IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Lucca, May, 08, 2024

VIA e-mail

To whom it may concern

Subject: Reference letter for Alberto Hidalgo Escudero SAEe 2024

Dear evaluation committee,

As director of the Economics Department at IMT School of Advanced Studies Lucca I took part in the selection committee of the PhD students for the XXXV cycle. I met Alberto during the selection process, and I have supervised his academic work since then. Alberto passed all the exams with top marks and ranks among the best students of our PhD track.

Alberto's thesis is very innovative in that it seeks to answer to challenges in the identification and measurement of the impact of platform economies on tourism and local development.

Alberto's current work streams have the potential to deliver very interesting findings but still require to be presented and discussed to receive feedback. I am sure that Alberto will use this opportunity to the best of his abilities and therefore highly suggest him as candidate.

Massimo Riccaboni
Professor of Economics
Director of the Axes research unit
IMT School for Advanced Studies Lucca

Estudios sobre la Economía Española

Your Room is Ready: Tourism and Urban Revival

ALBERTO HIDALGO

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Febrero 2024

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Your Room is Ready: Tourism and Urban Revival*

Job Market Paper

Alberto Hidalgo†

This version: December 2023

Abstract

Tourism is an essential sector of the global economy, contributing significantly to GDP and employment. Despite its importance, our understanding of its impact on urban economic activity remains limited. This paper aims to fill this gap by examining the impact of tourism on urban transformation using a dataset of hotel openings in Madrid from 2001-2010. I show that hotel openings positively impact the number of establishments and employment by using the number of protected buildings as an instrumental variable to account for the non-random distribution of hotel openings. Interestingly, hotel openings contribute to changes in the composition of the economic activities and the business structures, enhancing tourist-oriented corporate-owned businesses over other individual-owned companies. Finally, economic effects extend to the real estate market, increasing rental prices and residential investment.

Keywords: tourism, economic activity, urban transformation, cities
JEL Classification: R10, R23, Z32

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1 Introduction

Tourism plays a pivotal role in the global economy, contributing around 10% to global GDP and employment (World Travel Tourism Council, 2019). It stands out as one of the largest economic sectors, surpassing traditional industries such as construction, transport, information, and communication.[1] According to WTO (2019), international tourist arrivals have surged from 400 million in 1990 to 1.5 billion in 2019, with urban tourism leading this trend. At the core of this growth are hotels, representing the largest player in the tourism sector (Kosová and Sertsios, 2018).

Hotels can significantly impact the local economic landscape because their services are inherently non-tradeable, requiring consumption where they are offered. This form of trade in which customers travel to suppliers can transform the composition of local economic activities, driven by differences in tourist consumption patterns compared to residents (Allen et al., 2020). Tourists demand a series of goods and services more intensively, such as restaurants, gift stores, bars, and cafes (Hidalgo et al., 2022). In turn, the increase in new tourist-oriented businesses and employment can come at the expense of other tradeable activities, making the overall effect of hotel-induced tourism on the local economy unclear (González et al., 2020; Gálvez-Iniesta et al., 2023). In addition, hotel openings can affect the real estate market, either depriving or revitalizing the hotel's surrounding areas. On the one hand, converting residential land to accommodation use can create a negative supply shock in the housing sector, leading to higher rents (Garcia-López et al., 2020). Also, hotels in new or renovated buildings can enhance an area's overall appeal and vibrancy, potentially driving up property values (Carlino and Saiz, 2019). In contrast, hotel-induced tourism can cause nuisances and changes in amenities, making it less attractive to residents (Fontana, 2021). The potential impact of hotel openings on the real estate market can further reshape the economic landscape, affecting businesses differently based on their business structure. In this regard, individual-owned companies, lacking shared resources, may be more sensitive to rising land rental prices, as their fixed operating costs make them vulnerable to financial challenges. All in all, hotels exert demand and supply pressure on the local economy, the labor market, and the land market, making the overall economic impact an important research question worth investigating.

To explore the impact of tourism on urban economies, this paper focuses on the contribution of hotel openings to urban transformation. Specifically, I examine how hotel

[1] Specifically, construction (6.2%), transport equipment (1.3%), and the information and communications sector (3.2%). These figures are based on employment data from the EUKLEMS-INTRANPROD database, released in February 2023. The data refer to 2019, the year before COVID-19, and cover an aggregated basis for 30 countries with available information (source: https://euklems-intanprod-llee.luiss.it/).

openings influence the number of businesses, employment, and the housing sector within hotel surroundings in Madrid during the 2001-2010 period. Madrid is an ideal destination to study the impact of tourism on cities. It is one of Europe's leading urban tourist destinations and Spain's capital. This country ranks second globally in international tourist arrivals and income from non-resident tourists (World Travel Tourism Council, 2019). To understand the impact of hotels on urban transformation, I build a unique fine-grained dataset at the census tract level that combines hotel supply development, establishment-level data, and employment. I also collect data on rental prices and building renovation permits to analyze hotel impacts beyond local economic activity. By studying the main channels through which hotel openings affect the local economy, I aim to provide a comprehensive understanding of how tourism shapes the urban landscape.

Causal identification in this context is challenging as hoteliers select new locations based on unobserved local characteristics and trends. For instance, if hoteliers could predict which areas of the city would flourish in the future, they may systematically place hotels in these zones. This would make it difficult to understand whether changes in the urban landscape are a cause or a consequence of hotel growth. To address this issue, I propose a novel instrument - the number of protected buildings - to tackle the non-random distribution of hotel openings throughout the city.[2] The adaptive reuse of protected buildings for accommodation facilities offers urban developers a solution to the economic challenges associated with repurposing expensive structures, as hotel guests are willing to pay more to stay in these facilities (Pedersen, 2002; Lee and Chhabra, 2015). In turn, hotels are among the few economic activities that uniquely benefit from using protected buildings for their operations, turning these heritage structures into profitable assets (Lezcano González and Novo Malvárez, 2023). This approach mirrors the instrumental strategy employed by Faber and Gaubert (2019), who study the regional economic impact of tourism in Mexico, using environmental and historical amenities to predict tourism attractiveness.[3] Here, I study the impact of hotel-induced tourism in an urban setting by predicting hotel location decisions rather than overall tourism development using the number of protected buildings as an instrument.

Crucially for the identification strategy, I show that protected buildings strongly predict hotel openings across urban geography. In addition, the identification strategy is further

[2]Protected buildings are structures of particular architectural and historical interest that merit special protection. The list of protected buildings, established by the Madrid City Council in 1997, includes structures built before the onset of the tourist boom examined in this paper. For further details on protected buildings, see Appendix B.

[3]While unrelated to the primary research question, Gamalerio et al. (2023) employed a similar approach, using group accommodation buildings (such as homes for disabled people, the elderly, orphans, and drug addicts) to predict the presence of refugees in Italian municipalities.

supported in the context of Madrid, where changes in land use regulations during the analysis period have considerably facilitated the conversion of buildings into accommodation facilities (Comunidad de Madrid, 2005). Also, I demonstrate that protected buildings do not directly impact economic outcomes in areas without and prior hotel openings. Lastly, I provide evidence that the source of variation that I am exploiting comes mainly from protected buildings converted into accommodation facilities and not from other economic activities.

The main findings reveal that hotel openings positively impact the number of establishments and employment in the surrounding areas. Notably, employment effects are driven by the indirect impact of hotel opening on other economic activities rather than the direct impact of hotel employees, confirming the multiplier effect of tourism in other sectors (Exceltur, 2018). In quantitative terms, the main estimates reveal a substantial impact. Hotel openings explain the 27% variation in the number of establishments and the 82% variation in employment in the hotel surroundings between 2001 and 2010. These figures highlight the significant role that hotel openings play in shaping the urban economic landscape. Results are robust to different samples and specifications and consistent with varying measures of the outcome of interest, hotel activity, and the geography and period chosen.

Further analyses reveal substantial heterogeneity in the effects of hotel openings on local economic activity. In particular, these effects vary significantly across different sectors. Hotel openings positively impact tourist-oriented businesses such as restaurants, bars, and souvenir stores but lead to a decrease in production-based activities. This phenomenon signals a structural shift in the city's economic landscape, characterized by a progressive reduction of the tradeable goods in favor of services, especially those targeting tourists. Furthermore, the impact of hotel openings varies widely throughout the city. Hotels in areas specializing in leisure tourism experience more significant increases in employment and the number of establishments. Besides, hotel openings spur job and establishment creation by reducing vacancy rates and the construction of new stores. Last, the rise in businesses and jobs, fostered by hotel openings, stems from the net creation of new establishments but also from shifting economic activities from neighboring areas. This reinforces the concept that newly established hotels tend to create economic clusters, promoting growth and simultaneously attracting existing economic activities toward these emerging centers.

Lastly, the economic effects of hotel openings also extend to the real estate market, leading to increased rental prices and residential investment. Interestingly, the rise in housing prices appears to be driven by an amenity effect rather than converting residential units into accommodation facilities, reducing the stock of rental houses resulting from improved urban amenities. In light of this, the findings underscore an alternative mechanism through

which hotels influence the real estate market, as opposed to the reallocation of housing units away from long-term rentals to short-term rentals led by Airbnb. Finally, the increase in rental prices further reshapes the economic landscape, where corporate-owned businesses with a potentially stronger financial position displace individual-owned companies within the same economic activity. This finding underscores the role of tourism, which changes the composition of local economic activities and reshapes the legal structure of companies within the same sector.

This paper contributes to the emerging field of research on the economic impacts of tourism.[4] Several studies have focused on analyzing these impacts from a regional perspective (Kadiyali and Kosová, 2013; Lanzara and Minerva, 2019; Faber and Gaubert, 2019; González et al., 2020; Favero and Malisan, 2021; Nocito et al., 2023). The main results show that tourism is associated with increased income, employment in the tourism industry, expenditure, and the number of businesses, with positive spillovers in other sectors. Within this body of literature, short-term rental disruption has sparked significant interest in studying the economic impacts of tourism in cities. Consequently, the rise of Airbnb-induced tourism has been associated with a higher number of consumption amenities (Alyakoob and Rahman, 2022; Hidalgo et al., 2022), housing and rental appreciation (Garcia-López et al., 2020; Barron et al., 2021) increased residential investment (Xu and Xu, 2021; Bekkerman et al., 2022), resident discontent (Fontana, 2021), tax evasion (Garz and Schneider, 2023), displacement of businesses geared toward residents (Hidalgo et al., 2023) and the welfare impact on residents and tourists (Allen et al., 2020; Farronato and Fradkin, 2022; Almagro and Dominguez-Iino, 2022).

Concerning the literature, this paper makes several contributions. First, it is the first study to analyze the economic impacts of hotels on urban transformation. Although hotels play a central role in the tourism sector, previous research has focused primarily on other aspects of tourism, overlooking the specific effects of hotels. The lodging industry, which specializes in offering non-tradeable services meant for consumption precisely where they are produced, can reshape the urban economic landscape due to its sheer size and interrelatedness with other activities. Unlike short-term rentals, hotels are typically established in previously unused or newly constructed buildings, which helps reduce the displacement of residents and lessens the crowding-out effect on residents' consumption of goods and services. Second, it addresses a significant methodological challenge by introducing a novel instrument -the number of protected buildings- to tackle the endogeneity arising from the non-random distribution of hotels throughout the city. This

[4]For a comprehensive list of the recent contributions in the literature on the economic impact of tourism, see Table A1 in the Appendix A.

instrument is based on the premise that hoteliers are among the stakeholders who can effectively utilize protected buildings' historical and architectural features to create unique and desirable accommodations that attract hotel users. By repurposing these protected buildings, hotels can capitalize on the value users place on historical and architectural elements.

Building on the work of Glaeser et al. (2001), this research adds a novel dimension to understanding how the composition of local demand influences the urban economic landscape (Card et al., 2008; Guerrieri et al., 2013; Diamond, 2016; Behrens et al., 2022; Lanzara and Minerva, 2019). While previous studies have identified the influx of young, highly skilled individuals as a critical driver of these changes (Baum-Snow and Hartley, 2020; Couture and Handbury, 2020; Moreno-Maldonado and Santamaria, 2021; Curci and Yousaf, 2022), this study focuses on how hotel-induced tourism contributes to the emergence of the consumption city by enhancing urban amenities, including consumption-related establishments and aesthetic improvements facilitated by building renovation permits. In this context, the closest paper to this is Lanzara and Minerva (2019), which provides a theoretical framework for understanding the welfare effects of tourism in the city. In the paper, the authors show how tourism alters the sectoral composition of the local economy, driving up land prices and leading to structural transformation away from the tradeable sector, with a focus on specialization in services. I further extend and complement their work by empirically testing these theoretical predictions within the city in a causal setting.

Finally, this paper contributes to the growing empirical literature that leverages within-city variation to credibly identify the effects of economic shocks on various aspects of urban economic outcomes. These include immigration (Mazzolari and Neumark, 2012; Olney, 2013), the entry of big-box stores (Haltiwanger et al., 2010; Wang, 2023), the impact of ride-sharing services (Gorback, 2022; Daniele et al., 2022; Norris and Xiong, 2023), and the influence of sports facilities (Bradbury, 2022; Abbiasov and Sedov, 2023). Against this background, I leverage a supply shock to gain insights into how tourism affects business and employment dynamics and the real estate market.

The rest of the paper is organized as follows. Section 2 presents the data and Section 3 describes the empirical strategy. Section 4 presents the main findings and tests its robustness. I delve into the heterogeneity and extensions in Section 5. Finally, I discuss future research in Section 6.

2 Data

To assess the influence of tourism on economic activity, I have assembled a comprehensive dataset aggregated at the level of census tracts.[5] This dataset includes several variables, such as hotel openings, the number of establishments, employment, rental prices, residential renovation permits, and a wide range of sociodemographic characteristics.

2.1 Hotel information

The data set used in this analysis incorporates details on Madrid's hotel supply from 2001 to 2010.[6] The main data source is the Official Hotel Guide, an annual bulletin published by Tourspain, a public Spanish agency charged with overseeing tourism promotion, from 1936 through 2010. More precisely, the data include each hotel's coordinates, category and typology, opening date, and the number of rooms. I restrict the analysis to years before 2010 to avoid possible contamination effects of other tourist drivers, such as short-term rental disruption.[7]

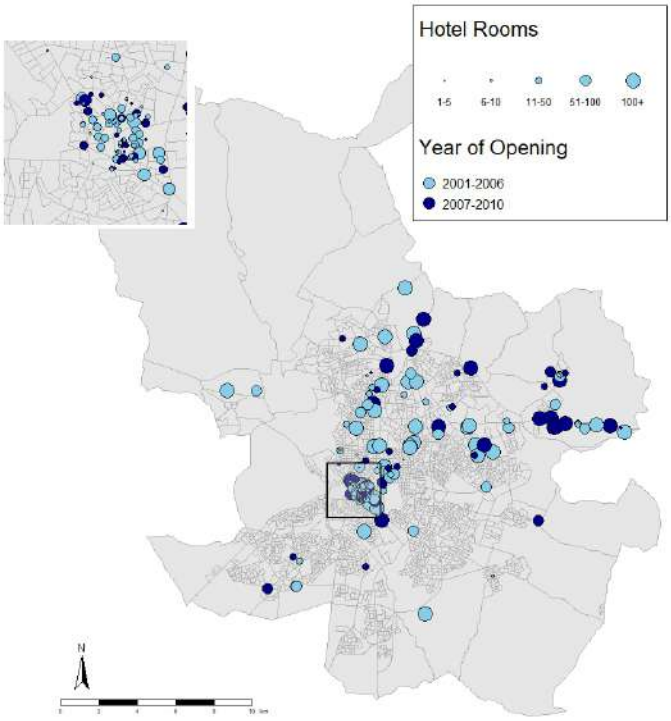
Figure I illustrates the geographic distribution of new hotel rooms across census tracts within Madrid municipality. The distribution of hotel room openings spans the city yet shows a notable agglomeration in proximity to the city center, the business district (North), and the airport (Northeast). This pattern underscores the presence of agglomeration economies and the influence of location determinants within the hotel industry (Freedman and Kosová, 2012). Additionally, we can see a clear connection between space and time since hotels tend to open in these specific census tracts from 2001 to 2010.

[5] Census tracts are the smallest statistical unit in Spain. In particular, the city of Madrid is divided into districts (21), neighborhoods (128), and census tracts (2358) according to 2001 city boundaries, from the largest to the smallest administrative unit (see Figure A2).

[6] In this context, the term "hotel" broadly includes a variety of accommodation types, such as hotels, hostels, boarding houses, motels, and resorts, to maintain clarity in exposition.

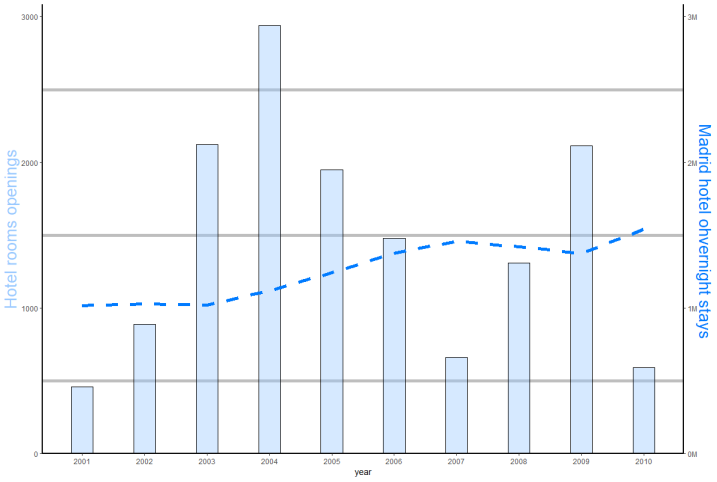
[7] Despite Airbnb's arrival in Madrid in 2009, the number of Airbnb listings didn't start to surge until 2014 (Hidalgo et al., 2022).

Figure I: Spatial distribution of hotel room changes from 2001 to 2010



Notes: Gray lines limit commuting polygons.

Figure II: Hotel room openings and Madrid hotel overnights from 2001 to 2010.



Notes: The left scale is for hotel room openings (bars), and the right scale is for the evolution of Madrid hotel overnight stays (dashed lines).

In 2001-2010, 188 hotels were opened, translating to 13,510 new hotel rooms, almost an expansion of 50% of the previous overall supply.[8] The influx of new hotels peaked in 2004 with almost 3000 hotel rooms opening, as depicted in Figure IV. On the demand side, there was a noticeable increase in overnight stays in Madrid, which experienced a minor drop during the initial years of the Great Recession. Despite this, both supply and demand demonstrated rapid recovery in subsequent years, highlighting the resilience of the tourism sector to buffer against the adverse impacts of the economic downturn (Antonakakis et al., 2015). Regarding distribution across hotel categories, 4-star hotels are significantly ahead in the number of new openings and available rooms. This trend underscores the pivotal role that high-rated hotels have played in fueling recent tourism growth (see Figure A3 in Appendix A).

2.2 Outcome of interest

Establishment and employment. Information on employment and establishment comes from *Directorio de Actividades Economicas*. This dataset provides georeferenced information for the universe of all economic activities in the Madrid region during the period 2001-2010. The data set compresses business-level data under a four-digit NACE-based classification, location, and employment size class.[9]

Housing information. Housing data comes from different sources. First, I collect rental market data from the rental guarantee database provided by the Madrid Regional Housing Department for 2001-2010. Second, I obtain residential permits from the Madrid City Council that cover the 2007-2013 period. Lastly, I gather information from the 2001 and 2011 Spanish census about the number of rental units and total dwellings.

2.3 Protected buildings

The information on protected buildings come from the *"Plan General de Ordenación Urbana de Madrid de 1997"*, a regulatory document guiding urban development in Madrid, Spain. This dataset outlines comprehensive guidelines covering land use, density, infrastructure, and building conservation, with the goal of achieving balanced and sustainable urban growth. It includes a detailed list of buildings that hold cultural, historical, or architectural significance. These buildings are legally protected to ensure their preservation, aligning with the broader framework of urban development. In this paper, I consider all protected buildings in my instrumental strategy, regardless of their protection level, except for monuments, museums,

[8] Between 2001 and 2011, only four hotels experienced permanent closures, while nine others, which had opened before this period, temporarily ceased operations for renovations

[9] There are ten size classes: 1, 1-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999 and +900. I take the minimum of each category to attribute employment at the establishment level and remove observations for the last two size classes due to the imputation noise. The results remain consistent regardless of other imputation measures, such as the class mark or the maximum or including all size class categories.

and other non-lodging facilities, which have been excluded from the analysis. In this way, I keep 18047 protected buildings out of 19476.

2.4 Sociodemographic variables

I enrich the dataset by incorporating additional variables that help to account for various factors related to changes in the local economy, such as the population, the share of educated people, and the unemployment rate. I collect this information from the Spanish 2001 census. By including those sociodemographic characteristics, I aim to control for other trends related to changes in the number of establishments, such as gentrification and urban revival (Baum-Snow and Hartley, 2020; Behrens et al., 2022; Couture and Handbury, 2023).

Table 1 presents the descriptive statistics of the main variables in this study (see Table A2 in Appendix A for the description and sources of the variables and Appendix B for a more detailed explanation of the data collection).

Table 1: Descriptive statistics

Panel A: Change 2001-2010			
	Sum	Mean	S.D
Establishments	11,171	4.737	17.47
Employment	59,733	25.332	217.733
Hotel rooms	13,632	5.781	51.078
Panel B: Level 2001			
	Sum	Mean.	S.D
Establishments	111,513	47.291	61.352
Employment	619,534	262.737	639.855
Hotel rooms	27,360	11.603	66.34
Protected buildings	18,962	8.042	17.517
Population	2,971,924	6204.434	3386.223
Share college	-	0.214	0.125
Unemployment rate	-	0.126	0.033

Notes: N = 2358. Descriptive statistics for commuting zone level observation.

3 Empirical strategy

This paper aims to investigate the impact of the entry of hotels into urban transformation. In the first part, I aim to determine to what extent hotel openings have affected the surrounding areas regarding the number of establishments and employment. To address this research question, I employ the following regression specification:

$$\triangle Y_i = \beta \triangle Hotel\ rooms_i + \rho X_i + \delta Z_n + \epsilon_i$$

where i indexes census tracts and the operator $\triangle$ denotes long-run differences from 2001 to 2010.[10] The main dependent variables, $\triangle Y_i$, are the change in the number of establishments and employment as a proxy of local economic activity. The key explanatory variable, $\triangle Hotel\ rooms_i$, measures the change in the stock of hotel rooms in a given census tract. This measure captures the number of hotel openings and the size.

I complement the specification and expand it to control for sociodemographic characteristics measured in 2001 at the census tract level X_i, such as population, the share of educated people, and the unemployment rate. I measure them at the beginning of the sample period to avoid potential contamination effects of the treatment variable. To account for different geographical business dynamics trends depending on the location of the economic activity, I add the distance to the city center as an explanatory variable.[11] To address the concern that the results are driven by differential pre-hotel opening establishment and employment changes, I include the change in the number of establishments from 1990 to 1997. In this way, the specification allows for differential trends in establishment and employment 2001–2010 based on pre-existing trends. Lastly, I incorporate spatial district fixed effect, Z_n, to control for contemporaneous shocks common to all the census tracts of a given district. By including these fixed effects, I effectively capture and account for factors that remain constant over time but vary across different census tracts within the district. Including district fixed effects and the set of sociodemographic covariates implies that β is estimated from changes in the number of hotel rooms within the census tract over time, compared to other census tracts in the same district with similar pre-determined and geographical characteristics during the ten window period.

However, the coefficient of interest β could still be correlated with unobserved changes that are not partial out in the regression specification, therefore biasing the coefficient in an unclear direction. On the one hand, hotel openings may be higher in areas more attractive to local amenities and with higher perceived quality. On the other hand, hotel openings can be concentrated in the declining zones with lower land costs and limited investment prospects, such as those close to airports or critical transportation hubs, catering primarily to business travelers (Lee and Jang, 2011).

[10] I chose to employ long differences over yearly panel data due to the absence of time-varying control variables at the census tract level and the treatment's inherent nature. Although there are areas where hotels have opened several facilities within the same tract over the years, many census tracts only experimented with one hotel opening over the period, making long differences the most convenient specification to identify contemporaneous and subsequent economic effects. As a robustness check, I use a panel data specification and found that the results remain consistent.

[11] I measure the distance to the center as the distance from Puerta del Sol (main square in Madrid city) to the centroid of each census tract.

To address any remaining non-randomness in hotel opening locations across census tracts, I use the number of protected buildings as an instrument for the variation in the number of hotel rooms in a given census tract. Specifically,

$$\triangle Hotel\ rooms_i = \alpha Protected\ Buildings_i + \rho X_i + \delta Z_n + \epsilon_i \tag{1}$$

Protected buildings have been identified as one of the key price determinants in the hotel management literature (Henderson, 2011, 2013; Lee and Chhabra, 2015; de la Pena et al., 2016). The adaptive reuse of historic buildings for accommodation facilities allows developers to overcome the economic viability of adapting costly structures for new uses, which will not be affordable or cost-effective for other economic activities. Hotel users highly value the opportunity to be hosted in these protected buildings due to their aesthetics and architectural value, making them willing to pay a premium for such unique and culturally rich experiences. As a result, many countries have implemented this approach to modify existing historic buildings to serve purposes that are usually different from their original purpose, with the conversion of historic buildings into hotels also serving as a method of preservation.[12]

Furthermore, several changes to existing land use regulations were approved during the analysis period in Madrid to facilitate the opening of new accommodations by easing the requirements for establishing accommodation facilities (Comunidad de Madrid, 2005). These regulations aimed to respond to the developing demand for hotel rooms due to the increase in tourist flows and to strengthen its bid for the 2012 Olympic Games (see Figure A1 for real examples of the transformation of protected buildings into accommodation facilities in Madrid). In this manner, the timing of the regulation can be considered exogenous, as it was explicitly chosen to boost the chances of hosting the Olympic Games without affecting any other economic activities except the lodging industry.

The instrument has two requirements to yield a causal estimate of hotel openings on local economic activity. The first is a strong relationship between hotel room openings and the number of protected buildings. The second requirement is that, conditional on covariates, the number of protected buildings is uncorrelated with unobserved determinants of changes in local economic activity. That is, the number of protected buildings impacts changes in local economic activity only by hosting hotel facilities. I provide evidence in favor of these requirements.

[12]For instance, the creation of public-managed hotel chain "Paradores" in Spain, a collection of hotels established in castles, fortresses, and other historic structures, *La Oficina del Historiador* with its hotel chain "Habaguanex" in Cuba, which places hotels in small and medium historical buildings, and *Pousadas* in Portugal.

First, I present evidence to support the first requirement in Figure A4 and Figure A5 in Appendix A. As shown in Figure A4, census tracts with many protected buildings exhibit a higher concentration of hotel room openings. This strong relationship also holds spatially, as demonstrated in Figure A5, where I plot the spatial distribution of protected buildings and hotel room openings across census tracts.

Concerning the exclusion restriction, the identification strategy assumes that census tracts with a higher concentration of protected buildings affect local economic activity only through their impact on hotel location decisions and their subsequent economic effects. I provide evidence in favor of the validity of the instrument as follows.

First, I check whether the instrument predicts changes in the number of establishments and employment for census tracts that have never experienced any hotel presence. This exercise aims to show that the number of protected buildings is only related to changes in the outcomes of interests through its effects on hotel openings. I do not find any significant relation between the instrument and the difference in the number of establishments and employment in these areas (see estimates in columns 1-2 in Table A3 in Appendix A).

Second, an important consideration regarding the instrumental variable is the potential influence of the number of protected buildings on an area's economic activity, even before the hotel openings. To examine this, I test whether pre-period changes in both outcomes of interest are correlated with subsequent changes in hotel penetration predicted by the instrument. In this manner, I regress changes in the number of establishments and employment between 1970 and 1980 against the predicted changes in the number of hotel room openings by protected buildings between 2001 and 2010. I provide evidence that census tracts with protected buildings and hotel openings are not areas already undergoing different trends correlated with changes in local economic activity (see columns 3-4 in Table A3). Furthermore, I conduct a placebo test to ensure that the instrumental variable strategy accurately reflects the effects of repurposing protected buildings into accommodation facilities rather than any spurious correlation due to unobserved activity influencing changes in the number of establishments and employment. Specifically, I implement a randomized treatment test akin to Christian and Barrett (2017) and Barron et al. (2021). In this test, I randomly redistribute the variation in hotel room openings across census tracts experiencing hotel openings and run the baseline IV specification. This procedure is repeated 1,000 times. Figure A6 in Appendix A shows it can be that the effect of hotel room openings is statistically insignificant for over 98% of the randomized allocations, provides evidence that the relationship between the change in the number of hotel rooms predicted by the instrument and the difference in the number of establishments and employment is not spurious.

Third, the previous exercises do not provide evidence against a potential confounder correlated in time and space with the variation in the number of hotel rooms, the concentration of protected buildings, and the evolution of economic activity. However, the number of protected buildings in an area may be correlated with other socioeconomic trends like gentrification. To test this hypothesis, I check whether the predicted variation in the hotel rooms leveraged by the instrumental strategy predicts sociodemographic and urban transformation changes related to gentrification. In particular, I measure gentrification through an establishment perspective using the variation in the number of cultural and creative sector activities.[13] The main findings show no effect of hotel openings on gentrification activities (see estimates in Columns 5-6 in Table A3 in the Appendix).

Fourth, the relevance of the instrumental variable strategy is based on the fact that hotels are one of the few economic activities that can take advantage of the repurposing of historic buildings, as hotel guests value being hosted in those facilities. However, firms may select these buildings as their headquarters due to aesthetics (Bargenda, 2015). This could lead to changes in the urban landscape that could be driven by those activities, confounding the effects of hotel economic impacts. To test for this issue, I examine whether the change in the number of hotel rooms predicted by the instrument is correlated with a variation in the number of firms' headquarters in each census tract. The existence of this confounder, associated with the presence of hotels and the change in the dynamics of the local economy, could invalidate the identification strategy, as I would mistakenly attribute the increase in the number of establishments and employment to hotels. Columns 7-8 in Table A3 show no effect of the hotel openings predicted by the instrument on the location of the headquarters.

Fifth, to ensure the reliability of the identification strategy and assess whether hotel openings effectively capture the presence of hotel guests and tourists in the vicinity, I conduct an additional exercise. This exercise involves testing the predictive capacity of hotel openings for the presence of tourists in the area. To achieve this, I gather photographs taken by tourists from the Flickr platform.[14] The results in column 9 of Table A3 show that hotel openings positively impact the number of photos tourists take in the census tracts. Finally, I

[13] I adapt the classification proposed by Behrens et al. (2022) to this setting and include the following activities: 9272 Other recreational activities, 9252 Activities of museums and preservation of historical sites and buildings, 9231 Artistic and literary creation and interpretation, 9211 Film and video production, 7484 Other business activities, 7481 Photography activities7440 Advertising, 7414 Consultation and advisory services on business management and direction, 5225 Retail trade of beverages, 5227 Other retail trade in specialized food establishments, 7420 Technical services of architecture and engineering and other related technical consulting activities, 9133 Other associative activities, 2211 Book publishing. The codes reflect the Spanish 1993 NACE-based classification of economic activities.

[14] I differentiate between photos taken by tourists and residents by considering users who captured photos in Madrid over a continuous 7-day period between 2007 and 2013. Then, I compute the difference between the tourist photo stock in each census tract between 2007 and 2013.

employ sensitivity analysis tools for regression models developed by Cinelli and Hazlett (2020, 2022) to assess whether the results are robust to the potential existence of other confounders apart from gentrification and other economic activities or all of them interacting non-linearly. Table A4 in the Appendix A confirms that it is highly unlikely that the main results are driven by a potential confounder.

Having provided evidence about the validity of the proposed instrumental strategy, I now analyze the effect of hotel opening on the number of establishments and employment in Section 4.

4 Results

Table 2 displays the results of the OLS (columns 1-4) and IV (columns 5-8) specifications. The sample includes 2358 census tracts in Madrid. The dependent variables are long differences computed between 2001 and 2010 for the number of establishments and employment. I instrument for the variation in the number of hotel rooms with the number of protected buildings in the same area in columns 5-8. Columns 2, 4, 6, and 8 include, as control variables measured in 2001, the population, the share of educated people, and the unemployment rate. I also include the change in the number of establishments from 1990 to 1997 to control for differential trends in establishment and employment based on pre-existing trends. Finally, I add district fixed effects to remove time-invariant unobserved heterogeneity and the distance to the city center to control for geographical characteristics across census tracts within districts.

Table 2: The impact of hotel room openings on the number of establishments and employment (OLS and IV).

	OLS				IV			
	Δ Establishments		Δ Employment		Δ Establishments		Δ Employment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Hotel rooms	0.121***	0.118***	1.29***	1.28***	0.222**	0.222**	4.52*	4.18*
	(0.022)	(0.021)	(0.365)	(0.361)	(0.112)	(0.094)	(2.50)	(2.12)
Covariates		x		x		x		x
Adjusted R-squared	0.164	0.187	0.112	0.13				
F Stat, Excluded instru.					9.25	10.84	9.25	10.84
Observations	2358	2358	2358	2358	2358	2358	2358	2358

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, ** and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010. I use the number of protected buildings as an instrument for the variation in hotel rooms. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center in Madrid. Fixed effects at the district level.

The main results show a positive effect of hotel openings on the number of establishments

and employment, regardless of the model specification.[15] The inclusion of controls reduces the coefficients for changes in the number of hotel rooms. However, they remain significant across all specifications. Although I control for an extensive range of factors, I cannot rule out unobserved time-varying characteristics related to hotel entry and the changes in the number of establishments and employment. Therefore, I use an instrumental variable strategy to overcome the potential endogeneity problem in the hotel location decision. The instrument, the number of protected buildings, predicts hotel location decisions, as can be seen in the Kleibergen-Paap Wald F-test value. In the second stage, we can see that the sign of the hotel room effect remains positive, and the magnitude has slightly increased.[16]

Notably, the coefficients tend to be slightly larger for the IV specification. This suggests that omitted factors are negatively correlated with changes in the number of establishments and employment but positively correlated with hotel room availability decisions, and measurement errors may push down the coefficient's OLS magnitude. In that sense, hotels may cluster in census tracts with restricted investment prospects, typically featuring lower prices. The affordability of these areas can attract more accommodations, leading to a greater concentration of hotels in such places. Although the data set provides detailed information on hotel openings, it is essential to note that there may be measurement errors, especially for potentially small accommodations that were not included. Finally, an additional explanation for the larger magnitude of IV coefficients may be that IV estimates capture the effect of the treatment on a specific subset of the population - the compliers. In this context, census tracts whose treatment status, the opening of new hotels, is influenced by the instrument, the number of protected buildings. Consequently, in the presence of heterogeneity of the effect, IV coefficients estimate the local average treatment effect

[15]Table A5 in Appendix A presents the first-stage, reduced-form, and regression results, taking the mark class and the maximum of the employment size class as a robustness check. Also, I include all employment-size classes without removing the two largest categories. Last, I remove hotel employees to test that mechanical increases in the number of hotel employees do not drive the employment effects in each census tract. In particular, I find consistent results showing that tourism-induced employment comes mainly from tourist activities other than the hotel industry (Exceltur, 2018). The results show the strength of the instrument and the stability of the coefficient of interest for different employment imputation measures and excluding hotel employees.

[16]One potential criticism of the instrumental strategy lies in the fact that protected buildings encompass a diverse array of structures, making it challenging to pinpoint which types of repurposed structures are driving the observed results. I incorporate all protected buildings into the instrumental strategy in the baseline specification, irrespective of their protection level, except monuments, museums, and other non-lodging facilities, which have been excluded from the study. To show that the results remain consistent no matter the typology of the protected buildings used as instruments, I follow the classification provided by the Madrid City Council and created four different instruments: the number of protected buildings with protection levels I, II, and III, and the total number of all protected buildings. The results in Table A6 reveal that the significance and magnitude of the results remain consistent, with minor exceptions noted in the establishment specification when paired with the number of protected buildings at level II. This null effect may be attributed to the limited variability observed due to these buildings' small number and specific characteristics, which may pose challenges in repurposing.

(LATE) related to places with a high density of protected buildings, which may be more sensitive regarding economic activity to hotel openings. On the other hand, the OLS estimates capture the average effect of hotel openings across all areas, including those where hotels open, for reasons unrelated to protected buildings. This average effect might be diluted by including areas where the impact of hotel openings is less pronounced.

To further investigate whether the downward bias in the OLS estimate is the result of a problem of omitted variable bias plus the presence of heterogeneity on the effect, I proceed to estimate the IV specification separately by subgroups. In particular, I identify depriving census tracts according to the Spanish Catalog of Vulnerable Neighborhoods and repeat the IV and OLS specifications for depriving and not depriving tracts.[17] As demonstrated in Table A7 of Appendix A, the relative stability of IV estimates across subgroups contrasted with the substantial variability in the OLS estimate. This implies that while the IV estimates specifically reflect the impact of new hotel openings on a select subgroup of census tracts characterized by the presence of protected buildings, which enhances the propensity for new hotel establishments, the OLS estimates represent the general effect of hotel openings across all tracts, being those estimates downward biased, stemming from the tendency of hotel development to be predominantly focused in economically disadvantaged tracts.

In quantitative terms, the coefficients in columns 6 and 8 suggest that each additional hotel room creates .222 establishments and 4.18 employees. This equates to an approximate 27% increase in establishments and an 82% increase in employment explained by hotel openings from baseline levels in an average commuting zone during the period 2001-2010.[18] In summary, the impact of hotel rooms on employment is larger than the impact of the number of establishments. This is because the employment variable considers both the increase in the number of establishments and the increase in the workforce within existing establishments. To contextualize these figures, it can be inferred that 100 overnight stays would typically stimulate a rise of 1.5 employees and .12 establishments, given the average room occupancy in Madrid in 2010. These estimates are consistent with the 2-5 jobs per room observed in other studies (Kadiyali and Kosová, 2013; Exceltur, 2022).[19]

[17] The "Catalog of Vulnerable Neighborhoods" from the Spanish Ministry of Development is a comprehensive database that identifies and characterizes neighborhoods across Spain deemed vulnerable from a socio-economic and urban perspective in 2011. This catalog serves as a critical tool for urban planning and policy-making, offering insights into areas that may require targeted interventions for improvement and redevelopment.

[18] These figures were computed by taking into account the average increase in the number of hotel rooms, which was approximately 5, and the average changes in the number of establishments and employment, which were around 4 and 25, respectively, between 2001 and 2010.

[19] Although not directly related to our main research question, Hidalgo et al. (2022) adopted a similar methodology for Madrid, albeit in a different time frame and with a distinct focus. Specifically, they examined the effects of Airbnb's presence in Madrid from 2014 to 2019. Their analysis, which used the increase in Airbnb rooms and an instrumental variable approach involving the proportion of rental houses and changes in the number of consumption amenities in each census tract, yielded an estimate of .064. This is comparable to

4.1 Robustness checks

Now, I test the robustness of the results to changes in the set of controls, specifications, and sample definitions.

4.1.1 Alternative specification

In the first part, I show that the results are robust to different specifications. I check whether the main tenets hold whenever I augment the baseline specification, including the pre-treatment control variables in levels and changes. Then, I change the way of measuring the main variable of interest using the number of hotel opening units without taking into account the size. After that, I estimate the model using panel data instead of long differences. Finally, I address the potential spatial correlation among census tracts from nearby census tracts in different neighborhoods.

To begin with, I augment the baseline regression specification by incorporating the changes in the explanatory variables as additional control variables.[20] This allows me to consider relevant dynamics, such as the influx of highly skilled young people, which can contribute to urban transformation in the area (Baum-Snow and Hartley, 2020; Couture and Handbury, 2020; Curci and Yousaf, 2022). As evident in result A in Table 3, there is minimal change in the coefficients' magnitudes, suggesting that potential confounding factors related to gentrification are unlikely to drive the results. As an additional robustness check, I test whether the main results hold by measuring hotel-induced tourism through the number of hotel opening units. The decision to use the number of hotel room openings in the baseline specification is based on the fact that I can control the hotel size in this way. Again, the sign of the result B in Table 3 shows that the findings are not sensitive to alternative ways of measuring hotel activity, although the magnitude of the coefficient has changed due to the different metrics.

Then, I take advantage of the time variation in the analysis and run a yearly panel data specification. I employ long differences over yearly panel data due to the absence of time-varying control variables and the treatment's inherent nature. Although some census tracts have seen multiple hotel openings at the same location over the years, many census tracts had only one hotel opening during the entire period. To solve the endogeneity problem that arises from the non-random location and timing of hotel openings, I interact the number of protected buildings with the total hotels' overnights in Spain as a proxy for tourists in a

the .057 estimate that would be obtained by limiting the scope of activities to consumer amenities alone, as shown in Table A8 in the Appendix A.

[20] Specifically, I calculate the decade-long differences (2001-2010) in the proportion of degree holders and population. I exclude decade-long differences in the proportion of unemployed individuals since this information is unavailable for 2010.

shift-share style.[21] Result C reveals that the choice of a long difference over panel data does not affect the significance of the results.

Table 3: Robustness checks

Variable	Establishment	Employment
Alternative specification		
A. Long-diff controls	0.229**	4.37*
	(0.104)	(2.38)
B. Number of hotel openings	8.64**	205.0**
	(4.26)	(104.1)
C. Panel data	0.138***	3.65***
	(0.074)	(1.24)
D. Conley errors	0.222***	4.18***
	(0.093)	(1.89)
Alternative sample		
E. Tourist attractions	0.252**	4.434***
	(0.104)	(2.33)
F. Pre-crisis (2001-2006)	0.334***	6.96**
	(0.123)	(3.33)
G. Great Recession (2007-2010)	0.313**	-0.366
	(0.136)	(1.75)
H. Unit of observation: commuting zones	0.330*	2.73*
	(0.176)	(1.36)
I. Unit of observation: neighborhood	0.481***	3.60***
	(0.199)	(1.36)

Notes: Statistical significance at levels 1, 5, and 10% is indicated by ***, ** and *, respectively. All specifications are IV regressions with clustered standard errors at the neighborhood level in results A-B and E-H, census tracts in result C, Conley in D, and heteroskedasticity in I. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2011. Control variables include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance to the city center in results A-D and G-I. Result D specification only controls for the same variable interacted with time-varying year dummies due to the lack of time-varying regressors. I include district-fixed effects in Results A-H. The number of observations remains constant in all specifications (2358), except Results C (2348), Results E (235800), Results H (585), and Results I (128 neighborhoods).

Up to this point, all the specifications have employed cluster standard errors at the

[21] While the number of protected buildings explains the extensive and intensive margin of the treatment, the Spain hotel overnights describe the timing. Previously, Garcia-López et al. (2020) and Hidalgo et al. (2022) have used a similar identification strategy in a panel data context to instrument the growth and location of short-term rentals. Specifically, while both studies use the same shift (Google searches worldwide for Airbnb), Garcia-López et al. (2020) use the number of tourist attractions, and Hidalgo et al. (2022) use the proportion of rental houses as the share.

neighborhood level. However, neighborhoods that serve as administrative units may not capture the influence of agglomeration and other economic factors. Consequently, census tracts located close to each other but in different neighborhoods may be exposed to similar shocks and trends. To address the potential spatial correlation among census tracts from different neighborhoods, I adopt the HAC method proposed by Conley (1999), with a parameter value of 2 km. This choice is informed by previous research that indicates that tourists tend to move a maximum of 2 km from their accommodations (Shoval et al., 2011). Furthermore, considering the average neighborhood diameter is 1.2km, I opt for a larger distance to adequately account for any remaining spatial correlation. The result D confirms that the main results are robust to computing the standard errors at a larger level.

4.1.2 Alternative sample

So far, we have seen that the baseline results do not depend on adding new control variables, measuring the variable of interest, exploiting the temporal dimension through a panel data set, or potential spatial autocorrelation in the error term. In this section, I want to test the robustness of the results using different samples. First, I remove census tracts hosting tourist attractions to show the robustness of the results by excluding tourist areas. Then, I test whether the results hold by splitting the sample into different periods. Finally, I assess whether the baseline results are robust to the geographical aggregation of the data.

First, a possible violation of the exclusion restriction arises due to the non-random distribution of hotel openings, which are predominantly located in the city center, where most tourist points of interest are. This spatial bias presents a challenge in disentangling the impact of hotel room openings on the local economic activity from other influences, such as those originating from other tourist activities or resident consumption. For example, the increase in the number of establishments and employment can be attributed to city-centric characteristics (García-Palomares et al., 2015; Salas-Olmedo et al., 2018; Aparicio et al., 2021). This situation is particularly relevant in Madrid, where tourists are predominantly concentrated in the city center. Although I address this issue to some extent by accounting for a large set of socio-demographic and spatial covariates, I cannot wholly dismiss other factors, such as shifts in resident consumption taste toward the city center or the surge of tourist-related activities such as convention centers or markets. To test for this, I exclude all census tracts intersecting with the top ten points of interest in Madrid from Tripadvsor.[22] Result E in Table 3 show that the findings are not affected by the characteristics of the city center or confounding factors related to tourism.

[22]Specifically, the top ten points of interest in Madrid according to Tripadvisor are: Santiago Bernabéu Stadium, Royal Palace, Gran Via Avenue, Plaza Mayor, Salamanca District, La Latina, Crystal Palace, Malasaña and Puerta del Sol.

Second, to further ensure the robustness of the results, I test whether they hold up under different sample periods. This is particularly relevant because the time frame covers the Spanish economic boom and the onset of the Great Recession. To assess the independence of the findings from the chosen period, I divide the sample into two distinct phases: the "Pre-crisis" period from 2001 to 2006 and the "Great Recession" period from 2007 to 2010. The results F and G show that hotel room openings similarly impact establishments regardless of the chosen period. If so, the estimate for the employment specification in the "Great Recession" period is insignificant. This could be attributed to Spain's labor market dynamics during recessions, where the country experiences a strong contraction in employment (Sanz-de Galdeano and Terskaya, 2020) and also to the decrease in hotel occupancy rate as can be seen in Figure IV.

Last, the decision to use census tracts as the observation unit is based on the need to identify local spillovers of hotel entry on economic activity while still capturing spatial spillovers. Although other aggregation units, such as commuting zones or neighborhoods, could have been used, census tracts balance being small enough to identify local effects and large enough to capture spatial influences. To demonstrate the robustness of the findings regarding the selected geography, I replicate the baseline observation by aggregating the data into these alternative administrative units. The results H and I reaffirm that the main findings remain consistent regardless of the chosen geography.

5 Heterogeneity and Extensions

Having explored the impact of tourism on the local economy and the robustness of the findings, I now explore other aspects of the urban landscape that may be affected by hotels in more detail. First, I analyze the heterogeneous effects of hotel openings on different economic activities. Then, I study whether the economic impacts of hotels are different across urban geography. To conclude, I explore whether tourism impacts the real estate market measured through rental prices and building renovation permits and whether that impact, at the same time, affects the configuration of establishments according to the business structure.

5.1 Heterogeneity

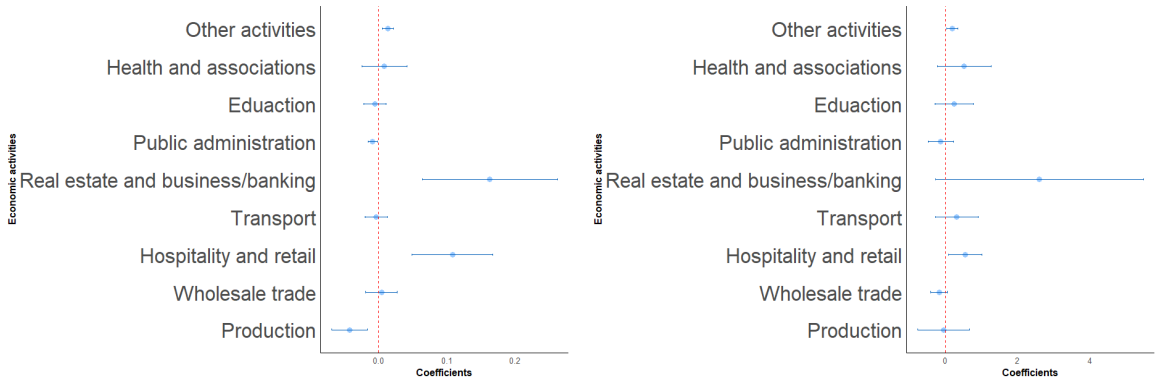
5.1.1 Sectoral composition heterogeneous effects

The opening of a hotel in a particular area can have a significant impact on various economic activities. This impact is attributed to the different consumption patterns of tourists and residents. Tourists, typically seeking accommodation and entertainment, contribute directly to the hotel industry and related sectors such as restaurants, bars, cafes,

or souvenirs (Almagro and Dominguez-Iino, 2022; Hidalgo et al., 2022; Alyakoob and Rahman, 2022). On the other hand, residents often engage in different spending patterns, focusing more on daily necessities and services within their community. In addition, the fact that tourism consumption is mainly concentrated in the non-tradeable sector can contribute to fastening the transition from a production-based city toward a consumption city, displacing tradeable activities.

To test whether tourism has an even impact on economic activities, I turn to the narrower analysis of the effect of hotel openings on economic activity by focusing on its differential effects on establishment and employment depending on the activity sector.[23] Figure III shows how tourism has an unequal effect across the establishment sectors, primarily benefiting activities related to the hospitality and retail sectors and negatively impacting production activities. In this sense, the results are consistent with previous findings in the literature (Lanzara and Minerva, 2019; González et al., 2020; Hidalgo et al., 2023). As services cannot be traded, a surge in tourism boosts income in non-tradeable activities. Assuming that the cost of intermediate inputs remains constant in global markets, the economy reallocates resources towards the non-tradable sector and replaces the local production of intermediate inputs with imported goods (Lanzara and Minerva, 2019).

Figure III: Heterogeneous effects on other economic activities



Notes: Figure reproduce the heterogeneous effects of hotel openings on establishments (left) and employment (right) across sectors using the main baseline specification (Columns 6 and 8 in Table 2), respectively.

A potential concern may be that the category "hospitality and retail" includes a wide variety of tradeable and non-tradeable activities, potentially masking heterogeneous effects within this category. To check whether the main findings are driven by purely tourist-oriented and non-tradeable activities and not other economic activities, I perform an

[23] I define nine activity sectors according to a NACE-based classification in Spain (CNAE-93). A list of economic activities within the industry can be found in Table A9 in Appendix A.

additional exercise where I define tourist or resident-oriented activities following the classification proposed by Hidalgo et al. (2023). Mainly tourist-oriented establishments include consumption amenities, souvenirs, and clothing stores. At the same time, the resident-oriented category comprises grocery stores, hairdressers, nurseries, and other activities aimed at satisfying the daily needs of locals. Table A10 in Appendix A show that tourist-oriented activities, mainly non-tradeable activities, drive the creation of business and jobs in the analysis. However, I do not find evidence of a negative effect on resident-oriented activities. This could be attributed to the fact that hotel openings during the period were potentially concentrated in unused or newly constructed buildings, thus minimizing the displacement of local residents in the area.

In general, the negative impact on production-based activities, together with the positive effects on tourist-related activities, confirms that tourism contributes to explaining the transition from a production city to a consumption city (Glaeser et al., 2001; Lanzara and Minerva, 2019). In this way, hotel-induced tourism leads the town to undergo a structural shift away from the tradeable sector, focusing on specializing in services, particularly those catering to tourists.

5.1.2 Spatial heterogeneous effects

Table 4: Spatial Heterogeneous analysis.

	Inner areas		Business premises	Ring method	
Dependent Variables:	Δ Est.	Δ Emp.	Δ Business premises.	Δ Est.	Δ Emp.
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Δ Hotel rooms	0.239**	4.55*	0.168**	0.115**	1.18
	(0.109)	(2.45)	(0.080)	(0.057)	(1.07)
Observations	2322	2332	2332	1,889	1,889

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, **, and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010 in columns 1-2 and 4-5 and the change in business premises between 2001-2010 in 3. I use the number of protected buildings as an instrument for the variation in the number of hotel rooms. The number of observations varies across specifications. For columns 1-3, I exclude census tracts that are located outside the main driveway roads in Madrid. In columns 4-5, the focus shifts to removing those tracts that are adjacent to the areas where new hotels are established. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level.

The impact of hotel openings can vary widely across a city. To illustrate, hotels near airports or other accessibility areas may not yield as substantial economic spillover in hotel

surroundings as in central areas. This difference can be attributed to the predominant clientele of airport-adjacent hotels, primarily business travelers rather than leisure tourists (Lee and Jang, 2011). Additionally, the increase in establishments and employment associated with new hotel developments may predominantly reflect the dynamics of urban expansion. This trend suggests a shift towards the extensive margin of economic activity, characterized by the development of new commercial spaces, rather than an intensive margin approach focused on reducing vacancy rates. To assess these hypotheses, I conduct two exercises. First, I restrict the analysis to areas of the city within the main ring road.[24] Then, I estimate the main IV baseline model to see whether the impact of hotel openings differs. Following this, I assess the effect of new hotel openings on the difference in the stock of business premises as a proxy for the floor space in the same areas.[25] The results are reported in Table 4.

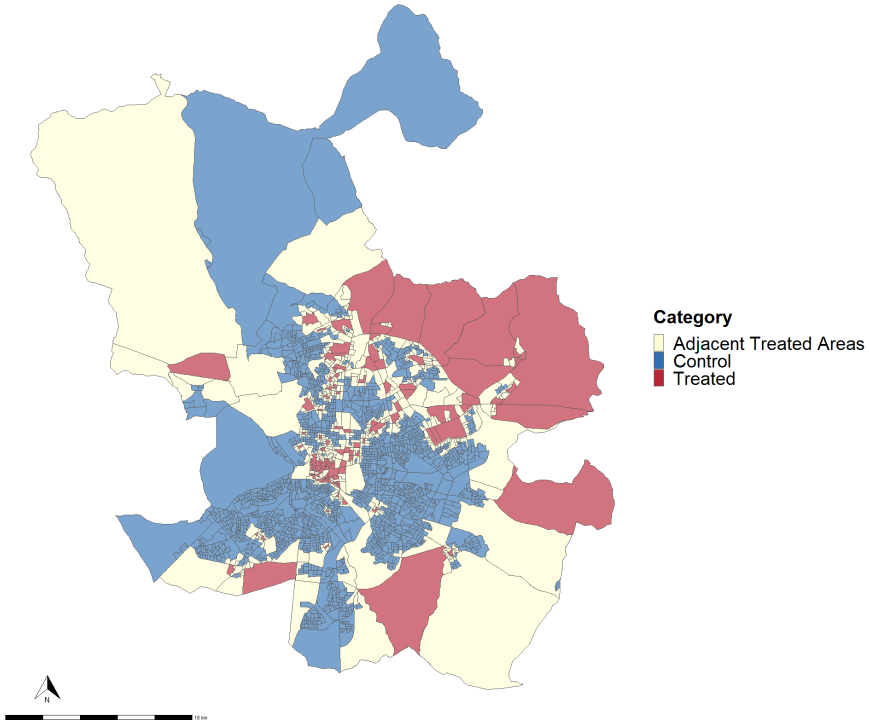
In columns 1 and 2, I examine the impact of hotel openings on business formation and employment in Madrid, filtering out mainly tracts near the airport and accessibility points. Both estimates, establishment and employment increase in magnitude, suggesting that the primary effects of hotel openings are observed in areas where business travelers are not the dominant user group. Moving to column 3, I find that part of the increase in establishments and employment led by hotel openings is attributable to new physical business premises. Therefore, hotel-induced tourism impacts the intensive margin by reducing vacancy rates and the extensive margin by constructing new physical stores.

It is important to explore whether the rise in businesses and jobs, sparked by new hotel openings, stems from the creation of new establishments or merely shifts resources from neighboring areas. This notion is particularly compelling when observing the potential clustering effects of these hotels, which might foster localized economic surges, influencing both the emergence of new establishments and the spatial redistribution of the existing ones. To test this, I estimate the IV baseline specification excluding tracts adjacent to these new hotels to clearly see the impact (see Figure IV). The main findings, shown in columns 4 and 5 from Figure IV, reveal that growth in businesses and employment is a combination of new creation and economic shifts from adjacent areas. This supports the idea that new hotels often form economic clusters, fostering growth while also redirecting existing economic activity toward these new hubs.

[24]The M-40 is the main ring road highway around Madrid, with a length of 61.1 km and an average radius of about 10.07 km from the Puerta del Sol, the city center of Madrid.

[25]I collect business premises information from the Spanish Cadastre that comprises detailed information and the precise geolocation of the universe of floor space in Spain. Here, a business premise refers to the physical property where an establishment conducts its activities.

Figure IV: Spatial Distribution of control, treated, and adjacent census treated areas.



Notes: Red areas represent census tracts where new hotels have opened. The white areas indicate tracts adjacent to those with hotel openings, while blue areas are not directly affected by or adjacent to the hotel developments.

5.2 Extensions

5.2.1 Housing market

The increase in amenities and building investment aesthetics driven by hotel openings may impact housing prices and contribute to urban revitalization. Previous research has consistently shown the influence of amenities and urban architectural aesthetics on the valuation of surrounding residences, with areas that possess distinct consumption amenities that often attract premium prices (Glaeser et al., 2001; Carlino and Saiz, 2019). Additionally, repurposed residential buildings as accommodation facilities can also positively impact rental prices through a decrease in rental housing stock (Garcia-López et al., 2020). In contrast, hotels can bring other problems in terms of congestion and nuisance, potentially negatively impacting the housing market. To test the impact of hotels on the housing market, I collect data from rental prices to study whether hotel room

openings contribute to real estate revitalization. To do so, I compute the difference in the mean rental price per square meter at each census tract between 2001 and 2010 and see whether hotel openings affect the rentals in the hotel's surroundings. The results, as shown in column 1 of Table 5, provide compelling evidence that hotel openings contribute to increased rental prices.

Table 5: The impact of hotel room openings on the real estate market.

Dependent Variables:	Δ Rental price	Δ Building renovation permits	Δ Rental houses	Δ Dwellings
Model:	(1)	(2)	(3)	(4)
Variables				
Δ Hotel rooms	0.03**	0.049***	-0.506	0.180
	(0.018)	(0.017)	(0.311)	(1.41)
Observations	1,407	1,207	2,358	2,358

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, ** and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the change in the mean rental price per square meter between 2001 and 2010 in column 1, the change in the number of building renovation permits between 2007 and 2013 in column 2, the change in the number of rental houses between 2001 and 2011 in column 3, and the change in the number of dwellings between 2001 and 2011 in column 4. Census tracts without rental information and building renovation information drop out from the analysis. I use the number of protected buildings as an instrument for the variation in the number of hotel rooms in each respective regression specification period. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level.

However, it is not clear whether the increase in rental prices prompted by hotel openings is due to a demand or supply driver. To better understand which channel explains the increase in housing rental prices, I perform three additional exercises, where I regress the difference in building renovation permits, the difference in the number of rental houses, and the number of dwellings against the change in the stock of hotel rooms.[26]. In this way, I can identify whether the positive effect on rental market prices is due to a reduction of the housing supply or residential investment. Unlike short-term rental platforms like Airbnb, which affect the real estate market by removing rental units from the stock of housing, thereby constraining supply, the results in columns 2-4 in Table 5 suggest a different mechanism for hotels. They confirm that urban regeneration is the most plausible channel driving the increase in rental prices, given that the opening of hotel rooms appears to have no impact on the stock of rentals or the number of dwellings, while it increases the number of building renovation permits. Essentially, hotels seem to enhance the overall attractiveness of an area, unlike the direct supply reduction effect observed with short-term rentals. In general, these results corroborate previous evidence on the role of tourism in neighborhood regeneration (Lanzara and Minerva, 2019; Xu and Xu, 2021; Bekkerman et al., 2022; Vizek et al., 2023).

[26]Due to data availability, the difference in building renovation permits is computed only using data from 2007 to 2013, as provided by the Madrid City Council. However, the change in the number of rental houses and dwellings is calculated using data spanning from 2001 to 2011, sourced from the Spanish Census (see Appendix B for homogenization of census tract limits over time)

5.2.2 Establishments business structure

Having observed that hotel openings contribute to the appreciation of rental properties in nearby areas, it is crucial to investigate whether this effect unevenly affects economic activities due to the high correlation between residential and commercial rents (Cuestas and Monfort, 2021). In this regard, hotel openings may not only lead to changes in the sectoral composition of the local economy but also influence the business structures within those sectors. This could be particularly challenging for individual-owned companies, which may struggle to cope with rising rents. Individual-owned companies often operate on smaller budgets and may have limited financial resources compared to corporate-owned businesses. When commercial rents increase, individual-owned activities, such as small retail store owners or independent service providers, may face greater difficulties absorbing these costs. They may have limited bargaining power and less access to capital, making it challenging to continue their operations in areas where rents are rising rapidly and, therefore, more sensitive to local shocks (Bartik et al., 2020). On the contrary, corporate-owned businesses often have more substantial financial resources and may benefit from economies of scale that allow them to absorb cost increases more effectively than individual-owned companies.

To examine the unequal impact of hotel openings on the business structure of establishments near hotels, I estimate the baseline IV specification but differentiate between individual-owned companies and corporate-owned businesses.[27] The findings in columns 1-4 in Table 6 confirm that hotel openings displace individual-owned companies in favor of larger corporate-owned businesses, possibly due to the appreciation in the commercial real estate market. These results suggest that when hotels open in a census tract, there is a discernible trend toward consolidation within the business sector. Smaller, independent establishments may face challenges in competing with the increased demand and changing dynamics brought about by the presence of hotels. As a result, larger corporate-owned businesses may be better positioned to take advantage of the opportunities arising from the growth in tourism and the subsequent commercial real estate appreciation.

However, the negative impact on individual-owned businesses may be driven by composition effects where some economic activities are displacing others. To rule out the possibility that this unequal effect results from a composition effect across activities, I test whether hotel openings affect the number of establishments and employment across economic activities and business structures. Interestingly, Figure A7 and Figure A8 in Appendix A show that hotel openings do not have an uneven impact on business structures across economic activities but within activities. In this manner, we can see that hotels

[27] Corporate-owned businesses refer to activities that involve multiple individuals and are structured as entities separate from their owners, such as limited liability companies, cooperatives, and partnerships.

Table 6: The impact of hotel room openings on establishment business structure.

	Individual-owned		Corporate-owned	
Dependent Variables:	Δ Establishments	Δ Employment	Δ Establishments	Δ Employment
Model:	(1)	(2)	(3)	(4)
Variables				
Δ Hotel rooms	-0.101**	-0.240	0.362***	2.86**
	(0.041)	(0.157)	(0.104)	(1.31)
Observations	2358	2358	2358	2358

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, ** and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the number of establishments and employment change between 2001-2010 for individual-owned companies (columns 1-2) and corporate-owned businesses (columns 3-4). I use the number of protected buildings as an instrument for the variation in the number of hotel rooms in each regression specification period. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between specific years, and the distance from the city center. Fixed effects at the district level.

replace mainly hospitality and retail activities in individual-owned establishments for corporate-owned businesses within this sector. Again, this evidence reinforces the idea that the increase in rental prices led by hotel openings leads to a change in the composition of the local economy, where corporate-owned businesses with potentially stronger financial positions displace individual-owned activities.

6 Conclusions

The paper provides evidence that hotel openings positively affect the number of establishments and employment in the surrounding areas. These findings are robust in different samples and specifications. Interestingly, hotel openings have heterogeneous effects on other economic activities and city areas. While tourist-oriented establishments benefit greatly, production-oriented activities are negatively affected. This suggests that hotel openings play a crucial role in transitioning from a production-oriented city to a consumption-oriented one. Moreover, the growth in employment and the number of establishments resulting from new hotel openings can be attributed to three key factors: the net creation of economic activity, the redistribution of economic activity from nearby tracts, and overall urban development. Notably, hotels in tracts oriented towards leisure tourism exhibit more substantial increases in both employment and the number of establishments. Finally, hotel openings impact the real estate market, leading to appreciation in the rental market and boosting residential investment, ultimately leading to a displacement of individual-owned establishments in favor of corporate-owned businesses within the same economic activity.

The present study makes meaningful contributions to incipient literature about the economic impacts of tourism. Hotels provide a market-driven solution to the conservation and restoration of historic buildings and, at the same time, foster overall economic activity in the vicinity. This is important due to the structural changes driven by remote working in urban areas after the COVID-19 outbreak. By repurposing vacant office spaces and empty protected buildings into mixed-use spaces, cities can leverage existing infrastructure to meet the growing demand for accommodation and housing. This not only addresses the issue of unused spaces but also presents an opportunity for economic growth and development. Since the IV approach I introduce in this paper is very general and can be applied to different cities, another possible future development is to extend the analysis to different urban areas other than Madrid.

However, more research is needed. While hotels can contribute to economic growth and revitalization, there is concern that they may exacerbate gentrification processes by expelling long-term residents. Although homeowners might experience benefits from hotel expansion through property value capitalization effects, tenants could potentially face adverse consequences. This complex interaction requires a comprehensive welfare analysis to determine the overall impact. In addition, the congestion caused by tourism can adversely affect a place's overall livability. Local amenities, such as parks, cafes, and shops, which are essential for the well-being of residents, can become overcrowded and less accessible due to the influx of tourists. It is crucial to fully comprehend the impact of tourism in all its aspects, given its significant contribution to the global economy. By gaining a comprehensive understanding of the effects of tourism, we can promote its sustainable and responsible growth, particularly in urban areas where the concentration of activities can amplify both the positive and negative consequences.

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A Appendix - Additional Tables and Figures

Before old palace dwelling

After hotel boutique

Before office building

After 5-star hotel

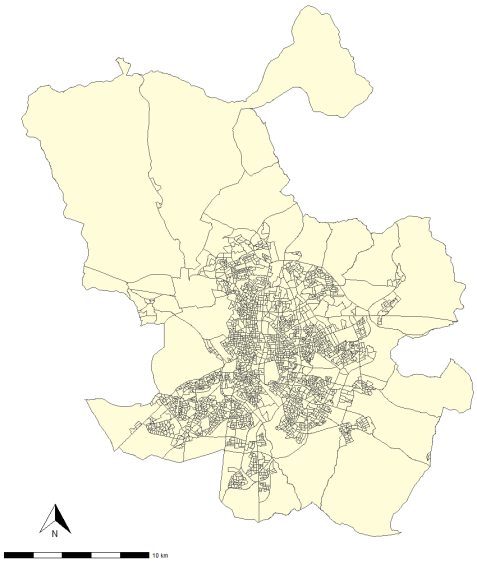
Figure A1: Conversion of protected buildings into accommodation facilities in Madrid

Table A2: Variable definition and source

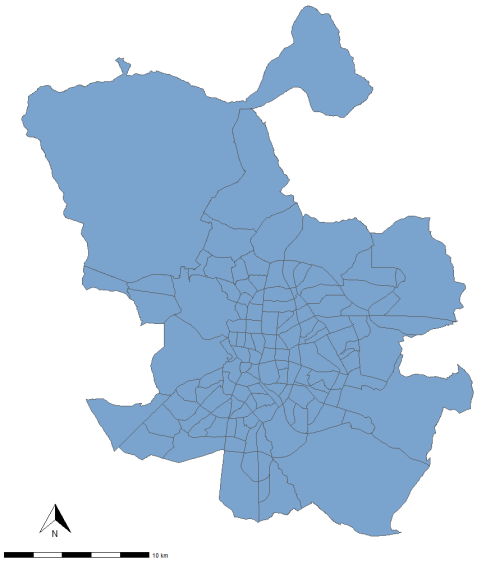
Variable	Definition	Source	Time Period
Establishment	# of establishments	Directorio de Actividades Economicas	2010-2001
Employment	Employment level (categories)	Directorio de Actividades Economicas	2010-2001
Rental price	Meter square rental price	Madrid Regional Housing Department	2010-2001
Building renovation permits	Stock building renovation permits	Madrid City Council	2013-2007
Hotel opening rooms	Stock of hotel rooms	Spanish Official Hotel Guide	2010-2001
Protected Buildings	# of protected buildings	Madrid City Council	1997
Population	# of inhabitant	Padron Municipal	2013-2001
Share college	% of people who hold a Bachelor's degree	Spanish Census	2001
Dwellings	# dwellings	Spanish Census	2001 and 2011
Rental houses	# rental houses	Spanish Census	2001 and 2011
Unemployment rate	% of people unemployed	Spanish Census	2001
Flickr images	# photos taken by a tourist	Flickr	2013-2007

Table A1: Literature review for tourism economic impacts.

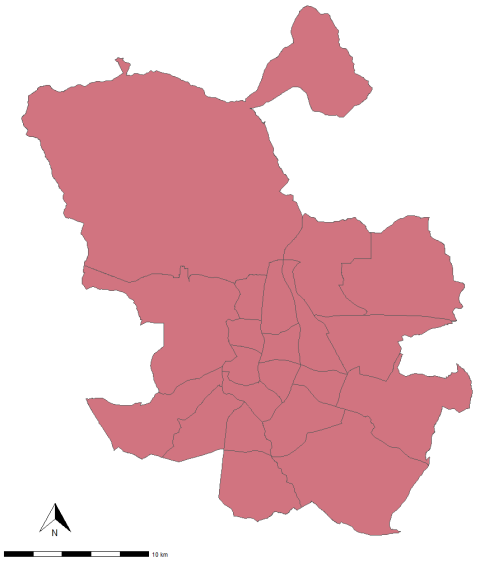
Topic	Reference	Country/City	Period	Geographical unit	Dependent variable	Technique
Regional perspective	Faber and Gaubert (2019)	Mexico	1998-2008	Municipality (2,455)	Employment, population, GDP and labor income,	Structural model & IV
	González et al. (2020)	Spain	2000-2018	Provinces (50) and individual-level data	Employment	Shift-share IV
	Nocito et al. (2023)	Italy	1997–2017	Municipality (390)	Tourist expenditure, rental and housing prices	DiD
	Lanzara and Minerva (2019)	Italy	2001-2011	Municipality (4951)	Number of establishments and employment	GE model
	Kadiyali and Kosová (2013)	USA	1987-2006	Metropolitan Statistical Areas (47)	Employment	GMM-based dynamic panel
	Favero and Malisan (2021)	Italy	2008-2019	Provinces (30)	Unemployment, income, establishments and employment	Event-study
	Di Giacomo and Lerch (2023)	Italy	2010-2019	Provinces (102)	College enrollment and migration flows	IV
Urban perspective	Hidalgo et al. (2022)	Spain (Madrid)	2014-2019	Census tract (2,409)	Consumption amenities and employment	Shift-share instrument
	Avetian and Pauly (2023)	France (Paris)	2018-2020	Establishment-level	Tripadvisor reviews	DiD
	Alyakoob and Rahman (2022)	USA (New York)	2007-2016 (yearly)	ZIP code (121)	Restaurant employment	DiD
	Garcia-López et al. (2020)	Spain (Barcelona)	2009-2017	Basic Statistical Area (221)	Rental and housing price	Shift-share instrument
	Barron et al. (2021)	USA (100 CBSAs)	2011-2016 (monthly)	ZIP code (221)	Rental and housing price	Shift-share instrument
	Batalha et al. (2022)	Portugal (Lisbon)	2018-2020 (quarterly)	Parish (24)	Housing price and Listings	DiD and IV
	Franco and Santos (2021)	Portugal (whole country)	2012-2016 (quarterly)	Municipalities (106) and civil parish (31)	Rental and Housing price	Shift-share instrument and DiD
	Xu and Xu (2021)	USA (Chicago)	2015-2018 (quarterly)	Census tract (800)	Residential renovation project	Bartik instrument
	Bekkerman et al. (2022)	USA (15 cities)	2008-2019 (monthly)	ZIP code (608)	Residential permit	DiD
	Hidalgo et al. (2022)	Spain (Madrid)	2014-2019	Establishment-level data	Business demographics (Births, deaths and displacement)	IV
	Almagro and Dominguez-Iino (2022)	Netherlands (Amsterdam)	2008-2019	Households and ZIP code (100)	Rents, amenities, and within-city migration	IV &Structural model
	Farronato and Fradkin (2022)	USA (50 cities)	2011-2015 (monthly)	City (50)	Hotel performance outcome	IV & structural model
	Fontana (2021)	UK (London)	2002-2019 (yearly)	Ward (624)	Discontent with tourism measures	Shift-share instrument
	Allen et al. (2020)	Barcelona (Spain)	2017-2019	Census tract (1,095)	Tourist expenditure	Structural model & IV



Census tracts (2358)



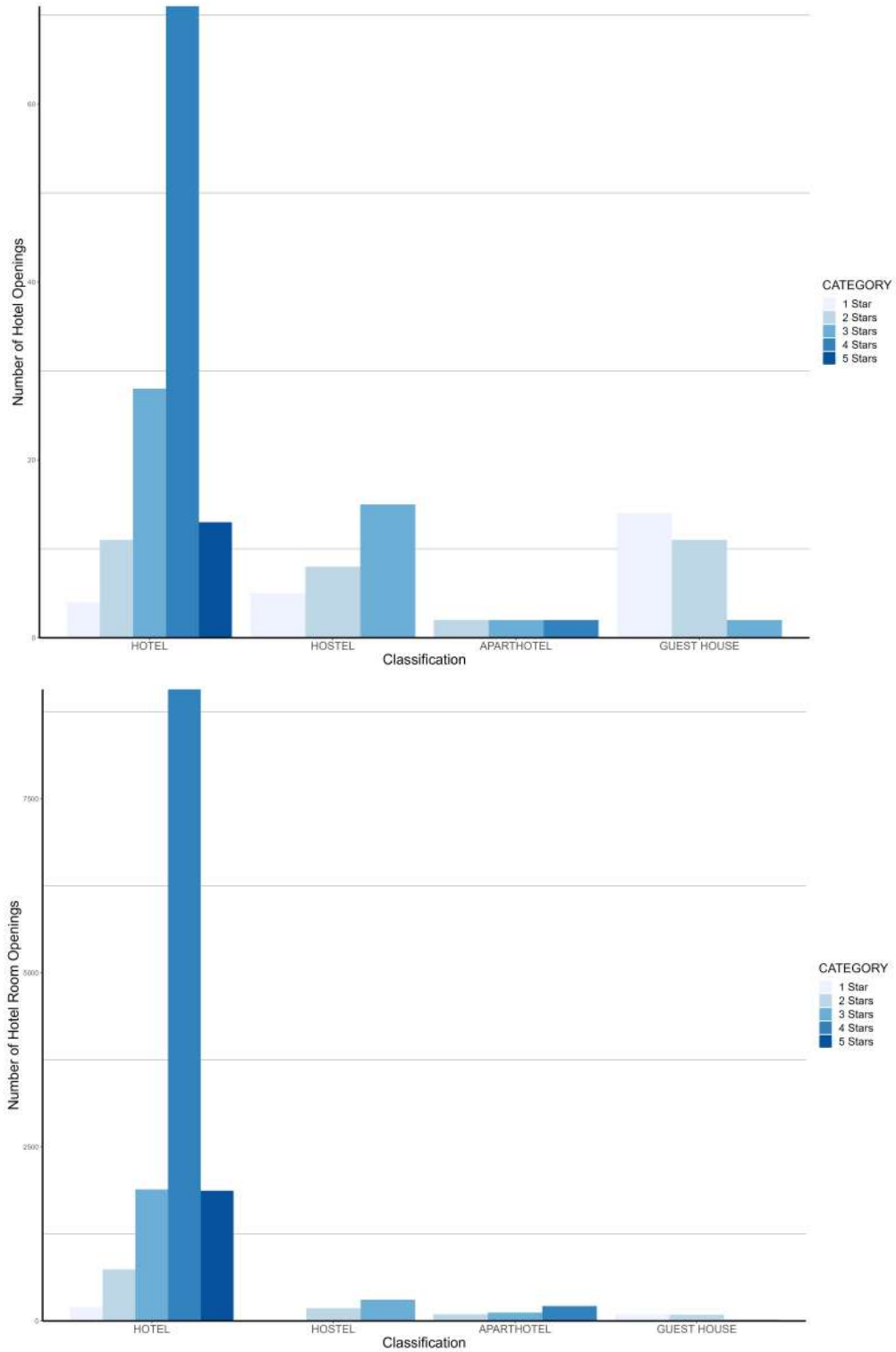
Neighborhoods (128)



Districts (21)

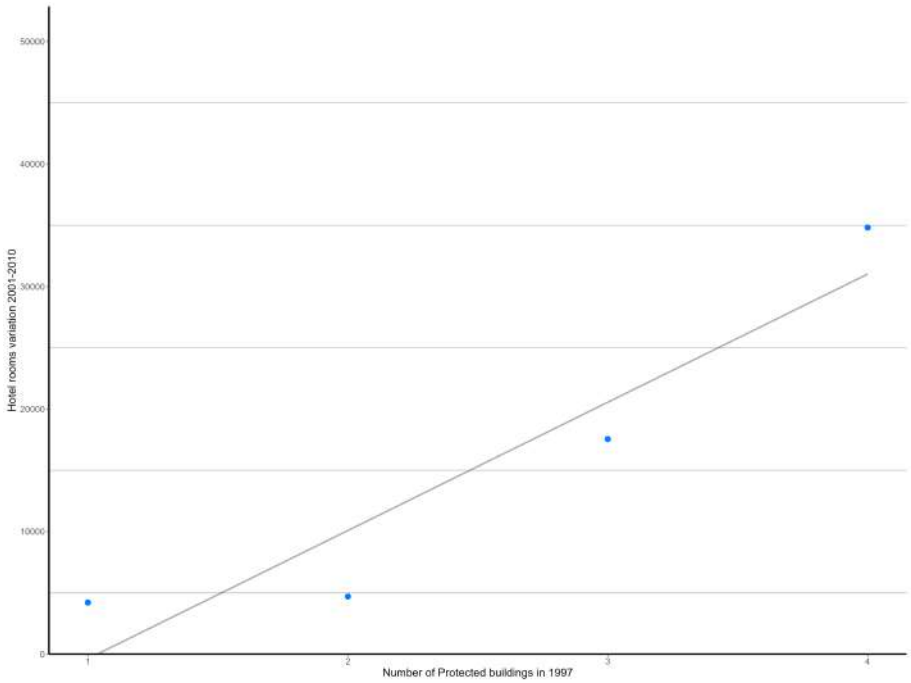
Figure A2: Administrative units in Madrid

Figure A3: Hotel openings classification and ratings



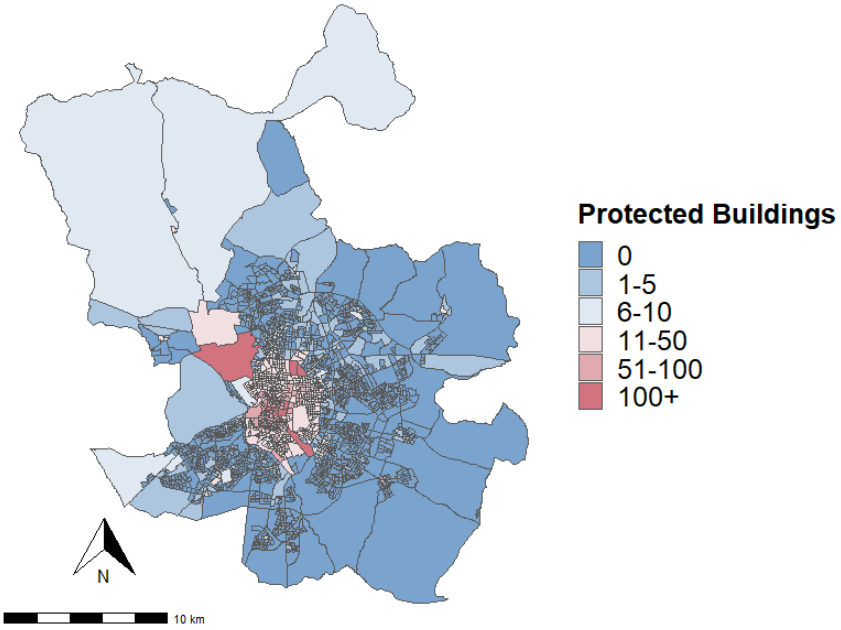
Notes: The graphs show the distribution of the types and categories of hotels that opened during 2001-2010 in Madrid (up) and taking into account the size of each hotel opening through the number of rooms (bottom). Boarding houses (17) are not included as they do not have a star rating.

Figure A4: Instrument relevance

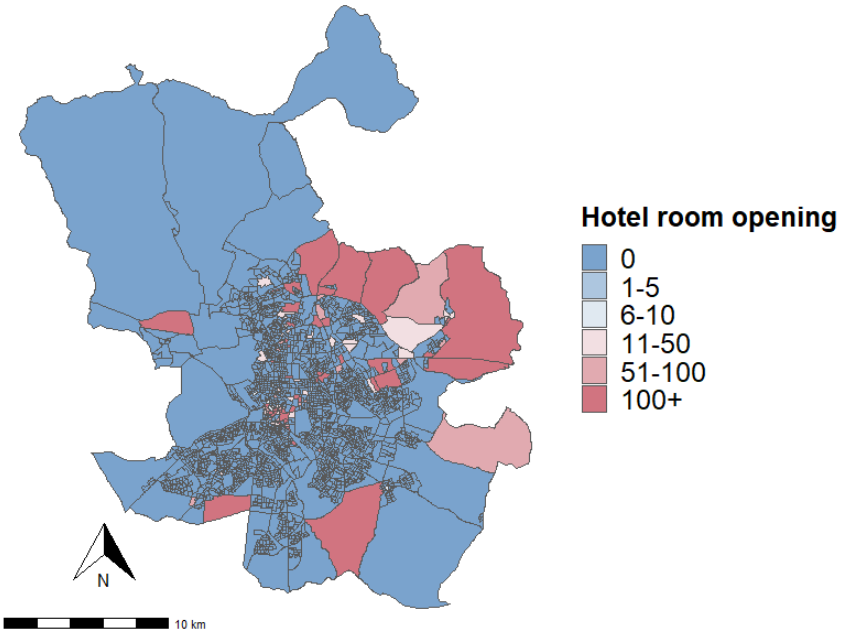


Notes: Figure illustrates the relationship between census tracts' hotel openings and the number of protected buildings. The data is categorized into quartiles based on the distribution of protected buildings across the city.

Figure A5: Geographic variation in treatment and instrument.



(a) Protected buildings in Madrid



(b) Hotel room opening 2001-2010

Notes: Subplot (a) depicts the distribution of protected buildings in Madrid. Subplot (b) shows the evolution of hotel room opening between 2001-2010.

Table A3: IV VALIDITY EXERCISES

	No hotel opening areas.		Pre-trends		Gentrifiers		Headquarters		Flickr images
Dependent Variables:	Est.	Emp.	Est.	Emp.	Est.	Emp.	Est.	Emp.	Tourist images
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables									
Δ Hotel rooms			0.064	5.98	-0.003	-0.105	-0.014	0.273	11.1***
			(0.152)	(4.42)	(0.004)	(0.092)	(0.012)	(0.257)	(4.68)
Protected buildings	0.074	2.08							
	(0.048)	(1.30)							
Observations	2,088	2,088	2358	2358	2358	2358	2358	2358	2358

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, ** and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010 columns 1-2 and between 1970 and 1980 in columns 3-4. Columns 5-6 and 7-8 capture the long differences in the number of economic activities related to gentrification as in Behrens et al. (2022) and headquarters and employment, respectively. Finally, the dependent variable in column 9 is the long difference in the number of tourist photos between 2007-2013. I use the number of protected buildings as an instrument for the variation in the number of hotel rooms in columns 3-9. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level. In columns 1-2 I remove all census tracts with hotel facilities in 2001-2010. In columns 3-4, I change the dependent variable and measure the number of establishments and employment change in 1970-1980. Finally, in column 9, I regress the changes in the number of hotel rooms predicted between 2007 and 2013 by the number of photos taken by tourists predicted by the instrument.

A.1 Sensitivity analysis

Table A3 provides evidence that the main results are not driven by confounders related to gentrification, other economic activities, and temporal trends. However, the way to rule out the existence of those unobserved confounders might be wrong whenever they are manifested through other processes not taken into account in this analysis. To assess that our results are not biased because of those unobserved confounders, I employ sensitivity analysis tools for regression models developed by Cinelli and Hazlett (2020, 2022).

Cinelli and Hazlett (2022) introduced a method to assess the level of association required with the error term to make the coefficient of the treatment variable null (change in the number of hotel rooms) in the 2SLS (Two-Stage Least Squares) estimation. This is especially straightforward for the null hypothesis $H_0 : \beta_{IV} = 0$ because the IV estimator is essentially the ratio of the reduced-form estimate (obtained by regressing the dependent variable on the instrument along with control variables) divided by the first-stage estimate (obtained by regressing the treatment variable on the instrument along with control variables): $\beta_{IV} = \frac{\beta_{RF}}{\beta_{FS}}$.

Therefore, examining how rapidly β_{RF} approaches zero in the presence of unobserved confounding is simultaneously a test for $\beta_{IV} = 0$. Since the reduced-form regression is a standard OLS regression, I can conveniently apply existing tools for sensitivity analysis in linear models, as discussed by Cinelli and Hazlett (2020).

Cinelli and Hazlett (2020) proposed two measures to check the extent to which any unobserved confounders are likely to bias our results:

- The *Robustness Value* (RV): It provides a convenient reference point for assessing the overall robustness of a coefficient to confounders. Suppose the association of our coefficient of interest β and our dependent variable Δ *Establishments* (measured as partial R^2) are both assumed to be less than RV. In that case, the potential existence of some confounders cannot explain away the observed effect.

- $R^2(_{\Delta Establishments \sim \Delta Protectedbuildings|X})$: It is the proportion of the variation in the outcome (Δ *Establishments*) explained exclusively by the treatment (Δ *Protected buildings*). It reveals how strongly a confounder that explains 100% of the residual variance of (Δ *Establishments*) would have to be associated with (Δ *Protected buildings*) to eliminate the effect.

To make some meaningful sense of the magnitude of the value for those two measures, Cinelli and Hazlett (2020) suggests using some covariate to bound the strength of unobserved confounders. In this setting, I consider that population is the covariate that

helps to explain the most the variation in the change in the number of establishments. Table A4 reports that information. As we can observe, a confounder as strong as the population can at most explain 0.6% of the residual variation of our outcome variable (Δ Establishments) and 0.5% of the treatment (Δ Protected buildings). As both numbers are below the robustness value of 7.3%, we can conclude that our point estimate is robust to a confounder(s) as strong as the population.

Table A4: Sensitivity analysis

Outcome: Δ *Establishments*

Treatment:	Est.	S.E.	t-value	$R^2_{Y\sim D\|\mathbf{X}}$	$RV_{q=1}$	$RV_{q=1,\alpha=0.05}$
Protected buildings	0.131	0.036	3.641	0.6%	7.3%	3.4%
df = 2331			*Bound (1x population)*: $R^2_{Y\sim Z\|\mathbf{X},D} = 1.3\%$, $R^2_{D\sim Z\|\mathbf{X}} = 0.5\%$			

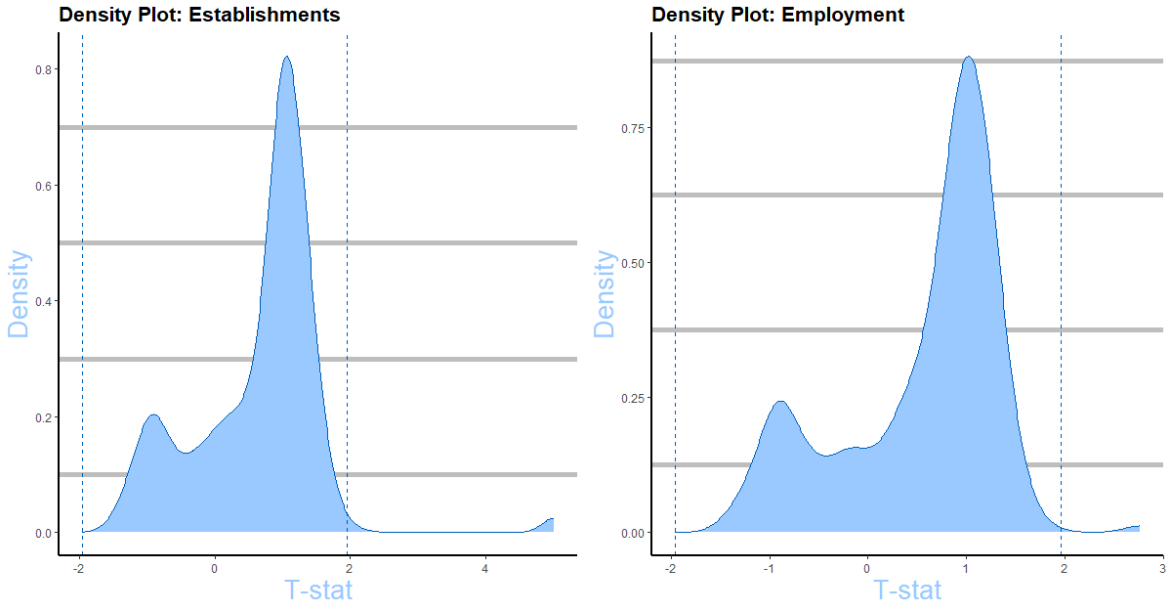
Notes: Y refers to the outcome variable, Δ Establishments, D, our variable of interest, the number of protected buildings, X the set of controls, and finally, Z the unobserved confounder(s).

A.2 Randomization test

Here I follow an approach inspired by Christian and Barrett (2017) and Barron et al. (2021) to assess the instrument's exogeneity and determine whether incidental time trends primarily influence it. I randomize the change in the number of hotel room openings across census tracts that experimented with a variation in the number of hotel rooms between 2001 and 2010. To illustrate, we randomly assign the variable $\Delta Hotel\ rooms_i$ (representing changes in the stock of hotel rooms for census tract i) to census tract j. In this way, this randomization retains the overall temporal trends in the change in the number of hotel rooms while altering the allocation of hotel room openings among different census tracts.

Suppose the results are primarily driven by spurious time trends interacting with the extensive margin pertaining to the presence or absence of hotel openings. In that case, this exercise should yield IV estimates that remain positive and statistically significant. Otherwise, the first stage will become notably weak when regressing the randomized regressor on the instrument. Consequently, this will result in statistically insignificant estimates, coupled with an exceedingly high variance due to the weakness of the first stage.

Figure A6: Randomization



Notes: Figure presents the distribution of estimated t-statistics for the main effect (β) across the two dependent variables. Vertical dashed lines identify 1.96 critical values. Out of 1000 estimates, only thirteen t-statistics from the establishment specification and five from the employment specification are significant at the 5% level.

I estimate the IV specification on this dataset for 1,000 random allocations of hotel

openings among census tracts that possessed positive hotel openings. Remarkably, it can be seen in Figure A6 that the measured effect of hotel room openings is statistically insignificant for over 98% of the randomized allocations, considering the change in the number of establishments and employment.

Table A5: The impact of hotel room openings on employment (IV, Different employment measures)

Dependent Variable:	First Stage	Reduced Form	Reduced Form	Δ Employment				
	Δ Hotel rooms.	Δ Est.	Δ Employ.	Min	Mean	Max	All classes (Min)	No hotel employ.
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
Protected Buildings	0.591***	0.131***	2.47**					
	(0.180)	(0.050)	(0.947)					
Δ Hotel rooms				4.18*	6.83*	9.41*	6.62*	3.82*
				(2.12)	(3.47)	(4.80)	(3.65)	(2.12)
Covariates	x	x	x	x	x	x	x	x
Observations	2358	2358	2358	2358	2358	2358	2358	2358

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, ** and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in hotel room stock between 2001 and 2010 in column 1, the number of establishments and employment between 2001 and 2011 in columns 2-4, and employment only in columns 4-8. I use the number of protected buildings as an instrument for the variation in hotel rooms. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level. Columns 4-6 use different imputation measures to assign employment at the establishment level, column 7 includes all employment-establishment size classes without removing the two largest categories, and column 8 removes direct hotel employment.

Table A6: The impact of hotel room openings on employment (IV, Different instruments)

	Protected buildings level I		Protected buildings level II		Protected buildings level III		All Protected buildings	
Dependent Variables:	Δ Est.	Δ Emp.	Δ Est.	Δ Emp.	Δ Est.	Δ Emp.	Δ Est.	Δ Emp.
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
Δ Hotel rooms	0.192**	3.44***	0.143	3.10**	0.277**	4.63*	0.217**	4.20*
	(0.077)	(1.07)	(0.089)	(1.44)	(0.108)	(2.52)	(0.095)	(2.13)
Number of protected buildings	991	991	2537	2537	8998	8998	19476	19476
F Stat, Excluded instru.	14.408	14.408	10.747	10.747	7.801	7.801	10.445	10.445
Observations	2358	2358	2358	2358	2358	2358	2358	2358

Notes: Statistical significance at levels 1, 5, and 10% is indicated by ***, **, and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010. I use the number of protected buildings with protection level I in columns 1-2, protection level II in columns 3-4, protection level III in columns 5-6, and all levels in columns 7-8 as an instrument for the variation in the number of hotel rooms. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level.

Table A7: The heterogeneous impact of hotel room openings on establishment and employment (OLS and IV)

	Establishments		**Employment**		**Observations**
	OLS	**IV**	**OLS**	**IV**	
Depriving tracts	-0.009	0.181*	0.673*	2.39**	536
	(0.022)	(0.098)	(0.355)	(1.09)	
Non depriving tracts	0.124***	0.245**	1.30***	4.73	1,822
	(0.123)	(0.023)	(0.384)	(2.93)	
All census tracts	0.118***	0.222**	1.28***	4.18*	2,358
	(0.021)	(0.094)	(0.361)	(2.12)	

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, **, and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010. I use the number of protected buildings as an instrument for the variation in hotel rooms. Census tracts are classified between depriving and non-depriving according to the Catalog of Vulnerable Neighborhoods developed by the Spanish Ministry of Development. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments and employment between 1990-1997, and the distance from the city center. Fixed effects at the district level.

Table A8: The impact of hotel room openings on consumption amenities (IV)

	Consumption amenities	Consumption amenities (Hidalgo et al., 2022)
Dependent Variables:	Δ Establishments	Δ Establishments
Model:	(1)	(2)
Variables		
Δ Hotel rooms	0.057***	0.064***
	(0.015)	(0.013)
Observations	2358	2301

Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, **, and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of consumption amenities between 2001 and 2010. I measure consumption amenities as in Hidalgo et al. (2022). Mainly, consumption amenities comprise food and beverage establishments such as restaurants, bars and cafes. I use the number of protected buildings as an instrument for the variation in hotel rooms. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level.

Table A9: The impact of hotel room openings on employment (IV, Different employment measures)

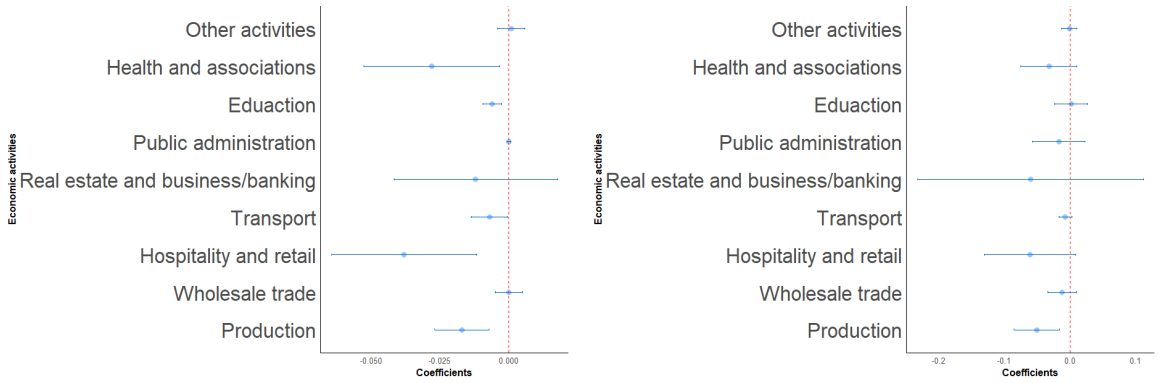
Category	Economic Activity
Production	Agriculture, livestock, hunting, and related service activities
	Forestry, logging, and related service activities
	Fishing, aquaculture, and related service activities
	Mining of coal and lignite; extraction of peat
	Extraction of crude petroleum and natural gas; services related to oil and gas extraction, except exploration
	Uranium and thorium ore mining
	Mining of metal ores
	Mining and quarrying of non-metallic minerals, except fuels
	Food and beverage industry
	Tobacco products manufacturing
	Textile industry
	Clothing and fur product manufacturing
	Tanning and dressing of leather; manufacture of luggage, handbags, and the like; saddlery, harness, and footwear manufacturing
	Wood and cork industry, except furniture; basketry and wickerwork
	Paper and paper products manufacturing
	Publishing, printing, and reproduction of recorded media
	Coke, refined petroleum products, and nuclear fuel processing
	Chemical industry
	Rubber and plastic products manufacturing
	Other non-metallic mineral products manufacturing
	Metallurgy
	Manufacture of fabricated metal products, except machinery and equipment
	Manufacture of machinery and equipment n.e.c.
	Office machinery and computer equipment manufacturing
	Machinery and equipment manufacturing
	Electronic and optical equipment manufacturing; manufacturing of radio, television, and communication equipment and apparatus
	Medical and dental instrument manufacturing, precision optical instruments, and watches
	Motor vehicle, trailer, and semi-trailer manufacturing
	Other transport equipment manufacturing
	Furniture manufacturing; other manufacturing industries
	Recycling
	Production and distribution of electricity, gas, steam, and air conditioning
Wholesale trade	Wholesale trade and commission trade, except motor vehicles and motorcycles
Hospitality and retail	Retail trade, except motor vehicles and motorcycles; repair of personal and household goods
	Accommodation and food service activities
Transport	Land transport; transport via pipelines
	Water transport, coastal and transoceanic
	Air transport
	Supporting and auxiliary transport activities; travel agencies
Real estate and business/banking	Financial intermediation, except insurance and pension funding
	Insurance and pension funding, except compulsory social security
	Activities auxiliary to financial intermediation
	Rental and leasing of machinery and equipment without operator, personal and household goods
	Computer programming, consultancy, and related activities
	Research and development
	Other business activities
Public administration	Public administration, defense, and compulsory social security
Education	Education
Health and associations	Human health and veterinary activities; social work activities
Other activities	Various personal services activities.

Table A10: The impact of hotel room openings on establishments and employment (IV, tourist and resident-oriented activities

	Tourist-oriented		Resident-oriented	
Dependent Variables:	Δ Establishments	Δ Employment	Δ Establishments	Δ Employment
Model:	(1)	(2)	(3)	(4)
Variables				
Δ Hotel rooms	0.109***	0.925***	0.0008	-0.084
	(0.029)	(0.268)	(0.011)	(0.131)
Observations	2358	2358	2358	2358

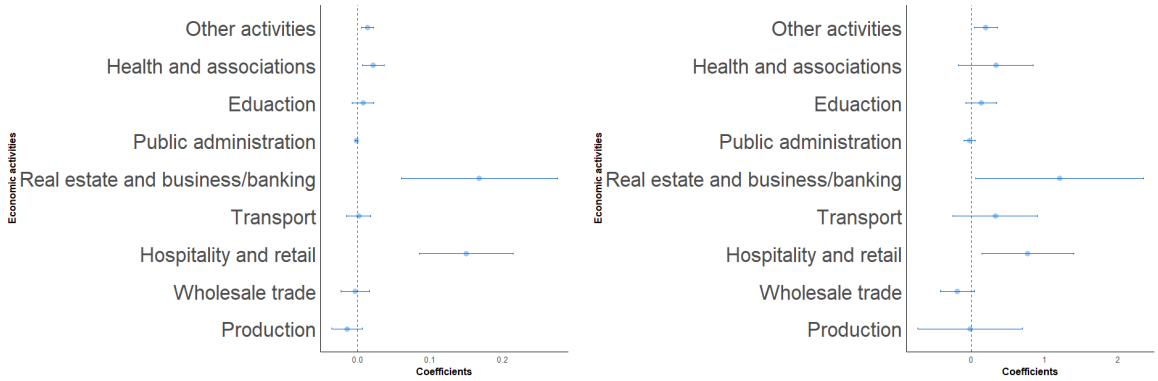
Notes: Statistical significance at levels 1, 5 and 10% is indicated by ***, **, and *, respectively. Cluster standard errors at the neighborhood level. The dependent variables are the long difference in the number of establishments and employment between 2001 and 2010 in tourist activities in columns 1-2 and resident-oriented business in columns 3-4, according to the classification proposed by Hidalgo et al. (2023). I use the number of protected buildings as an instrument for the variation in hotel rooms. Covariates include the population, the share of educated people, the unemployment rate, the change in the number of establishments between 1990-1997, and the distance from the city center. Fixed effects at the district level.

Figure A7: Heterogeneous effects on individual-owned companies.



Notes: Figure reproduces the heterogeneous effects of hotel openings on establishments (left) and employment (right) across sectors for individual-owned companies using the main baseline IV specification (Columns 6 and 8 in Table 2), respectively.

Figure A8: Heterogeneous effects on corporate-owned businesses



Notes: Figure reproduces the heterogeneous effects of hotel openings on establishments (left) and employment (right) across sectors for corporate-owned businesses using the main baseline specification (Columns 6 and 8 in Table 2), respectively. Corporate-owned businesses refer to businesses that involve multiple individuals and are structured as entities separate from their owners, such as limited liability companies, cooperatives, and partnerships.

B Appendix - Data source and description

B.1 Hotel information

Hotel information comes primarily from the Official Hotel Guide, an annual publication by Tourspain, a Spanish government agency responsible for promoting tourism. This guide was published from 1936 to 2010. Since these data exist solely in physical format, I digitized the Madrid section covering the years 2001 to 2010. From this digitized data, I extracted key details such as the name of the accommodation, classification, category, year of inauguration, and the number of rooms. I supplemented this data set with information from Expedia web scraping and the Touristic Accommodation Register (Registro de Establecimientos Turísticos) provided by the Madrid Region Statistic Department.

It is worth noting that the term "hotel" in this context encompasses various types of accommodations, including hotels, hostels, guest houses, and boarding houses. This broader categorization is used for clarity and to provide a comprehensive view.

Here are specific definitions for each type:

- **Hotel:** These are establishments that occupy an entire building or a distinct part. They have facilities that create a cohesive unit with exclusive entrances, elevators, and staircases. If they also offer facilities for food preservation, preparation, and consumption within each lodging unit, they are known as Apartment Hotels. Hotels are classified with star ratings ranging from 1 to 5 stars.

- **Hostel:** They provide lodging in rooms, with or without dining areas or additional services. They must have a minimum of 10 rooms and 20 beds. Hostels are categorized with star ratings of 1, 2, or 3.

- **Guesthouse:** These lodging establishments offer accommodation in rooms, with or without dining areas or extra services. However, they do not meet all the requirements for the hotel classification. Guesthouses are rated 1, 2, or 3 stars.

- **Boarding Houses:** These accommodations may or may not have dining areas and typically offer basic services. They are not categorized with star ratings.

In this paper, I use hotels as a proxy for tourism to assess the influence of tourism in an area. To do this, I calculate a measure of tourism penetration as follows:

$$\triangle Hotel\ rooms_i = Stock\ hotel\ rooms_{i,2010} - Stock\ hotel\ rooms_{i,1998}$$

This equation computes the absolute difference in the number of hotel rooms between the start and end of the sample period in each census tract. This approach considers hotel entries and departures and their size, providing a comprehensive view of tourism's impact.

B.2 Establishment and employment by workplace

Data related to employment and establishments are obtained from the *Directorio de Unidades de Actividad Económicas*. This dataset from the business registry includes essential details such as establishment name, location, business status, category, activity, tenure, and employment category for all establishments in Madrid. There are nine employment categories: 1-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999 and +999 employees. To attribute employment at the establishment level, I take the minimum value within each category. Notably, the results remain consistent regardless of whether I use the mean, minimum, or maximum values. Additionally, companies with more than 500 employees were excluded from the sample to mitigate the influence of employment imputation on larger businesses. Once again, the results are robust, even when considering potential outliers. I also include only establishments with physical premises that were operational each year.

This dataset for business records spans 1997 to 2010, with annual updates. However, within this time frame, I can identify two distinct stages: 1) **1997-2000**: The directory was updated only through administrative processes. 2) **2001-2010**: In this later period, in addition to administrative updates, fieldwork was conducted to validate information for establishments that were deemed less reliable. Consequently, I have chosen to restrict the time frame to 2001-2010 for better data reliability.

B.3 Housing sector

Housing data is collected from three different sources. First, I obtain rental price information from the Madrid Regional Housing Department, covering 2001 to 2010. In Madrid, tenants must provide landlords a security deposit equal to one month's rent. This deposit must be submitted to a regional government agency within one month of officially signing the rental agreement. The agency safeguards the deposit until the lease agreement is concluded, at which point it becomes eligible for a refund to the tenant. I combine this dataset with the cadastre data to determine the floor size of each apartment. Then, I calculate the difference in the mean rental price per square meter between 2001 and 2010 for each census tract.

Then, I collect data on residential permits from the Madrid City Council covering 2007 to 2013. This dataset includes licenses for various types of building construction and conservation works. I calculate the absolute difference in the stock of building permits

between the start and end of the sample period in each commuting zone.

B.4 Protected buildings

The protected building information is sourced from the *"Plan General de Ordenación Urbana de Madrid de 1997"* dataset. This dataset serves as a regulatory document that outlines the urban development guidelines for Madrid, Spain. It covers aspects such as land use, density, infrastructure, building conservation, and more to achieve balanced and sustainable growth.

Within the *Plan General de Ordenación Urbana de Madrid de 1997*, there is a list of protected buildings. This list includes structures of cultural, historical, or architectural significance, legally protected to ensure their preservation within the urban development framework. These protected buildings are categorized into three levels: Global protection (Level 1), partial protection (Level 2), and element-specific protection (Level 3). Within each protection level, various grades determine the specific areas of a building that require special attention. In this paper, I consider all protected buildings in my instrumental strategy, regardless of their protection level, except for monuments, museums, and other non-lodging facilities, which have been excluded from the analysis. In this way, I keep 18047 protected buildings out of 19476.

When it comes to the adaptive reuse of historic buildings for accommodation facilities, approval from the Madrid City Council is necessary through a legal mechanism known as a "Plan Especial". In 2005, the Regional Government of Madrid revised the regulations to streamline this process, mainly to increase the availability of high-quality hotel accommodations to strengthen Madrid's position as a candidate city to host the 2012 and 2016 Olympic Games (Timón, 2010). The new regulation removes this requirement except for protected buildings classified as levels 1 and 2. Creating a specific plan to allow lodging and preserve their cataloged elements will be necessary.

B.5 Flickr images

I collect data from the Madrid photography Flickr web community between 2001 and 2011. I specifically looked for pictures with location tags and categorized users based on their behavior. Users who posted pictures consistently for at least one week during this period were considered tourists, while others were considered residents. This approach uses the timing of photos to distinguish between residents and tourists, a method used in previous research studies (Ahlfeldt, 2012; Saiz et al., 2018; Gaigné et al., 2022).

B.6 Area homogenization

Census tract boundaries are not immutable; they can change due to urban expansion, leading to the creation of new tracts or the modification of existing ones. This variability presents a challenge when analyzing data like the number of rental units and dwellings, which is only available at the census tract level. To accurately compute variations in rentals and dwellings within these tracts, it is essential to standardize the boundaries of the census tracts. To achieve this, I will undertake the following steps:

1. **Spatial Intersection:** Determine the overlapping areas between the census tracts of different years. This is represented as:

$$A_{\text{overlap}} = A_{2001} \cap A_{2011} \tag{2}$$

   where A_{2001} and A_{2011} are the areas of tracts in 2001 and 2011, respectively.

2. **Area Calculation:** Compute the area of each intersection:

$$\text{Area}_{\text{overlap}} = \text{Area}(A_{\text{overlap}}) \tag{3}$$

3. **Data Imputation:** For variables such as the number of dwellings and rental units, impute data from 2011 to 2001 tracts proportionally based on the area of overlap:

$$\text{Population}_{\text{imputed, 2001}} = \left(\frac{\text{Area}_{\text{overlap}}}{\text{Area}(A_{2011})} \right) \times \text{Dwellings}_{2011} \tag{4}$$

This methodology facilitates accurate data comparison across time despite changes in census tract boundaries.