels, medium and large size hotels.

As discussed in Section 2.1, the theoretical literature (Johnson, 2017; Wang and Wright, 2020) suggests platform prices should decrease following the elimination of Price Parity Clauses, especially if increased OTA competition contributes to drive down the commission fees. Yet, our findings are only partially in line with these predictions. Indeed, the Macron Law only had a minor and not significant impact on hotel prices in the medium run. However, the price response of some of the identified categories was more pronounced than in the short run. Hence, we find a substantial divergence between different hotel groups when moving from the short to the medium run.

Our results can be interpreted in the light of formal and informal changes that occurred in the relationship between hotels and OTAs. On the one hand, between 2015 and 2016 *Booking.com* introduced new revenue management tools to expand its support to client hotels.[16] This may have resulted in a higher dependency on the platform, especially for small, independent and family-run establishments. On the other hand, OTAs such as *Booking.com* started penalizing with worse rankings hotels that charged lower prices elsewhere, a practice euphemistically called 'dimming' (Hunold et al., 2020).[17] Hence, for establishments for which the platform was a "must-have", a consistent price reduction was not really an option.

The situation is however different for more organized units, such as chain and highly rated hotels, which further reduced prices in the medium run. A relevant factor that can explain the price decrease on *Booking.com* for these hotels is the substitution effect across sales channels, which seemingly became more prominent in the medium run. We collected data on our sample hotels in Corsica and Sardinia from Kayak in 2017 and found that chain, better-rated and larger hotels offered their rooms on more sales channels.[18] This confirms that specific characteristics, such as chain affiliation and higher quality, are related to hotels that successfully manage multiple distribution channels, including the direct one. Consequently, additional pressure was exerted on OTAs by these hotels when price parities were prohibited as channel competition increased.[19]

Also, the characteristics that we highlighted in the previous sections play an important role in explaining our results, especially when considered in combination with the use of direct sales channels. Chain affiliation increases reputation, and this renders OTAs less fundamental for hotels' visibility. Similarly, better-rated hotels are usually characterized by superior managerial practices, including revenue management (Hollenbeck, 2017). Hence, they are less reliant on the OTA's reservation systems. As a result, many high-end chain hotels, including Marriott and Hilton, encouraged end users to book directly on their websites; interestingly, this intensified precisely starting from 2015.[20]

In the traditional wholesale model, Baker and Chevalier (2012) highlight how Most Favored Nation clauses can enhance a manufacturer's bargaining position towards retailers. In the e-book sector, De los Santos et al. (2018) show that platforms can use price restrictions to shift the bargaining power in their favor. In our setting, the bargaining power of chain and highly rated hotels is due to the presence of a well-reputed direct channel, in which hotels can offer cheaper prices when price parities are banned. The increased competition across distribution channels can even materialize in a renegotiation of contractual terms, leading to a reduction of agency fees.[21] Following the full elimination of Price Parity Clauses, the expected effect can be appreciated in the medium run and consists of a significant price drop on *Booking.com*.

The findings of this section are particularly relevant in terms of their policy implications. Therefore, we perform a placebo test. Specifically, we run exactly the same analysis and compare stay dates that are all prior to the implementation of the

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[16] In April 2015, *Booking.com* launched the *BookingSuite* system, which helps independent and boutique hotels to build innovative and user-friendly websites. In March 2016, the *RateManager* platform was introduced at the core of the *BookingSuite* system. This platform suggests optimal prices for each day depending on a number of factors such as expected demand, weather forecast, special events, and so on.

[17] For more details, see the following article: https://www.washingtonpost.com/lifestyle/travel/how-online-travel-agencies-are-dimming-results-on-hotel-searches/2016/07/28/16a33026-52ab-11e6-88eb-7dda4e2f2aec_story.html.

[18] Chain hotels used on average 6.02 distribution channels, whereas independent hotels only 3.86. Moreover, star rating was proportional to the number of sales channels: from 1.60 for 1 star hotels to 6.22 channels for 5 star ones. Finally, medium- and large-size hotels used on average 4.62 and 5.92 sales channels, respectively, whereas small-size hotels only 3.09.

[19] According to the European Competition Network (2017), the share of sales through OTAs is lower for chain than for independent hotels.

[20] For example, visit: https://www.nozio.biz/en/hotel-chains-focus-direct-bookings/.

[21] Marriott recently renegotiated its contractual terms with Expedia and agreed commission rates below 10%: https://www.hotelmanagement-network.com/comment/expedia-commission-rates/.

Table 7
Medium-run effects of removing PPCs: placebo treatment.

Variables	(1) D-in-D Placebo	(2) Triple interaction Placebo - Chains	(3) Triple interaction Placebo - Stars	(4) Triple interaction Placebo - Size
PostLaw*Treated	0.683			
	(1.592)			
PostLaw*Treated*NoChain		0.511		
		(1.612)		
PostLaw*Treated*Chain		6.333		
		(7.192)		
PostLaw*Treated*1Star			−1.892	
			(2.576)	
PostLaw*Treated*2Stars			1.361	
			(2.757)	
PostLaw*Treated*3Stars			4.579	
			(3.086)	
PostLaw*Treated*4Stars			−1.671	
			(6.885)	
PostLaw*Treated*5Stars			24.76*	
			(13.95)	
PostLaw*Treated*SmallSize				−1.178
				(1.701)
PostLaw*Treated*MediumSize				3.984
				(3.123)
PostLaw*Treated*LargeSize				6.377
				(5.387)
Interactions	Yes	Yes	Yes	Yes
Region Time Trend	Yes	Yes	Yes	Yes
Google Search Control	Yes	Yes	Yes	Yes
Hotel availability Control	Yes	Yes	Yes	Yes
Lagged dependent	No	No	No	No
Observations	94,505	94,505	94,505	94,505
R-squared	0.870	0.870	0.870	0.870

Notes. Dependent variable: Logarithm of room price $\times$ 100. Placebo test: all observations collected before August 6th, 2015. Treated: Corsica; Control: Sardinia; PostLaw: dummy taking value 1 for nights in 2015. Robust standard errors in parentheses, clustered at hotel level. *** p<0.01, ** p<0.05, * p<0.1.

Macron Law, i.e., we consider room prices gathered in 2014 and 2015 before August 6th. The results of the D-in-D and triple interaction effects are reported in Table 7 and, as expected, almost all the effects are not statistically significant. This conclusion provides a further validation of our empirical strategy, as well as general support of our main findings.

Our data do not allow to perform a welfare analysis, but we can provide a rough estimate of the implications of the results. Our sample features 343 hotels using *Booking.com* in Corsica, with 28.9 rooms on average. We cover 243 days from April 1st to November 30th, during which the 2015 average room price was 126 euros. Hotel occupancy data suggest 56.3% of rooms occupied in Corsica throughout the year.[22] Since we exclude the low season, we conjecture an occupancy rate of 60–70% in the period of our study.

On these grounds, we can estimate the potential savings for tourists visiting Corsica and reserving a room through *Booking.com* in the two groups that (statistically) significantly decreased their prices. There are 145 hotels rated 3 stars in Corsica. These hotels are larger in size (36.6 rooms) and less expensive (119 euros per room in 2015) than the average. Taking into account the identified 12.13% price reduction, the expected savings for their clients range between 11.17 and 13.03 million euros. Similar calculations suggest savings between 3.72 and 4.34 millions for guests of chain hotels.

These figures provide a lower bound of consumers' savings as they only refer to Corsica and to certain hotel groups. In our sample, only 25 hotels belonged to a chain in Corsica, whereas their prevalence is more common in urban areas. As such, the effects on the French lodging sector are likely to be much larger. These considerations also hint at potentially stronger price effects of the full elimination of Price Parity Clauses in economies where chain hotels represent an important share, such as the UK and the US (Butters and Hubbard, 2019). Moreover, tourists reserving rooms on other OTAs or directly using the hotel website could have saved even more.

8. Concluding remarks

Online platforms profoundly revolutionized the business model of firms belonging to different sectors. Amid their impressive growth, these platforms have been raising a number of new antitrust challenges and the use of Price Parity Clauses

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[22] Source: Eurostat, Net occupancy rate of bedrooms in hotels (NACE Rev. 2, I, 55.1) by NUTS 2 regions, https://ec.europa.eu/eurostat/web/products-datasets/-/tin00173.

has been one of the most debated. This article presented a first empirical assessment of the short- and medium-run effect on platform prices of the full removal of these restrictive provisions.

Our analysis was based on data from _Booking.com_, the most popular OTA in the EU. In particular, we mainly focused on the elimination of Price Parity Clauses in France in 2015 (Macron Law). Our data on hotels listed on the platform before and after the policy change allowed us to implement a D-in-D analysis by comparing hotel prices in Corsica and Sardinia. These two regions are extremely similar and geographically very close to each other.

First, we showed that the complete removal of Price Parity Clauses led to a significant short-run price decline of 2.6% for hotels listed on _Booking.com_ in Corsica. Moreover, when considering more complex organizational units such as chains and high-star rated hotels, we found more conspicuous, albeit not always statistically significant, short-run price effects. Indeed, prices decreased up to 6% with respect to hotels in the control group.

Second, by considering a longer time horizon for hotels to adjust to the institutional change, we identified a divergent behavior between the average hotel and more organized establishments. In fact, whereas prices in our sample decreased less in the medium run, chain and highly rated hotels experienced a seemingly more substantial price drop, double or triple than in the short run. The latter result needs to be taken with some caution, as we found that the price reduction was significant for 3 star hotels, weakly significant for chains, but not significant for 4 and 5 star establishments. However, this does not invalidate the estimated heterogeneous effects, as their statistical power is reduced by the complex nature of our data and the limited size of certain hotel groups.

To sum up, if relevant price variations in response to policy interventions are to be expected, they are more likely to occur in the medium run, especially for chain and highly rated hotels. This may point to a better managerial organization and to a more extensive use of the direct sales channel, which becomes a competitive alternative to OTAs when price parities are forbidden. The combination of these factors may also result in a stronger bargaining position of these establishments towards OTAs. Conversely, for independent and family-run hotels, for which OTAs have become a sort of must-have to reach customers around the globe, the possibility to reap the benefits of the elimination of Price Parity Clauses seems rather limited.

The analysis in the article and the results provided can be especially relevant to policy makers, in a global landscape characterized by heterogeneity concerning the need to regulate platforms. The evidence, in fact, is based on a uniquely detailed database on hotel prices on _Booking.com_ in EU countries which were differently affected by recent interventions against Price Parity Clauses. The EU's action constituted an unprecedented attempt to limit OTAs' anti-competitive practises.[23] Moreover, similar forms of platform Most Favored Nation provisions in industries as diverse as publishing and insurance are receiving increasing attention. Therefore, the EU experience can be extremely helpful not only to other countries but also other sectors, in which similar clauses are adopted.

The main implication that can be drawn from our study is the following. The elimination of Price Parity Clauses, if not complemented with other measures, may have limited price effects. Indeed, the initial positive response faded away in the medium-run, in which relevant price reductions (although not always statistically significant) were registered only for highly-rated and chain hotels. This suggests that the policy intervention might have strengthened the position of those organized structural units that were able to efficiently use their direct channel and, probably, renegotiate the commission fees with OTAs. Instead, independent and family run hotels were probably not able to modify their contractual terms. Policy makers may therefore need to resort to additional provisions, such as imposing limits to commission fees (Gomes and Mantovani, 2020).

Moreover, recent practises adopted by OTAs, such as penalizing hotels if they decide to price differentiate across sales channels, raised concerns for regulators, as they limit hotels' freedom to adjust prices. In such cases, a policy mandating more transparency on how hotels are ranked on the platform should be adopted in conjunction with the elimination of Price Parity Clauses.[24]

The analysis carried out in this study is subject to some limitations, mainly related to the features of the collected data. First, our dataset only covers prices posted on _Booking.com_. Therefore, we cannot verify possible price reductions occurred on other OTAs, for example Expedia, and/or on hotels' direct sales channels. Complementary evidence is, however, provided by Hunold et al. (2018) and Ennis et al. (2020), suggesting that similar policy interventions led to a wider adoption of direct channels, in which hotels offered cheaper prices than on OTAs.

Second, we have no direct evidence that prices were always at parity before the law was passed, as Price Parity Clauses were legal but not mandatory before the French legislative intervention. However, it has been widely documented that major OTAs adopted Price Parity Clauses whenever this was possible.[25] In addition, anecdotal evidence suggests that OTAs closely monitored hotels' pricing behavior through rate checker software. Specialised blogs also reported that hoteliers received threatening e-mails from OTAs if there was the mere suspicion that parity clauses were not respected.[26]

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[23] In the rest of the world, with exceptions such as Australia, New Zealand and Switzerland, national competition authorities have only recently looked into this issue.

[24] Following recent complaints, Booking.com agreed to modify the way it presents offers, discounts, and prices to consumers. See: https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6812

[25] Apart from the already cited European Competition Network (2017), the initial investigations carried out by the French, Italian and Swedish competition authorities confirmed that the standard contracts between the largest OTAs and their client hotels contained parity clauses. For example, see the Swedish Competition Authority's Reasoning Ref. No. 596/2013 Bookingdotcom Sverige AB 15 April 2015.

[26] See, for example, the email that _Booking.com_ sent to client hotels adopting a price comparison widget: https://www.hotelspeak.com/2015/11/booking-com-threaten-legal-action-against-triptease/.

Third, we lack information about quantities and commission rates charged by *Booking.com* to client hotels. As a consequence, we cannot fully assess the welfare implications of eliminating Price Parity Clauses, even though we can provide reduced form evidence on the price effects as well as a first evaluation of the potential savings for consumers booking different types of hotel rooms through *Booking.com*. Ideally, further research should be carried out on the effect of the policy changes that have been investigated on potential fee reduction. Unfortunately, these data are still very difficult to obtain.

Appendix A. Event study: additional graphical evidence

(a) Event study - 2 Stars Hotels. Vertical lines: Macron Law.
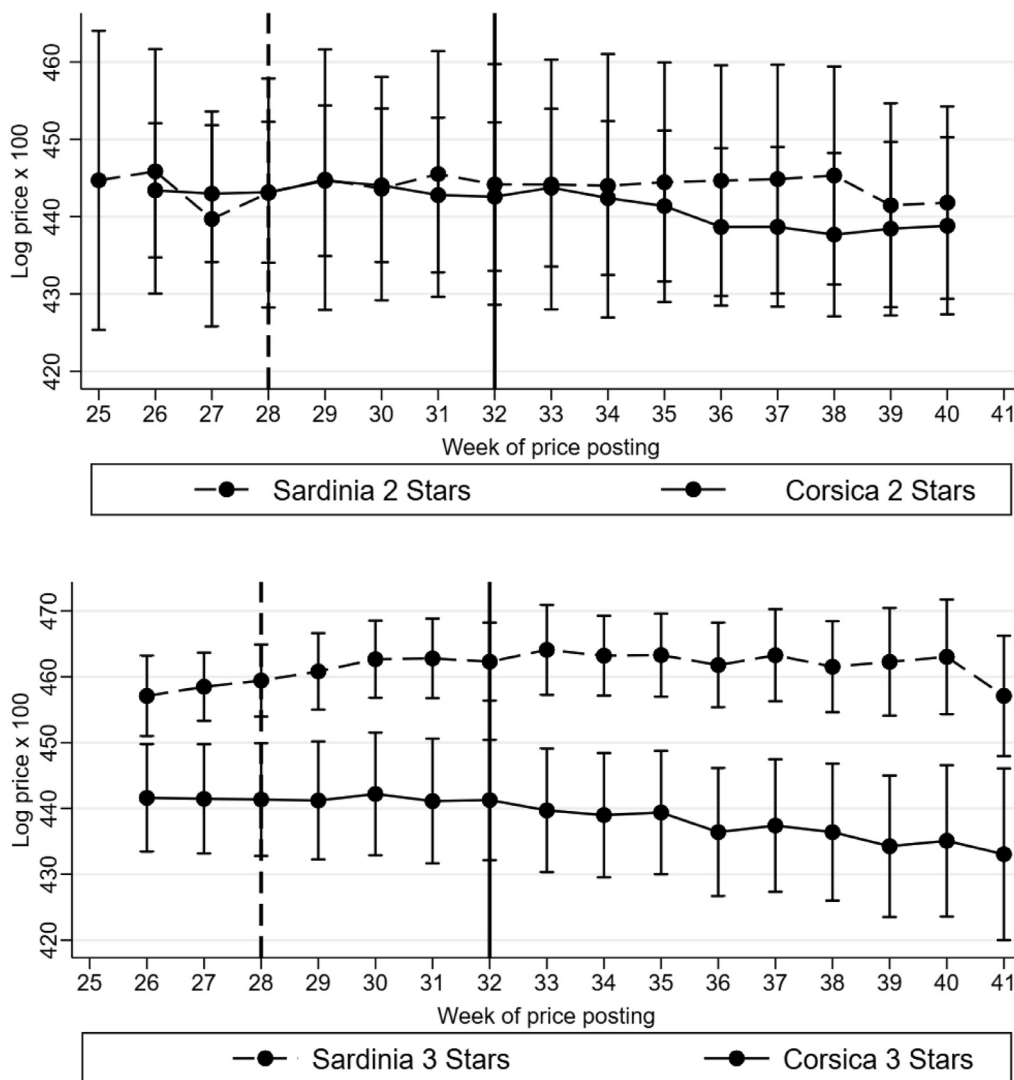
(b) Event study - 3 Stars Hotels. Vertical lines: Macron Law.

Fig. A.1. (a) Event study - 2 Stars Hotels. Vertical lines: Macron Law.

(a) Event study - 4 Stars Hotels. Vertical lines: Macron Law.

(b) Event study - 5 Stars Hotels. Vertical lines: Macron Law.

Fig. A.2. (a) Event study - 4 Stars Hotels. Vertical lines: Macron Law.

(a) Event study - Small hotels. Vertical lines: Macron Law.

(b) Event study - Medium hotels. Vertical lines: Macron Law.

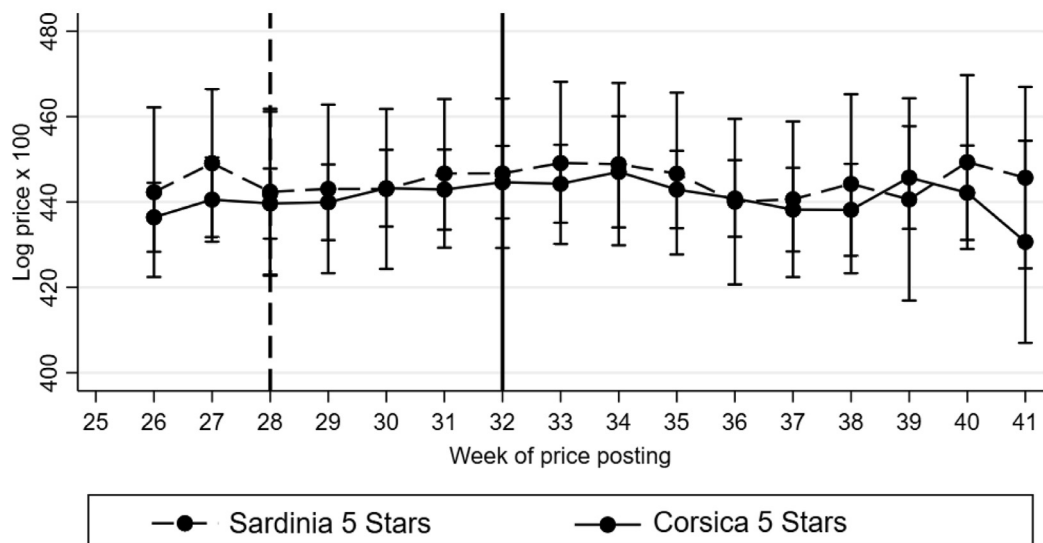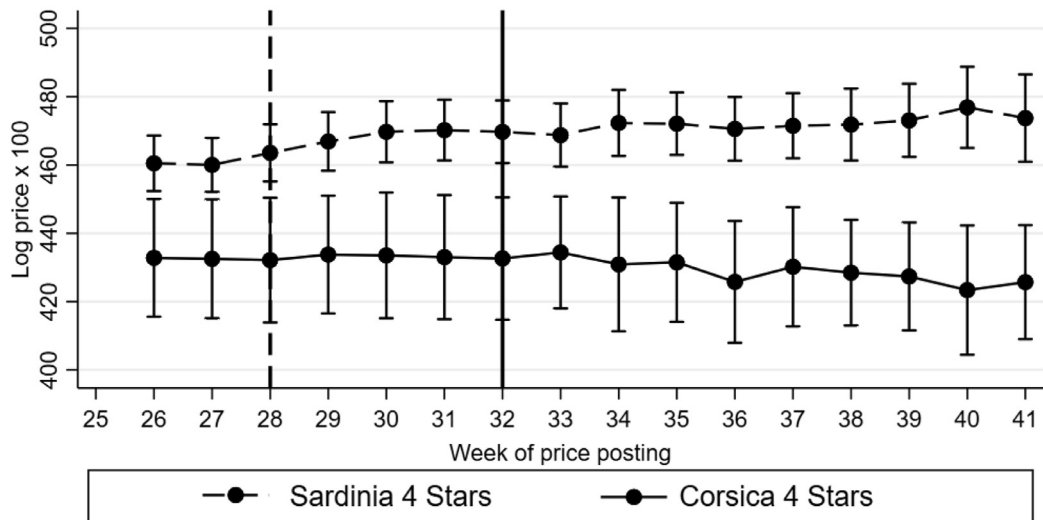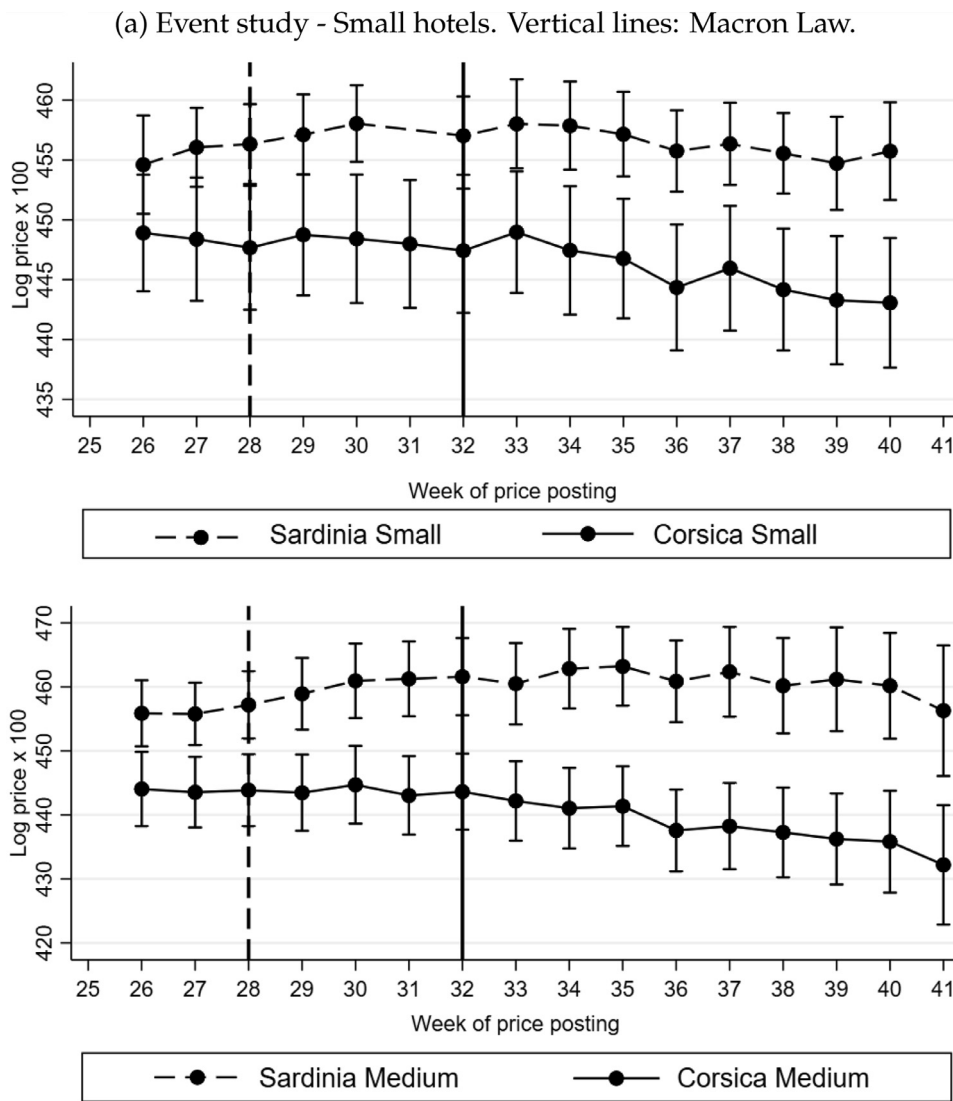**Fig. A.3.** (a) Event study - Small hotels. Vertical lines: Macron Law.

(a) Event study - Large size hotels. Vertical lines: Macron Law.

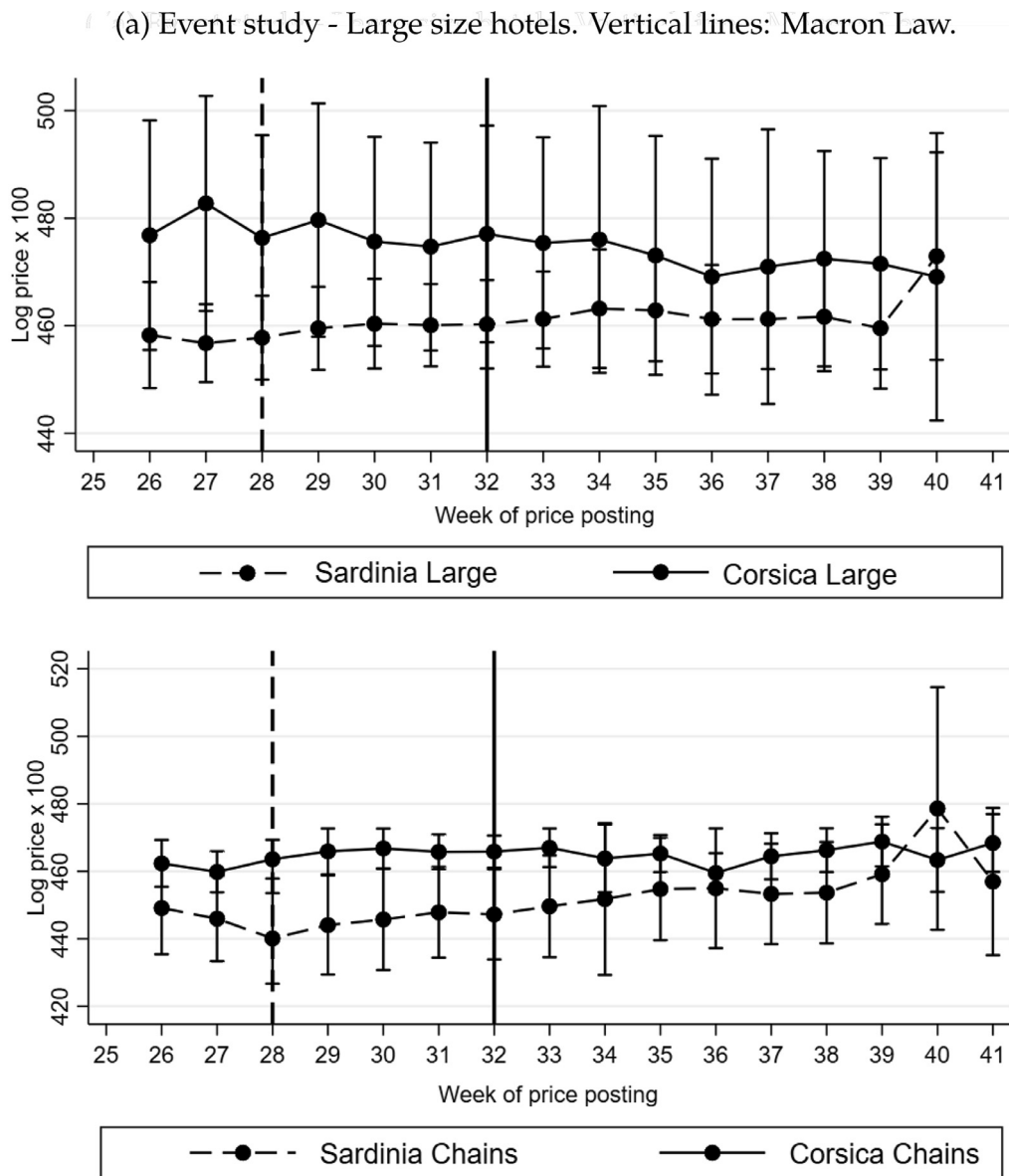(b) Event study - Chain hotels. Vertical lines: Macron Law.

Fig. A.4. (a) Event study - Large size hotels. Vertical lines: Macron Law.

Appendix B. Distribution of the dates before and after the events

In this appendix we report precise information about the width of the window of dates before and after the Macron Law, analyzed in our short-run benchmark specification. Table B.1 shows the percentiles of the distribution. More precisely,

Table B.1
Distribution of the dates of search by event.

Percentile	Macron Law
5%	−28
10%	−23
25%	−10
50%	1
75%	28
90%	43
95%	49

negative (positive) numbers indicate the distance between the percentile and the last (first) observation retrieved prior to (after) the event. The table confirms that the vast majority of observations lies within a relatively narrow time span.

Appendix C. Short-run effects: test of the heterogeneous effects

Table C.1
Heterogeneous effects: tests of statistical significance.

F-test (1,807)	F-stat	*p*-value
Chain vs Independent	2.35	0.1257
2 Stars vs 1 Star	2.18	0.1405
3 Stars vs 1 Star	4.06	0.0443
3 Stars vs 2 Stars	0.72	0.3975
4 Stars vs 1 Star	6.21	0.0129
4 Stars vs 2 Stars	2.70	0.1010
4 Stars vs 3 Stars	1.19	0.2759
5 Stars vs 1 Star	0.02	0.8877
5Stars vs 2 Stars	0.34	0.5572
5 Stars vs 3 Stars	0.69	0.4050
5 Stars vs 4 Stars	1.43	0.2314
Medium vs Small	6.74	0.0096
Large vs Small	2.09	0.1489
Large vs Medium	0.00	0.9710

Appendix D. Short run anticipation effects: D-in-D and Triple Interaction evidence

Table D.1
Macron Law. Potential short run anticipation effects following the approval of the law on July 9th, 2015. D-in-D and Triple interaction.

Variables	(1) D-in-D Anticipation Corsica v Sardinia	(2) Triple interaction Anticipation Chains	(3) Triple interaction Anticipation Stars rating	(4) Triple interaction Anticipation Size
PostLaw*Treated	0.402 (0.428)			
PostLaw*Treated*NoChain		0.605 (0.453)		
PostLaw*Treated*Chain		−5.413** (2.702)		
PostLaw*Treated*1Star			−0.441 (1.444)	
PostLaw*Treated*2Stars			0.483 (2.219)	
PostLaw*Treated*3Stars			−1.360 (1.144)	
PostLaw*Treated*4Stars			−6.221*** (1.795)	
PostLaw*Treated*5Stars			−1.544 (3.423)	
PostLaw*Treated*SmallSize				1.748** (0.707)
PostLaw*Treated*MediumSize				−2.371** (1.148)
PostLaw*Treated*LargeSize				−6.638** (2.946)
Interactions	Yes	Yes	Yes	Yes
Region Time Trend	Yes	Yes	Yes	Yes
Google Search Control	Yes	Yes	Yes	Yes
Hotel availability Control	Yes	Yes	Yes	Yes
Lagged dependent	No	No	No	No
Observations	69,651	69,651	69,651	69,651
R-squared	0.975	0.975	0.975	0.975

Notes. Dependent variable: Logarithm of room price $\times$ 100. Stay dates: 20 July to 1 September 2015. Treated: Corsica; Control: Sardinia; PostLaw: dates between 9 July and 6 August 2015. Robust standard errors in parentheses, clustered at hotel level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Appendix E. Robustness check: short run

First, we report the results of the short-run analysis when the variable measuring the availability of hotels at town level (i.e., Fig. 3(b)) is excluded as a further control for demand shocks. Tables E.1 show the results of the D-in-D (Column 1) and Triple interaction (Columns 2–4) estimates. All the main findings reported in the main text are confirmed in both the magnitude and statistical significance of the estimated coefficients.

Second, to better account for the temporal variation in prices throughout the booking period, we have included in our specification the lag dependent variable. The results of the estimation are reported in Table E.2. Both the D-in-D (Column (1)) and the triple interaction specifications (Columns (2)–(4)) display slightly lower effects in terms of magnitude, but largely confirm the our benchmark findings.

Table E.1

Macron Law: short-run analysis, robustness of the findings, D-in-D and Triple interaction.

Variables	(1) D-in-D Corsica v Sardinia	(2) Triple interaction Chains	(3) Triple interaction Star rating	(4) Triple interaction Size
PostLaw*Treated	−2.835***			
	(0.835)			
PostLaw*Treated*NoChain		−2.749***		
		(0.849)		
PostLaw*Treated*Chain		−6.149		
		(3.944)		
PostLaw*Treated*1Star			0.298	
			(1.394)	
PostLaw*Treated*2Stars			−2.496	
			(1.760)	
PostLaw*Treated*3Stars			−3.725**	
			(1.513)	
PostLaw*Treated*4Stars			−6.130***	
			(2.239)	
PostLaw*Treated*5Stars			1.002	
			(5.874)	
PostLaw*Treated*SmallSize				−1.011
				(1.091)
PostLaw*Treated*MediumSize				−4.052**
				(1.583)
PostLaw*Treated*LargeSize				−4.002
				(2.803)
Interactions	Yes	Yes	Yes	Yes
Region Time Trend	Yes	Yes	Yes	Yes
Google Search Control	Yes	Yes	Yes	Yes
Hotel availability Control	No	No	No	No
Lagged dependent	No	No	No	No
Observations	78,825	78,825	78,825	78,825
R-squared	0.951	0.951	0.951	0.951

Notes. Dependent variable: Logarithm of room price × 100. Treated: Corsica; Control: Sardinia; PostLaw: dates after 6 August 2015. Robust standard errors in parentheses, clustered at hotel level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table E.2

Macron Law: short-run analysis, robustness check including the lagged dependent variable, D-in-D and triple interaction.

Variables	(1) D-in-D Corsica v Sardinia	(2) Triple interaction Chains	(3) Triple interaction Star rating	(4) Triple interaction Size
Lag of Log Price x 100	0.361***	0.359***	0.356***	0.359***
	(0.0229)	(0.0229)	(0.0230)	(0.0230)
PostLaw*Treated	−1.711***			
	(0.651)			
PostLaw*Treated*NoChain		−1.643**		
		(0.664)		
PostLaw*Treated*Chain		−4.451		
		(3.168)		
PostLaw*Treated*1Star			1.070	
			(2.326)	
PostLaw*Treated*2Stars			−1.984	
			(1.335)	
PostLaw*Treated*3Stars			−2.835**	
			(1.244)	
PostLaw*Treated*4Stars			−4.086**	
			(1.883)	
PostLaw*Treated*5Stars			2.138	
			(4.749)	
PostLaw*Treated*SmallSize				−0.214
				(0.856)
PostLaw*Treated*MediumSize				−3.026**
				(1.239)
PostLaw*Treated*LargeSize				−3.907*
				(2.330)
Interactions	Yes	Yes	Yes	Yes
Region Time Trend	Yes	Yes	Yes	Yes
Google Search Control	Yes	Yes	Yes	Yes
Hotel availability Control	Yes	Yes	Yes	Yes
Lagged dependent	Yes	Yes	Yes	Yes
Observations	108,464	108,464	108,464	108,464
R-squared	0.965	0.965	0.965	0.965

Notes. Dependent variable: Logarithm of room price $\times$ 100. Stay dates: 1 September to 20 October 2015. Treated: Corsica; Control: Sardinia; PostLaw: dates after 6 August 2015. Robust standard errors in parentheses, clustered at hotel level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Appendix F. Italy's liberalization law

In the same period when France banned all price parities, the Italian Parliament was discussing a similar policy measure. Differently from the French case, in which the Macron Law was promulgated a few weeks after *Booking.com*'s commitment to switch to narrow price parities, the complete elimination of these clauses occurred in Italy only in August 2017, after a long debate. The data we collected allow to perform a short run analysis of the price effects of such intervention. Notice, however, that these effects may be diluted as OTAs were not caught by surprise as in France. Moreover, between 2015 and 2016 *Booking.com* adopted "stick and carrot" measures to deal with possible price differentiation among channels. These measures may have rendered hotels less inclined to reduce their prices, especially if highly dependant on OTAs.

Our data cover dates of stay between September 1st and September 30th, 2017. The data were gathered between May 20th and June 21st (before the event) and September 1st and September 30th (after the event). To keep a balanced panel, we focus on three observations before and after the event, when available. We note the following differences with respect to the short run analysis of the Macron Law. First, the window of dates is slightly shorter. Moreover, the policy change (August 29th, 2017) is very close to the first date of stay we cover. Finally, there is a gap between the before and after periods.

Table F.1 reports the estimated coefficients of Eqs. (2) and (3) for Italy's Liberalization Law. The D-in-D coefficient of interest (*PostLaw*Treated*) in Column (1) indicates that hotels in Sardinia did not decrease their prices relatively to the control group after the policy change. The estimated effect is basically zero (−0.001%) and it is not statistically significant. Columns (2)–(4) report the results of the triple interaction specifications. The coefficients do not seem to indicate a systematic pattern of effects for any group of hotels. Indeed, the results are noisy and almost all effects are not statistically significant. The overall emerging picture points towards an imprecisely estimated zero effect of Italy's Liberalization Law. The only price effect that seems confirmed with respect to the French case is related to chain hotels, which significantly decreased their price in Sardinia by about 8%.

Table F.1

Removing Price Parity Clauses: the short-run effect of Italy's Liberalization Law. D-in-D and Triple interaction specifications.

Variables	(1) D-in-D Sardinia v Corsica	(2) Triple interaction Chains	(3) Triple interaction Star rating	(4) Triple interaction Size
PostLaw*Treated	−0.00996			
	(2.518)			
PostLaw*Treated*NoChain		0.725		
		(2.598)		
PostLaw*Treated*Chain		−8.004*		
		(4.230)		
PostLaw*Treated*2Stars			−4.316	
			(5.441)	
PostLaw*Treated*3Stars			−3.112	
			(5.710)	
PostLaw*Treated*4Stars			2.343	
			(6.560)	
PostLaw*Treated*5Stars			0.279	
			(5.496)	
PostLaw*Treated*SmallSize				−3.017
				(3.621)
PostLaw*Treated*MediumSize				2.693
				(3.425)
PostLaw*Treated*LargeSize				4.680
				(3.771)
Interactions	Yes	Yes	Yes	Yes
Region Time Trend	Yes	Yes	Yes	Yes
Google Search Control	Yes	Yes	Yes	Yes
Hotel availability Control	Yes	Yes	Yes	Yes
Lagged dependent	No	No	No	No
Observations	88,566	88,566	88,566	88,566
R-squared	0.979	0.979	0.979	0.979

Notes. Dependent variable: Logarithm of room price $\times$ 100. Stay dates: 1 September to 30 September 2017. Treated: Sardinia; Control: Corsica; PostLaw: dates after 29 August 2017. Robust standard errors in parentheses, clustered at hotel level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix G. Event study: medium run

Fig. G.1 shows the results of our event study analysis of the medium-run price effects of the Macron Law. For illustrative purposes, the data are presented weekly. The figure omits the 52 weeks between August 6th, 2015 (week 0) and August 6th, 2016 (week 52). The estimated prices point to a slight but insignificant upward trend in Sardinia in 2015.
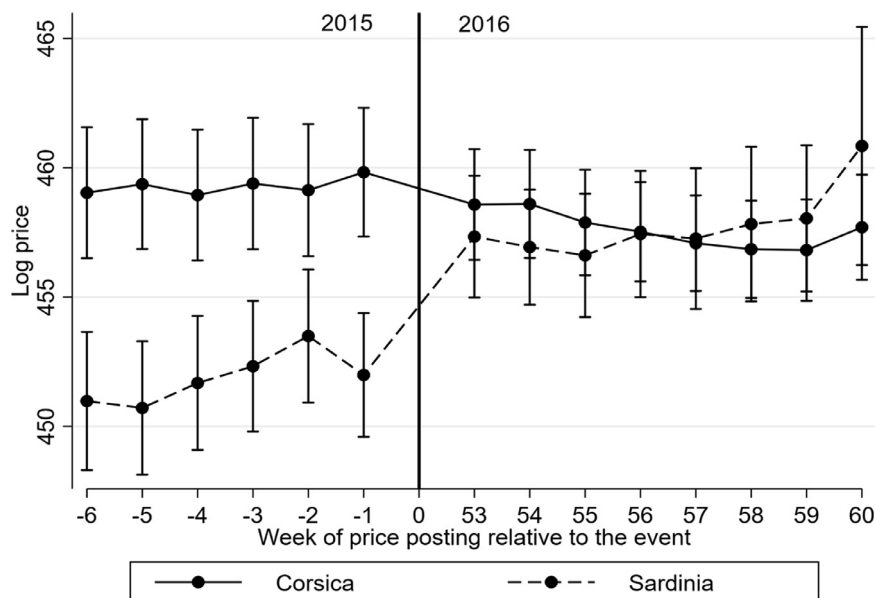

Fig. G.1. Event study of the medium-run price impact of the Macron Law.

Appendix H. Medium-run effects: test of the heterogeneous effects

Table H.1
Heterogeneous effects: tests of statistical significance.

F-test (1,705)	F-stat	p-value
Chain vs Independent	3.14	0.0077
2 Stars vs 1 Star	0.00	0.9931
3 Stars vs 1 Star	25.36	0.0000
3 Stars vs 2 Stars	2.26	0.1332
4 Stars vs 1 Star	3.34	0.0680
4 Stars vs 2 Stars	1.09	0.2975
4 Stars vs 3 Stars	0.17	0.6841
5 Stars vs 1 Star	2.73	0.0988
5Stars vs 2 Stars	1.22	0.2694
5 Stars vs 3 Stars	0.01	0.9287
5 Stars vs 4 Stars	0.04	0.8495
Medium vs Small	1.98	0.1594
Large vs Small	0.23	0.6348
Large vs Medium	0.08	0.7792

Supplementary material

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.euroecorev.2020.103625

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