

Kholodilin, Konstantin A.; López, Fernando A.; Rey, David; Arbues, Pelayo Gonzalez

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DIW Berlin  
German Institute for Economic Research  
Mohrenstr. 58  
10117 Berlin

Tel. +49 (30) 897 89-0  
Fax +49 (30) 897 89-200  
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# Lessons from an aborted second-generation rent control in Catalonia\*

Konstantin A. Kholodilin<sup>a,b</sup>, Fernando A. López<sup>c</sup>, David Rey Blanco<sup>d</sup>, Pelayo González Arbués<sup>d</sup>

<sup>a</sup>*DIW Berlin, Mohrenstraße 58, 10117, Berlin, Germany*

<sup>b</sup>*NRU HSE, Kantemirovskaya ul., 3, 194100, St. Petersburg, Russia*

<sup>c</sup>*Universidad Politécnica de Cartagena, C/Real 3, 30201, Cartagena, Spain*

<sup>d</sup>*idealista, Spain*

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## Abstract

This study investigates the effects of short-lived rent control regulations introduced in Catalonia in September 2020 and revoked in March 2022. Using the microdata of the largest Spanish housing advertisement portal *idealista* between January 2017 and May 2022, we analyze the dynamics of prices and supply for dwellings offered for rent and for sale. We also examine separately the rental and sales markets. We find that the introduction of rent control led to a reduction in rents in both controlled and uncontrolled Catalan municipalities, while quantities virtually did not react to it. The selling prices of dwellings remained unchanged, whereas their supply increased substantially. The revocation of rent control caused a strong increase in the rental and selling prices in all municipalities, no increase in the supply, with the exception of the supply of regulated dwellings for sale. In addition, using the macrodata on housing construction we find that during the rent-control period the average number of monthly dwelling starts in Catalonia declined by 6% compared to January 2019 – September 2020, while nationwide it increased by almost 12%. Thus, the effects are broadly consistent with the predictions of the economic literature on rent controls.

**Keywords:** rent control; Catalonia; asking rents; asking selling prices.

**JEL codes:** C43, O18, R38.

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## 1. Introduction

In this study, we examine potential effects of rent controls introduced in Catalonia in September 2020 and revoked in March 2022. Rent control is a widespread policy used to cap rent increases in the face of a housing crisis. As shown by [Kholodilin \(2020b\)](#), starting from World War I, rent control has been used at a large scale by virtually all countries. There is a generally accepted classification of rent controls into the first and second generations ([Arnott, 2003](#)). Under the first generation of controls, rents are nominally frozen and any rent adjustments are only possible upon authorization of the corresponding bodies (e.g., local government, courts, or arbitration councils). Under the second generation, the initial rent can be set freely at the market level, but the rent adjustment is limited by some measure of the purchasing power. However, in 2015, in Germany, a stricter form of the second-generation rent control was introduced. It can be regarded as a hybrid between the first and the second generations. According to this regulation, the initial rent is pegged to a reference rent, that is, a typical rent of similar dwellings in the same neighborhood. This hybrid form later expanded to France and Catalonia.

Rent control can have both desired effects (rent reduction) and a number of undesired effects (e.g., supply reduction, lower mobility, and rent increases of dwellings not subject to regulations). A systematic overview of all possible effects of rent control can be found in [Kholodilin \(2022\)](#). The paper examines 66 studies published in peer reviewed journals and covering 19 countries. Half of the studies are devoted to rent control in the USA. The studies investigating a stricter form of the second-generation rent control similar to that introduced in Catalonia are few and concern only Germany: for instance, [Breidenbach et al. \(2022\)](#); [Mense et al. \(2018\)](#); [Thomschke \(2015\)](#). However, until very recently there were no econometric studies devoted to rent control in Spain. The first such study is [Monràs and Montalvo \(2022\)](#) that investigates the effects of introduction of rent control in Catalonia. They use transaction rental prices from INCASOL<sup>1</sup> as well as the data on reference rents of AHC<sup>2</sup> and find that this policy

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<sup>1</sup>INCASOL stands for Institut Català del Sòl (Catalan Institute for Real Estate). It is a Catalan governmental body one of whose tasks is to collect information on housing rents from landlords, who, in turn, are obliged to provide it to this entity.

<sup>2</sup>AHC is an acronym for Agència de l'Habitatge de Catalunya (Housing Agency of Catalonia) — an institution that computes reference rental prices.

led to a 5% reduction of rents. Half of this price decline was due to changes in the composition of units available in the market. Catalan rent control also caused a decline in the supply of rental units. Our study differs from [Monràs and Montalvo \(2022\)](#) in three important respects. First, we consider not only the introduction but also the removal of rent control. Second, we use advertisement data that are far richer in terms of dwelling characteristics. Third, we also consider the dynamics of the market of dwellings for sale.

The focus of this study is on the price and quantity effects of the Catalan rent control. We investigate here the following seven hypotheses:

- The introduction of rent control led to declining rents and selling prices of regulated dwellings.
- The introduction of rent control led to accelerated growth of rents and selling prices of unregulated dwellings.
- The introduction of rent control led to reduction of supply of regulated rental dwellings.
- The introduction of rent control led to an increased supply of regulated dwellings offered for sale.
- The introduction of rent control led to an increased or unchanged supply of unregulated dwellings.
- The removal of rent control led to opposite effects with respect to those of the introduction.

The remainder of this study is structured as follows. Section [2](#) provides an overview of the rent control legislation in Spain and compares it to that in France and Germany. In section [3](#), we describe the data used in our analysis. Section [4](#) introduces the econometric methodology and reports estimation results. In section [5](#), our findings are summarized and discussed. Finally, section [6](#) concludes.

## 2. Rent control in Catalonia

Since 2019, Catalonia has been intending to introduce rent controls. The first attempt was undertaken in May 2019 by issuing a governmental decree.<sup>3</sup> According to the decree, the rents could not exceed 110% of the reference rent that represented a typical rent for the corresponding type of dwelling in the same neighborhood. For newly built and extensively refurbished housing, a more generous upper bound of 120% of the reference rent was set for the first five years after the certification of construction works. However, already in June 2019 the Catalan parliament declined to ratify the decree.<sup>4</sup>

The next attempt was undertaken in September 2020.<sup>5</sup> It lasted for a much longer time. Nevertheless, on 10 March 2022, the law was declared non-constitutional by the Constitutional Court of Spain.<sup>6</sup> The main argument is that it is the task of the central government and not of the regional authorities to determine the foundations of contractual obligations. Nevertheless, contrary to the international legal practice, the provisions of the revoked law still apply to the existing contracts ([Nasarre Aznar, 2022](#)).

General characteristics of the Catalan 2020 regulations are outlined in Tables 1 and 2. They encompass 60 municipalities in Catalonia, which are identified as areas with tense housing market; see criteria of such areas in Table 2. All dwellings in these municipalities are subject to rent control, except rental housing contracts subject to special regime.<sup>7</sup> Figure 1 shows a map of municipalities of Catalonia. Those shaded red are the municipalities subject to rent control. All other municipalities that are grey shaded are excepted from the regulation.

The population of 60 regulated municipalities accounts for more than 68% of the total

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<sup>3</sup>Decreto ley 9/2019, de 21 de mayo, de medidas urgentes en materia de contención de rentas en los contratos de arrendamiento de vivienda y de modificación del libro quinto del Código civil de Cataluña en el ámbito de la prenda.

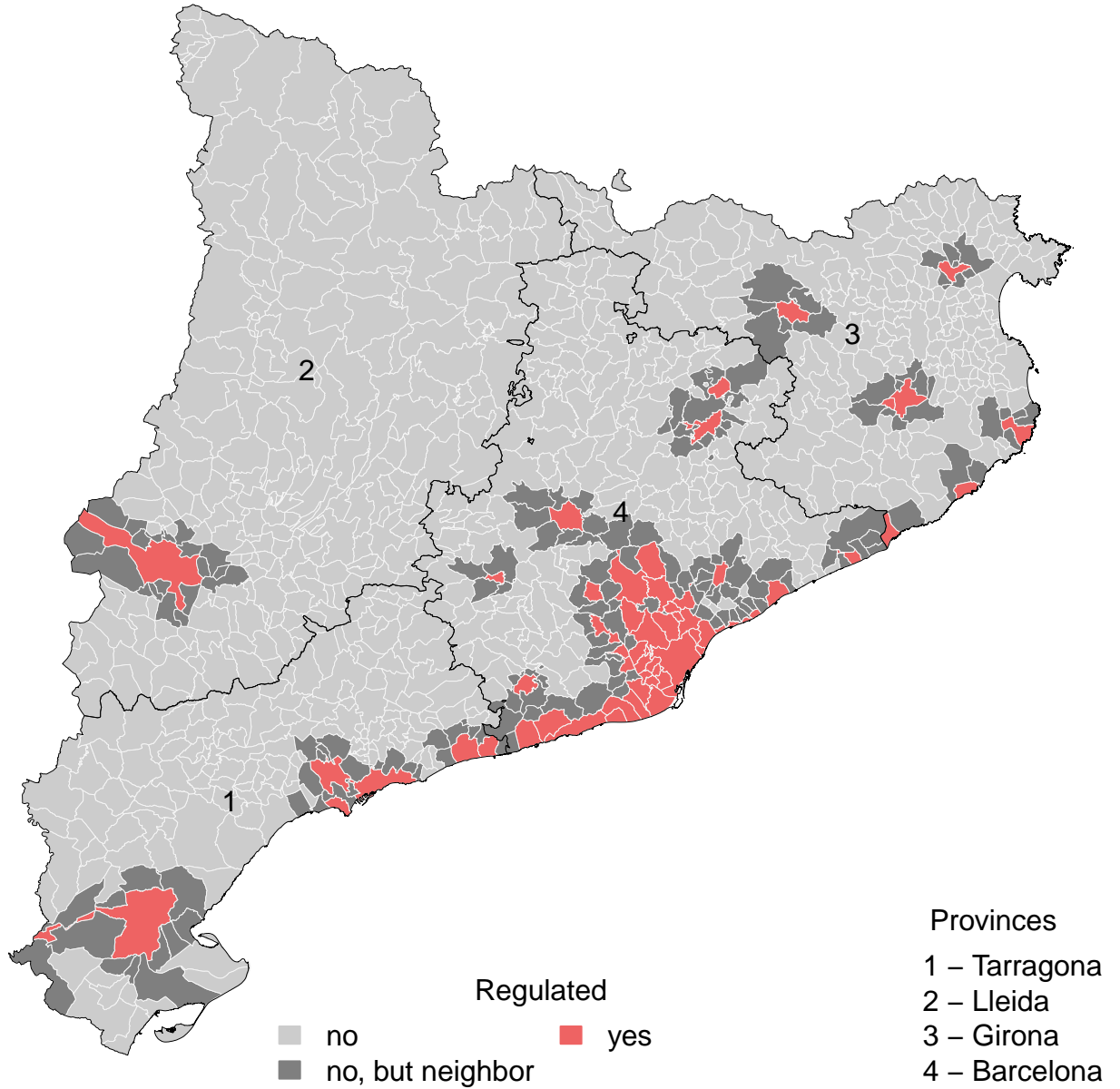
<sup>4</sup>Acuerdo de derogación del Decreto ley 9/2019, de 21 de mayo, de medidas urgentes en materia de contención de rentas en los contratos de arrendamiento de vivienda y de modificación del libro quinto del Código civil de Cataluña en el ámbito de la prenda.

<sup>5</sup>Ley 11/2020, de 18 de septiembre, de medidas urgentes en materia de contención de rentas en los contratos de arrendamiento de vivienda.

<sup>6</sup>Sentencia de Tribunal Constitucional de España — Sentencia 37/2022, de 10 de marzo de 2022. Recurso de inconstitucionalidad 6289-2020.

<sup>7</sup>These include: 1) contracts signed prior to 1 January 1995; 2) contracts whose object is housing subject to an official protection regime; 3) contracts whose object is housing integrated in public networks of insertion housing or mediation for social rental or in the rental housing fund for social policies; 4) contracts of a welfare nature; 5) contracts signed in accordance with the legal provisions applicable to compulsory social rental.

Figure 1: Catalonia's municipalities



Source: Ley 11/2020, de 18 de septiembre and own representation.

Note: Red areas denote municipalities subject to rent control (60 municipalities); dark grey areas correspond to municipalities that are not subject to rent control but share common border with regulated municipalities (165); while light grey areas stand for the remaining municipalities (723). Black borders are those of four comarcas of Catalonia.



population of Catalonia in 2021.<sup>8</sup> These are densely populated urban areas with a relatively high proportion of tenant households.

The rents set in the new contracts cannot exceed 1) either the reference price for the rental of a dwelling of analogous characteristics in the same urban neighborhood 2) or the rent stated in the last lease contract, updated in accordance with the Competitiveness Guarantee Index (Índice de Garantía de Competitividad, IGC), if the dwelling in question has been leased during the five years prior to the entry into force of the law. The reference rent can be increased or decreased by 5% depending on specific characteristics of the dwelling: 1) availability of elevator; 2) availability of parking lot; 3) availability of furniture; 4) heating or conditioning system of the dwelling; 5) availability of shared community areas, such as a garden or rooftop terrace; 6) availability of communal swimming pool or similar facilities; 7) availability of concierge services in the building; 8) availability of special views. The reference rent price is set on the basis of the reference index of housing rents determined and made public by the department responsible for housing, on the basis of the data contained in the Registry of rental guarantees for urban properties (*Registro de fianzas de alquiler de fincas urbanas*) and of the additional characteristics taken into account for calculating the said index at any given time. Rents set for newly built housing or housing resulting from a major renovation process during the five years after obtaining the certificate of completion are subject to slightly more generous limitations: they may not exceed the upper margin of the reference index of housing rental prices. Controlled rents for regulated dwellings may only be updated in accordance with regulations governing housing lease contracts. However, the law does not specify what kind of regulations are these.

Initially, in October 2020, rent control was applied to municipalities that: 1) had experienced a rent increase of more than 20% between 2014 and 2019, which were within the Metropolitan Area of Barcelona or that had a population of more than 20,000 inhabitants; and 2) that disposed of the rental reference index. For these municipalities, rent control was declared a temporary measure. Thus, they had to apply for its renewal or discontinuation within a period of 1 year. When this year passed, the municipalities were required by the Catalan Agency of Housing (*Agència Catalana de l'Habitatge*) to provide the mandatory reports showing that they

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<sup>8</sup>According to our estimates, in France and Germany, only about 25% and 7% of the population live in the regulated municipalities, respectively.

meet the necessary criteria to be able to be part of rent control. Some of the municipalities that were under rent control at first, decided not to renew it, while other municipalities that had not been considered under rent control before, presented their candidacy. Figure 2 shows these changes in the composition of regulated municipalities.

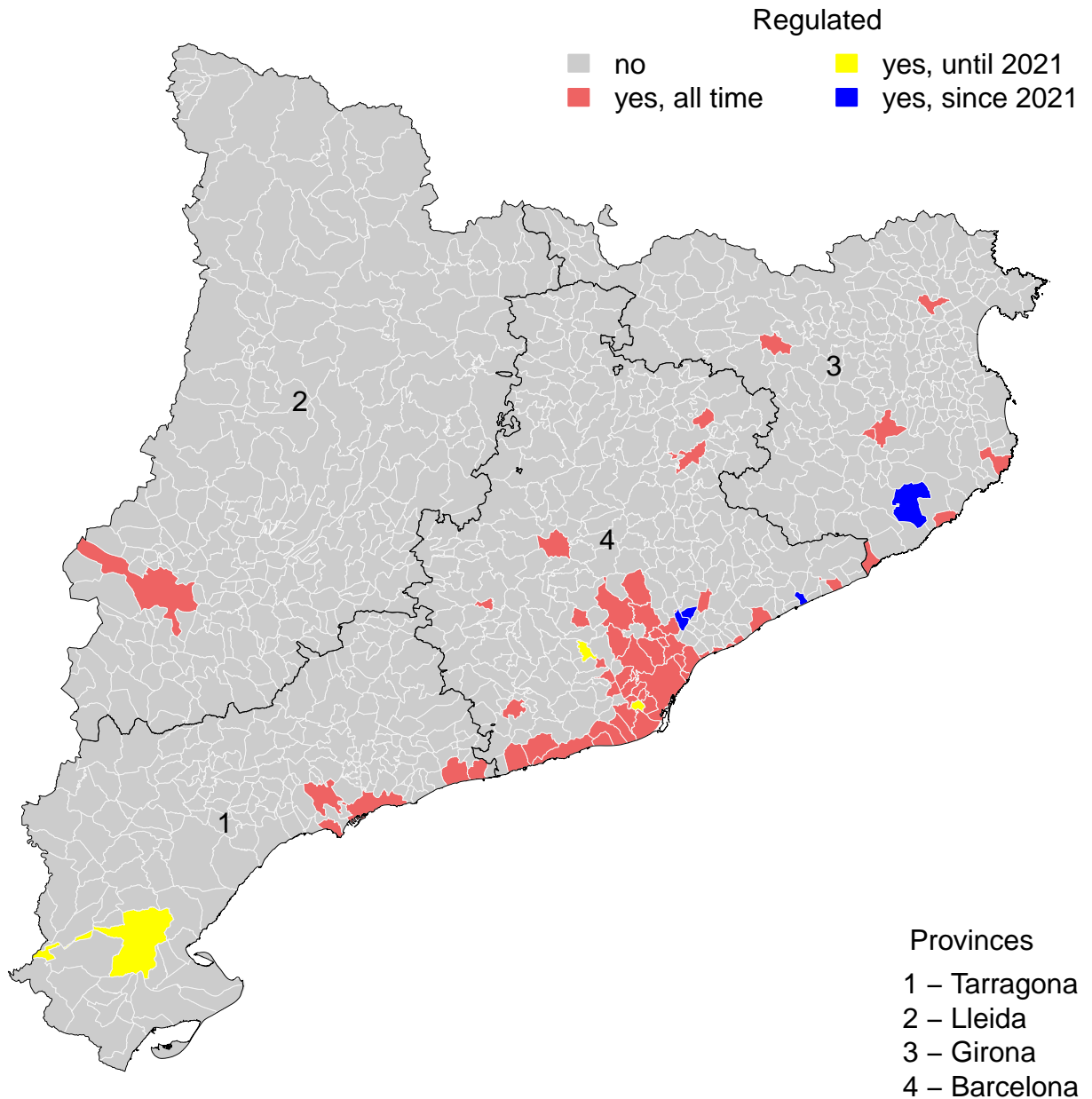
Rent control persisted in 57 municipalities out of initial 60, while in three municipalities (Cornellà de Llobregat, Martorell, and Tortosa) it was discontinued after one year. However, in 2021, four new municipalities came under regulation (Canet de Mar, Llagostera, Mollet del Vallès, and Parets del Vallès).

Catalan rental regulations, as a stricter form of the second-generation rent control, are not unique. To some extent they were influenced by German regulations adopted in 2015 and known popularly as a rental break (*Mietpreisbremse*) as well as those adopted in France in 2018. In the end of 2021, somewhat similar regulations were introduced also in Brussels (Belgium).<sup>9</sup> Tables 1 and 2 report major characteristics of German, French, and Catalan rent control regulations. Their common features include 1) the application of rent controls in areas with tense housing market; 2) fixing initial rents as a reference rent plus certain markup that varies between 5% in Catalonia and 20% in France.

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<sup>9</sup> *Arrêté d'exécution du Gouvernement de la Région de Bruxelles-Capitale du 19 octobre 2017 instaurant une grille indicative de référence des loyers* introduced the notion of reference rent as a median rent for similar dwellings in the same neighborhood, while *Ordonnance du 28 octobre 2021 visant à instaurer une commission paritaire locative et à lutter contre les loyers abusifs* set an upper limit of 120% of the reference rent. But at the moment of writing this study they were not implemented yet. I am grateful for this information to Hugo Périlleux Sanchez.

Figure 2: Catalonia's municipalities: Changes in regulation status



Source: Agència de l'Habitatge de Catalunya and own representation.

Note: Grey shaded areas stand for the municipalities not subject to rent control. Red areas denote municipalities subject to rent control in 2020–2021; yellow areas correspond to municipalities that were subject to rent control in 2020–2021; while blue shaded areas stand for municipalities that were subject to control in 2021–2022. Black borders are those of four comarcas of Catalonia.

Table 1: Hybrid rent control in Catalonia, France, and Germany

Country	Law title	Validity duration	Regions	Exceptions	Reference price definition	Upper bound
Germany	MietNovG of 21.04.2015	5 years, renewed in 2020	municipalities or their parts (335 out of 10,787 municipalities in 12 out of 16 Länder with 25% of population)	newly built / largely renovated dwellings starting from 01.10.2014	1) survey of typical rents of neighborhood that is updated every 2 years ( <i>Mietspiegel</i> ); 2) report of a sworn valuer; 3) rents of 3 dwellings; 4) rental database	$\leq 1.1$
France	Loi ELAN of 23.11.2018	5 years	municipalities (24 municipalities in 8 regions: city of Paris, Est Ensemble, Aix-Marseille-Provence, Bordeaux, Lille, Lyon, Montpellier, and Plaine Commune with about 7% of population)	no	median rent based on prices from local Rent Observatory by dwelling category and geographic region	[0.7,1.2]
Catalonia	Ley 11/2020 of 18.09.2020	indefinite	municipalities (60 out of 948 with 68% of population)	newly built / largely renovated dwellings until 2023 and then during 5 years, big dwellings (150+ $m^2$ )	rent based on data from Rent registry of urban dwellings ( <i>Registro de fianzas de alquiler de fincas urbanas</i> )	[0.95,1.05]

In terms of exceptions, Catalan regulations occupy an intermediate position: while French regulations do not provide any exceptions from rent control, German regulations exclude from rent control all newly built and substantially renovated dwellings for an indefinite time. Moreover, in Germany, rents for newly built and largely refurbished dwellings have virtually no upper bounds, whereas in Catalonia, such dwellings were subject to an, albeit more generous than for regulated dwellings, 20% over typical rent bound. In addition, while in France and Germany regulations are at least theoretically have definite duration of five years, in Catalonia no specific duration was provided for by the law. To be honest, the indication of a specific duration was never an obstacle to prolong rent control measures *ad infinitum*. In terms of criteria defining the tense housing markets, Catalan regulations are more similar to German ones: they both use rent dynamics, rental burden, and ratio between housing construction and population; see Table 2.

Table 2: Criteria of tense housing markets

Criterion	Germany	France	Catalonia
Local rents grow more rapidly than national rents	yes		yes
Rents grow more rapidly than consumer prices		yes	
Private rents are substantially higher than social rents		yes	
High average rents		yes	
Household rental burden	high		$\geq 30\%$
Low rate of housing starts		yes	
Limited perspectives of future construction		yes	
New construction insufficient vs. population	yes		
Low vacancy rate	yes		

The Catalan rent control is superimposed on a number of national rent control regulations that were enacted or planned in Spain since 2020. First, the COVID-19 pandemic disrupted many economic activities and, as a result, substantially deteriorated financial conditions of middle- and low-income households, especially of those living in the rental accommodations. Therefore, many countries introduced provisional regulations to protect tenants (Kholodilin, 2020a). In March 2020, Spain implemented a rent moratorium that both prevented evictions for rent non-payments by the fragile tenants and froze rents for dwellings let by large landlords

(those having housing with at least 10 dwellings or 1500  $m^2$  of residential area).<sup>10</sup> Second, the Ukraine war that began in February 2022 put an additional stress on the housing market, so that the central government capped rent increases at the annual growth rate of the Competitiveness Guarantee Index.<sup>11</sup> This amounts to a real freeze of rents, since IGC grows as a rule more slowly than the consumer price index. Third, at the moment of writing the paper, Spanish government was planing to introduce a new rental housing law that would extend regulations similar to those that existed in Catalonia to the whole country (Arranda, 2021).

### 3. Data

In this study, we take advantage of the data provided by the Spanish real estate classified ads portal *idealista*. It has been the leading real estate portal in Spain for more than 20 years in terms of either the number of active users or, more importantly for this paper, in terms of the number of advertised properties. The market share of *idealista* is above 70% in most Spanish regions.<sup>12</sup> So, it can be taken as a representative source of information for Catalonia's real estate market, given the great extent of correlation of market and asking prices (Monràs and Montalvo, 2022). Moreover, the dynamics of asking prices reported by *idealista* are very similar to those reported by two other large advertisement portals *Habitaclick* and *Fotocasa* (Cambra de la Propietat Urbana de Barcelona, 2022, p. 3).

We decided to carry out this research using asking price data, because they give an additional perspective of the situation to the few existing studies on the matter. Microdata from Spanish public sources are not usually available for research, and when they are available they are not updated as frequently as desired. The *idealista* data used in this study allow us to have the most up-to-date information that can allow us to measure the impact of regulation up to very recent dates. Listing records have also a variety of attributes describing the property, which are not usually available on official registries. This makes it possible to study the impact of the regulations on the diverse property segments.

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<sup>10</sup>Real Decreto-ley 11/2020, de 31 de marzo, por el que se adoptan medidas urgentes complementarias en el ámbito social y económico para hacer frente al COVID-19.

<sup>11</sup>Real Decreto-ley 6/2022, de 29 de marzo, por el que se adoptan medidas urgentes en el marco del Plan Nacional de respuesta a las consecuencias económicas y sociales de la guerra en Ucrania.

<sup>12</sup>This information is provided by *idealista* itself.

The data set used in this paper includes dwellings in multi-family homes offered for rent and sale, located in regulated and unregulated regions in Catalonia, and announced between January 2017 and May 2022. The data set contains not only prices but also the most relevant of each property.

Table 3: Description of the variables in the listing data sets

Variable	Description	Observations	Minimum	Mean	Maximum
PERIOD	Expressed in YYYYMMDD format, indicates the week when the advertisement was extracted	390,051	2017-01-01		2022-05-29
PRICE	Asking price for the advertisement at idealista in euros	390,051	330	1,059.624	4870
UNITPRICE	Asking price in euros per constructed square meter (CONSTRUCTEDAREA)	390,051	1.5	13.641	147.7
CONSTRUCTEDAREA	Total constructed area in square meters	390,051	26	81.423	234
ROOMNUMBER	Number of bedrooms	390,051	0	2.413	5
BATHNUMBER	Number of bathrooms	390,051	0	1.394	29
HASTERRACE	Dummy variable for terrace (1, if there is a terrace, 0 otherwise)	208,868	0	0.644	1
HASLIFT	Dummy variable for lift (1, if there is a lift in the building, 0 otherwise)	382,681	0	0.728	1
HASAIRCONDITIONING	Dummy variable for air conditioner (1, if has air conditioner, 0 otherwise)	257,068	0	0.766	1
AMENITYID	Indicates the amenities included (1 — no furniture, no kitchen amenities, 2 — kitchen amenities, no furniture, 3 — kitchen amenities, furniture)	334,434	1	2.357	3
HASPARKINGSPACE	Dummy variable for parking (1, if parking is included in the advertisement, 0 otherwise)	390,051	0	0.151	1
ISPARKINGSPACE- INCLUDEDINPRICE	Dummy variable for parking (1, if parking is included in the advertisement, 0 otherwise)	104,328	0	0.551	1
PARKINGSPACEPRICE	Asking price of parking space in euros	390,051	1	8.606	395001
HASNORTHORIENTATION	Dummy variable for orientation (1, if orientation is North in the advertisement, 0 otherwise) — Important note: orientation features are not orthogonal features, a house oriented to the north can be also oriented to the east	144,520	0	0.247	1
HASSOUTHORIENTATION	Dummy variable for orientation (1, if orientation is South in the advertisement, 0 otherwise) — Important note: orientation features are not orthogonal features, a house oriented to the north can be also oriented to the east	186,290	0	0.499	1

...continued

Variable	Description	Observations	Minimum	Mean	Maximum
HASEASTORIENTATION	Dummy variable for orientation (1, if orientation is East in the advertisement, 0 otherwise) — Important note: orientation features are not orthogonal features, a house oriented to the north can be also oriented to the east	169,141	0	0.407	1
HASWESTORIENTATION	Dummy variable for orientation (1, if orientation is West in the advertisement, 0 otherwise) — Important note: orientation features are not orthogonal features, a house oriented to the north can be also oriented to the east	148,845	0	0.283	1
HASBOXROOM	Dummy variable for boxroom (1, if boxroom is included in the advertisement, 0 otherwise)	174,292	0	0.236	1
HASWARDROBE	Dummy variable for wardrobe (takes 1 whether the property has wardrobes, 0 otherwise)	237,672	0	0.692	1
HASSWIMMINGPOOL	Dummy variable for swimming pool (1, if swimming pool is included in the advertisement, 0 otherwise)	166,073	0	0.179	1
HASDOORMAN	Dummy variable for doorman (1, if there is a doorman in the building, 0 otherwise)	82,460	0	0.299	1
HASGARDEN	Dummy variable for garden (1, if there is a garden in the building, 0 otherwise)	162,121	0	0.170	1
ISDUPLEX	Dummy variable for bachelor dwelling (referred as studio in Spain) (1, if it is a bachelor dwelling, 0 otherwise)	133,520	0	0.095	1
ISINTOPFLOOR	Dummy variable indicating if the dwelling is located in the top floor (takes 1 on the top floor 0 otherwise)	64,627	0	0.148	1
FLOORCLEAN	Indicates dwelling floor number starting from the 0 value for ground floor (source: advertiser)	371,204	-1	2.661	11
CADCONSTRUCTIONYEAR	Construction year as of cadastral source (source: cadastre), note this figure can differ from the one given by the advertiser	390,051	1520	1962.2	2021
CADMAXBUILDINGFLOOR	Maximum building floor (source: cadastre)	390,047	0	5.930	34
CADDWELLINGCOUNT	Dwelling count in the building (source: cadastre)	390,047	1	24.950	655
CADASTRALQUALITYID	Cadastral quality (source: cadastre): from 0 (the best) to 10 (the worst)	390,028	0	4.418	9
LONGITUDE	Longitude, geographical coordinate (EPSG 4326)	390,051	0.257	2.088	3.296
LATITUDE	Latitude geographical coordinate (EPSG 4326)	390,051	40.539	41.428	42.835



...continued

Variable	Description	Observations	Minimum	Mean	Maximum
Agent	Indicates the type of supplier: 0, if a private person, 1, if a real estate agent	390,051	0	0.908	1
COAST_CAR_10M	1, if the dwelling is located at most 10 minutes car ride from the sea coast; 0, otherwise	390,051	0	0.003	1
COAST_WALK_10M	1, if the dwelling is located at most 10 minutes walk from the sea coast; 0, otherwise	390,051	0	0.001	1
COAST_WALK_5M	1, if the dwelling is located at most 5 minutes walk from the sea coast; 0, otherwise	390,051	0	0.001	1
POPULATION_DENSITY	Population density in the corresponding zone defined by <i>idealista</i> : in cities, it is the neighborhood, while in smaller municipalities it is the municipality itself	379,446	0	231.9	757.8
DISTANCE_MUNI_CENTER	Distance in meters from the geographical center of the municipality	389,446	0.003	2.2	57.9

The sample includes all the ads that have been active and visible on the listings, during the period that includes the measurement period and the two previous months are selected. All the values that are thought to contain errors in their attributes are discarded. These include properties with wrong address; properties that do not have at least 3 visits; properties marked as fraudulent or erroneous by the customer care processes of *idealista*; as well as properties displaying wrong surfaces, prices or unit prices (determined by expert criteria and based on the study of the frequency distributions of these attributes for the typologies of study).

Finally, we consolidate all repeated ads, so that the sample contains only unique ads. We consider a set of advertisements as repeated when they refer to the same property, which have been marketed through multiple channels: several agencies or private individuals.

For each of the markets, the outliers are identified in terms unit prices and in terms of activity on the portal. The sample is stratified by type, operation and basic characteristics of the property (we call it sub-market segment). Therefore, all those values that have unit prices outside a 95% confidence interval with a 5% error, calculated for the distribution of the logarithm of the unit prices, are eliminated. In the case of the filtering of anomalies by activity, it also removes all assets classified as non-liquid for not having received enough contacts of views. Ads are discarded based on a confidence interval of at least 95% with an error of 5% over the normalized volume of visits and days in their sub-market segment. Hence, those ads with very little activity, very little or long time on market for their type are not included in

the analysis. Finally, the level of support is determined (considering the level of support as the level of coverage in number of records, which must be sufficient to take a price measurement as valid) for each of the sample strata: typology and geography.

The ads that fall outside the confidence intervals previously calculated are eliminated from the sample. This process is particular to each micro-market (geographic area in which the ad fits) and is performed based on the variability of the sample and the number of elements, determining the minimum sample size required for a 90% confidence interval with a 5% error for each of the aforementioned micro-segments.

Overall, there are 948 municipalities in Catalonia.<sup>13</sup> The rental advertisements cover 710 municipalities, with half of that number having less than 10 advertisements. The vast majority of rental announcements (about 92%) lie in the regulated municipalities, which can be explained by the larger economic importance and population of these areas as well as by the predominance of multi-family houses in them that are more likely to contain dwellings offered for rent. Roughly a half of the remaining announcements are those in the unregulated municipalities, which share common border with regulated ones, as well as unregulated municipalities without common borders with regulated ones. The picture differs a bit when sales announcements are considered. They cover 836 municipalities and the proportion of municipalities with less than 10 advertisements is just 30%, so that advertisements are less concentrated. Moreover, among the sale announcements, 75% refer to the dwellings from regulated municipalities, while 13% are from unregulated municipalities and 12% from unregulated municipalities that have common borders with regulated municipalities. This can be explained by the fact that the homeownership rates are higher outside of the cities.

The overall rental rate — share of rental, free, and other non-owner occupied dwellings — is rather low in Catalonia. It was just about 26%, according to the 2011 Census.<sup>14</sup> Figure 3 shows the rental rate in percent in Catalonia’s comarcas.

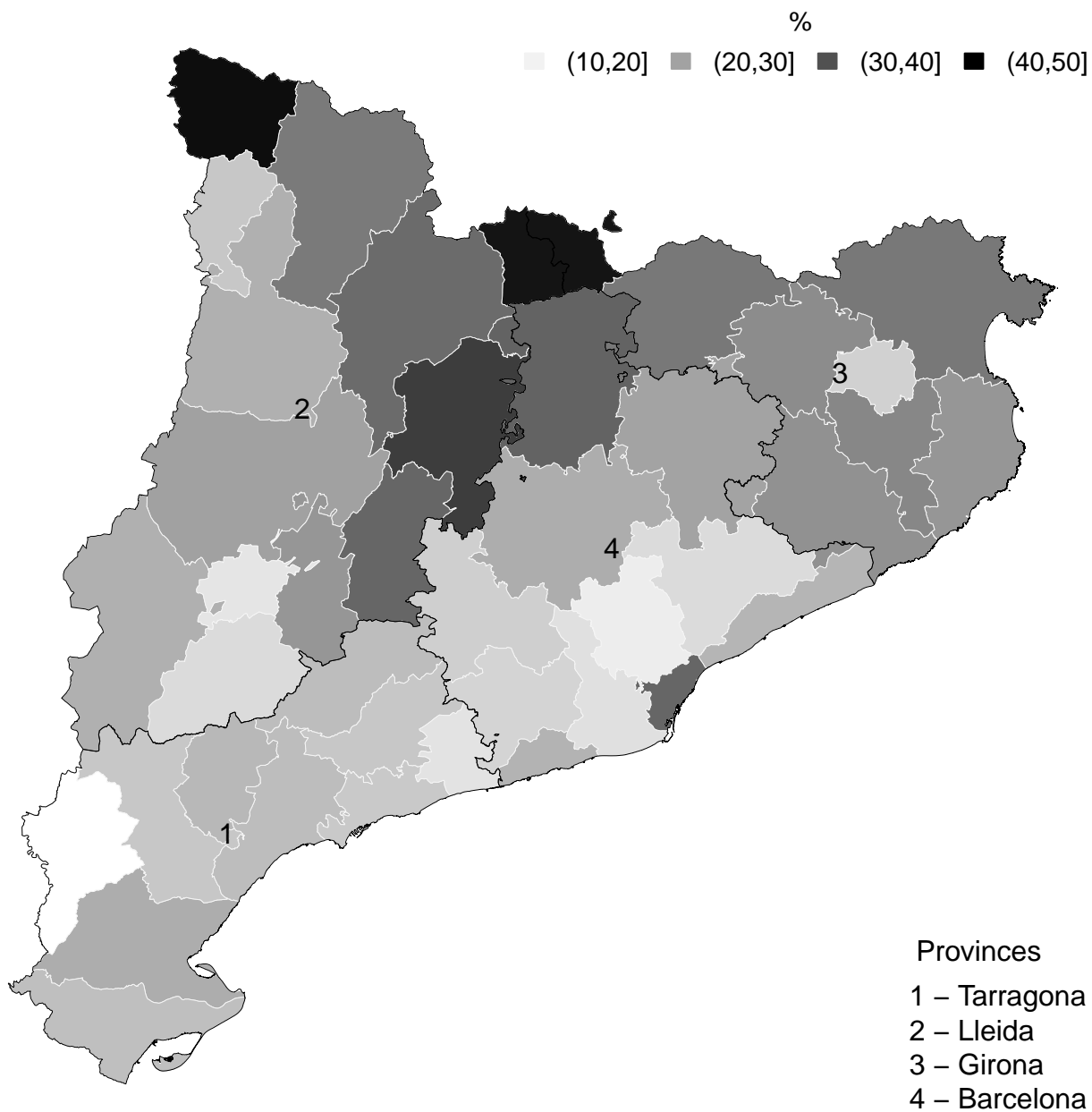
Surprisingly, the highest rental rates are observed not in Barcelonès — the comarca including the municipality of Barcelona — where it is about 33%, but in Val d’Aran (42%) and Cerdanya (41%) — two peripheric comarcas in the north. However, these two regions are very small

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<sup>13</sup>These fall into 41 *comarcas* that, in turn, make up four *provincias*.

<sup>14</sup>More recent data — those of the 2021 Census — were not available at the moment of writing the paper.

Figure 3: Rental rate in Catalonia's comarcas, 2011



Source: Instituto de Estadística de Cataluña and own representation.

Note: The shades of grey reflect the rental rates in Catalonia's 41 comarcas: the darker the higher the percentage of rental dwellings in the total housing stock.

in terms of their population. Together they make up less than 0.5% of the total population of Catalonia. Barcelonès is the most populous comarca accounting for almost 30% of total Catalonia’s population, according to the 2021 Census.

#### 4. Estimation results

In order to estimate the potential effects of the Catalonia’s rent control we use the difference-in-differences methodology, which became quite standard for such a question setting; see, for example, [Mense et al. \(2018\)](#); [Hahn et al. \(2021\)](#) as well as the first study on the effects of Catalonia’s rent control [Monràs and Montalvo \(2022\)](#).

First, we investigate the effects of rent control on the rental housing market: both rental price and supply effects. Next, we examine the effects that rent control potentially exerts on the market of dwellings for sale. Again, both price and quantity effects are considered.

##### 4.1. Dynamics of rental housing market

###### 4.1.1. Price effects

We take advantage of the microdata collected at the dwelling level. In order to assess the potential effects of rent control we use the difference-in-differences approach. The corresponding model can be formulated as follows:

$$y_{it} = \delta_1 I_{it}^{intr} + \delta_2 I_{it}^{rev} + \delta_3 Tr_{it} + \delta_4 I_{it}^{intr} \times Tr_{it} + \delta_5 I_{it}^{rev} \times Tr_{it} + x_{it}\beta + ft_i + \varepsilon_{it} \quad (1)$$

where  $y_{it}$  is the quantity of interest (logarithm of price or transaction volume);  $I_{it}^{intr}$  is the law introduction dummy;  $I_{it}^{rev}$  is the law revocation dummy;  $Tr_{it}$  is the dummy for the treatment group;  $ft_i$  is a cubic B-spline with two equidistant knots located at weeks 104 and 208 of the sample period that is estimated separately for treatment and control observations;  $x_{it}$  is a vector of control variables;  $\varepsilon_{it}$  is a random disturbance.

We start from examining the rental housing market. In particular, we consider the supply, demand, and prices for residential units offered for rent. Among three types of dwellings distinguished by *idealista* (chalet, home, and residential) we choose residential.

The control variables have mostly intuitive coefficient signs. The availability of amenities, such as lift and parking space, increases the rental price. The dwellings constructed after 1901

Table 4: Estimation results of hedonic model for rents

	<i>Dependent variable: log of rental price</i>					
	<i>control group: all</i>			<i>control group: only neighbors</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	6.424*** (0.005)	6.249*** (0.014)	6.130*** (0.020)	6.432*** (0.005)	6.279*** (0.021)	6.161*** (0.028)
Enactment_2020		-0.061*** (0.009)	-0.035*** (0.010)		-0.044*** (0.013)	-0.017 (0.014)
Revocation_2022			0.148*** (0.018)			0.156*** (0.025)
Regulated		0.158*** (0.015)	0.264*** (0.021)		0.126*** (0.021)	0.231*** (0.029)
Regulated_Enactment_2020		-0.015 (0.010)	-0.039*** (0.010)		-0.032** (0.013)	-0.056*** (0.014)
Regulated_Revoc			-0.128*** (0.019)			-0.136*** (0.026)
ROOMNUMBER	-0.023*** (0.001)	-0.023*** (0.001)	-0.023*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)
BATHNUMBER	0.122*** (0.001)	0.122*** (0.001)	0.122*** (0.001)	0.119*** (0.001)	0.119*** (0.001)	0.119*** (0.001)
CONSTRUCTEDAREA	0.006*** (0.00002)	0.006*** (0.00002)	0.006*** (0.00002)	0.006*** (0.00002)	0.006*** (0.00002)	0.006*** (0.00002)
Supplierreal estate agent	0.079*** (0.001)	0.079*** (0.001)	0.079*** (0.001)	0.092*** (0.002)	0.092*** (0.002)	0.092*** (0.002)
HASLIFT	0.104*** (0.001)	0.104*** (0.001)	0.104*** (0.001)	0.106*** (0.001)	0.106*** (0.001)	0.106*** (0.001)
HASPARKINGSPACE	0.052*** (0.001)	0.052*** (0.001)	0.052*** (0.001)	0.047*** (0.001)	0.047*** (0.001)	0.047*** (0.001)
Constr_year1901-1936	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.013*** (0.002)	-0.013*** (0.002)	-0.013*** (0.002)
Constr_year1937-1975	-0.086*** (0.001)	-0.086*** (0.001)	-0.086*** (0.001)	-0.086*** (0.001)	-0.086*** (0.001)	-0.086*** (0.001)
Constr_year1976-2000	-0.094*** (0.002)	-0.094*** (0.002)	-0.094*** (0.002)	-0.094*** (0.002)	-0.094*** (0.002)	-0.094*** (0.002)
Constr_year2001-	-0.066*** (0.002)	-0.066*** (0.002)	-0.066*** (0.002)	-0.056*** (0.002)	-0.056*** (0.002)	-0.056*** (0.002)
POPULATION_DENSITY	0.00001** (0.00000)	0.00001** (0.00000)	0.00001** (0.00000)	-0.00003*** (0.00000)	-0.00003*** (0.00000)	-0.00003*** (0.00000)
DISTANCE_MUNI_CENTER	0.010*** (0.0004)	0.010*** (0.0004)	0.010*** (0.0004)	0.010*** (0.0004)	0.010*** (0.0004)	0.010*** (0.0004)
Dist2BCN	-0.006*** (0.00002)	-0.006*** (0.00002)	-0.006*** (0.00002)	-0.007*** (0.00002)	-0.007*** (0.00002)	-0.007*** (0.00002)
COAST_WALK_10M	0.348*** (0.012)	0.350*** (0.012)	0.339*** (0.012)	0.339*** (0.013)	0.340*** (0.013)	0.330*** (0.013)
COVID19_restrict	-0.001*** (0.00004)	-0.0004*** (0.00004)	-0.0004*** (0.00004)	-0.001*** (0.00004)	-0.0004*** (0.00004)	-0.0004*** (0.00004)
Poly_1_Unreg	-0.403*** (0.008)	-0.221*** (0.016)	-0.100*** (0.022)	-0.393*** (0.011)	-0.235*** (0.023)	-0.114*** (0.030)
Poly_2_Unreg	-0.352*** (0.010)	-0.197*** (0.016)	-0.089*** (0.020)	-0.310*** (0.013)	-0.177*** (0.022)	-0.071** (0.028)
Poly_3_Unreg	-0.386*** (0.012)	-0.166*** (0.020)	-0.028 (0.026)	-0.390*** (0.015)	-0.195*** (0.029)	-0.057 (0.037)
Poly_4_Unreg	-0.112*** (0.010)	-0.009 (0.014)	0.084*** (0.018)	-0.118*** (0.014)	-0.031 (0.019)	0.060** (0.024)
Poly_5_Unreg	-0.317*** (0.010)	0.039 (0.031)	0.152*** (0.034)	-0.318*** (0.013)	-0.027 (0.043)	0.085* (0.047)
Poly_1_Reg	-0.192*** (0.005)	-0.174*** (0.006)	-0.161*** (0.007)	-0.201*** (0.005)	-0.173*** (0.005)	-0.160*** (0.007)
Poly_2_Reg	-0.176*** (0.005)	-0.158*** (0.005)	-0.146*** (0.006)	-0.186*** (0.005)	-0.160*** (0.005)	-0.148*** (0.006)
Poly_3_Reg	-0.150*** (0.007)	-0.125*** (0.007)	-0.111*** (0.009)	-0.162*** (0.007)	-0.126*** (0.007)	-0.112*** (0.009)
Poly_4_Reg	-0.087*** (0.005)	-0.090*** (0.005)	-0.078*** (0.006)	-0.096*** (0.005)	-0.093*** (0.005)	-0.081*** (0.006)
Poly_5_Reg	-0.225*** (0.006)	-0.074*** (0.009)	-0.060*** (0.010)	-0.239*** (0.006)	-0.076*** (0.009)	-0.062*** (0.009)
Observations	373,069	373,069	373,069	358,061	358,061	358,061
Adjusted R <sup>2</sup>	0.629	0.630	0.630	0.625	0.627	0.627

Note: \*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

are less expensive than those constructed before. An especially large price discount can be observed in case of dwellings built between 1976 and 2000. To some extent, this can reflect the fact that dwellings built prior to the 20th century are located near the city center and so they capture centrality. In part, this can be controlled by the distance to Barcelona’s center (Plaza Catalunya) variable, which is statistically significant and has a negative sign: thus, the farther the dwelling from the city center the lower the rent. Similarly, the distance to the seashore variable (no more than 10 minutes walk is needed to reach the sea) is significant and has a positive sign, indicating that dwellings located closer to the sea are more expensive than their counterparts located in the interior. Population density positively affects rents indicating that rents are higher in the settlements where multi-family buildings dominate. In addition, we account for the possible effects of governmental sanitary measures aimed at reducing the propagation of COVID-19 as measured by the Stringency Index of the Oxford Covid-19 Government Response Tracker (Hale et al., 2020).<sup>15</sup> The index is based on 23 indicators, such as school closures, travel restrictions, and vaccination policy. As our regression results show, the COVID-19 containment measures exert a statistically significant negative effect on rents, which is not surprising, given a strong pressure on the household incomes due to economic crisis.

The introduction of rent control in September 2020 had a statistically significant negative effect both for regulated and unregulated dwellings. However, this effect disappears when control group includes only dwellings from neighbor municipalities. By contrast, the revocation of rent control appears to led to a substantial surge in rents in regulated and unregulated municipalities. Nevertheless, this effect is smaller for regulated dwellings.

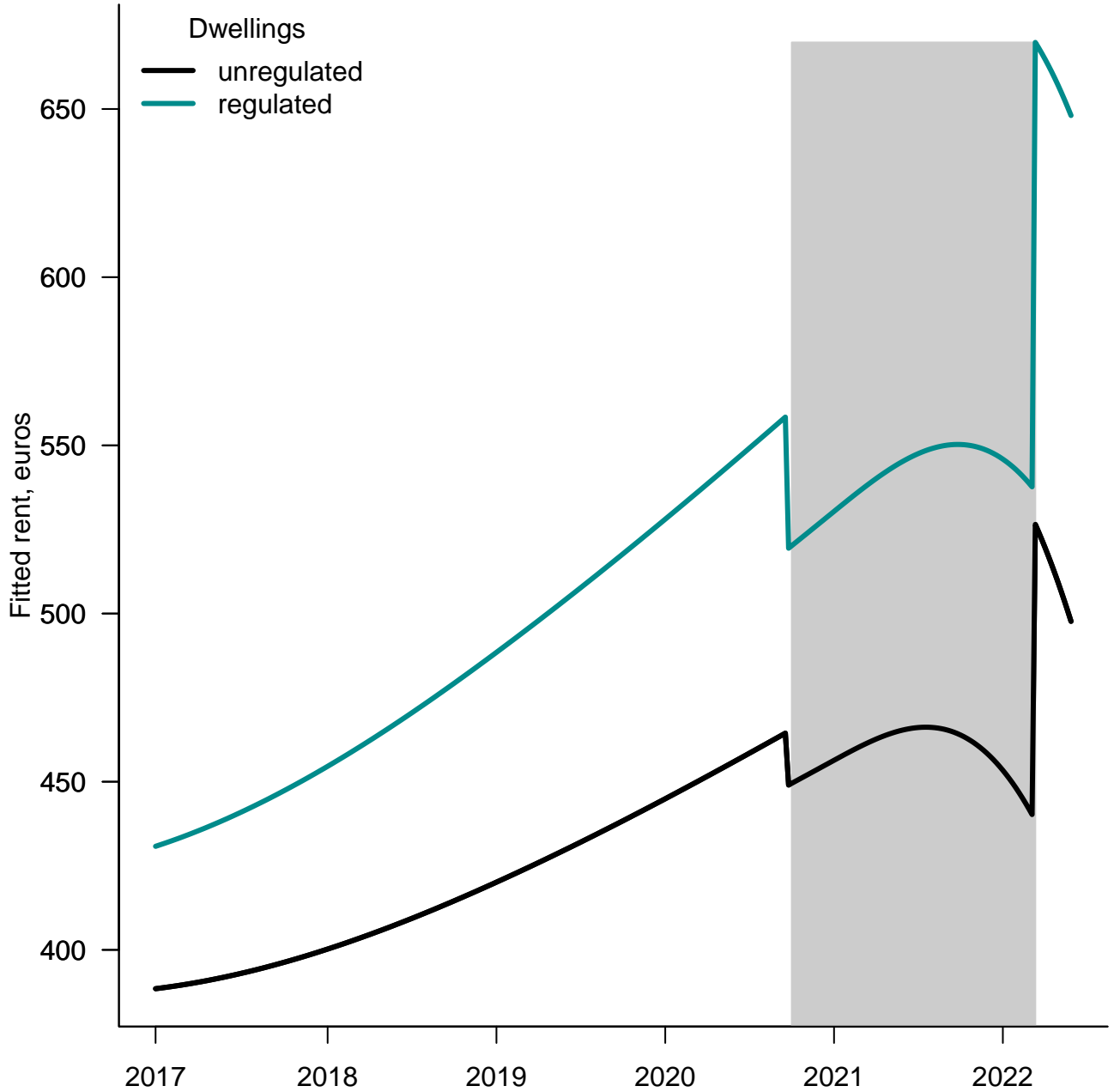
Based on the model (2) we estimate fitted rents for regulated and unregulated dwellings. These rent are computed for a two-room dwelling without any amenities located at 3.3 km from the city center of Barcelona and 4.4 km from the Mediterranean sea. The fitted rent dynamics are displayed in Figure 4.

The trends of rents for regulated and unregulated dwellings are roughly parallel prior to September 2020. Immediately after introduction of rent control in the third quarter 2020, the regulated rents dropped from 631 euros in the second quarter 2020 to 612 euros (i.e., by 3%)

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<sup>15</sup>Moreover, using this index allows to certain extent capturing the effects of nationwide rental moratorium adopted in Spain in March 2020.

Figure 4: Regulated and unregulated fitted rents, 2017–2022



Note: The black line depicts the fitted monthly rent for a dwelling in unregulated municipalities, while the greenish line shows the fitted monthly rent for a similar dwelling in regulated municipalities. The grey shaded area corresponds to the period during which the rent control was valid in Catalonia.

and then continued to fall slowly or stagnate. The introduction of rent control caused a short and small decline in the rents for unregulated dwellings followed by a return to the previous trend. Thus, no acceleration of rents for unregulated dwellings can be observed.

The distinction between control and treatment groups made until now can be too rough. Therefore, we try to identify the control group more precisely by concentrating not simply on the unregulated municipalities, but exclusively on the unregulated municipalities that are neighbors of the regulated municipalities. In particular, we define neighbors as those unregulated municipalities that share common borders with the regulated ones. Figure 1 illustrates the breakdown of Catalonia’s municipalities into regulated ones (red color); unregulated municipalities that share common border with regulated municipalities (dark grey shade); and the rest of unregulated municipalities (light grey shade).

Table 5 compares the three groups of dwellings: 1) dwellings in not regulated municipalities that are not immediate neighbors of regulated municipalities; 2) dwellings in not regulated municipalities that are neighbors of regulated municipalities; and 3) dwellings in regulated municipalities.

Table 5: Average values of variables for control and treatment groups: rental dwellings

Variable	Not regulated	Not regulated, neighbor	Regulated
PRICE	607.27	712.81	1094.74
UNITPRICE	7.74	9.09	14.10
CONSTRUCTEDAREA	83.69	82.83	81.26
ROOMNUMBER	2.48	2.45	2.41
BATHNUMBER	1.41	1.41	1.39
HASLIFT	0.57	0.66	0.74
AMENITYID	2.42	2.39	2.35
HASPARKINGSPACE	0.32	0.34	0.14
PARKINGSPACEPRICE	9.56	7.95	8.59
FLOORCLEAN	1.67	1.86	2.74
CADCONSTRUCTIONYEAR	1984	1988	1960
CADMAXBUILDINGFLOOR	3.34	3.71	6.14



... continued

Variable	Not regulated	Not regulated, neighbor	Regulated
CADDWELLINGCOUNT	13.52	23.34	25.54
CADASTRALQUALITYID	5.01	4.97	4.37
Agent	0.74	0.81	0.92
COAST_CAR_10M	0.003	0.01	0.003
COAST_WALK_10M	0.002	0.01	0.001
COAST_WALK_5M	0.002	0.01	0.001
POPULATION_DENSITY	12.30	25.26	249.89
DISTANCE_MUNI_CENTER	1.79	1.80	2.22
Dist2BCN	76.75	55.58	13.79

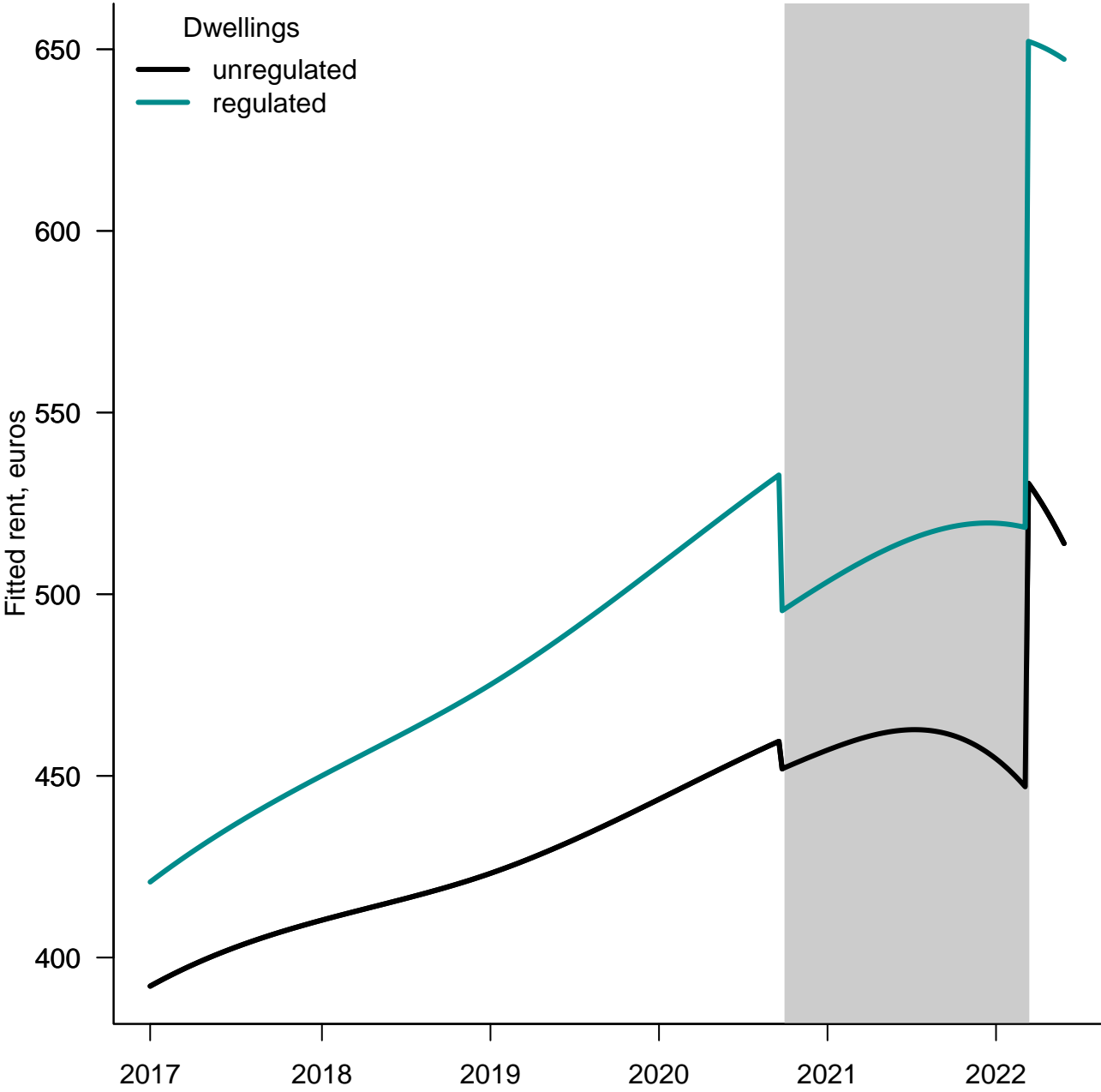
Dwellings in regulated municipalities are smaller in terms of area and number of rooms, have less parking space, are older, are located in higher floors, are more likely to have lifts and to be offered by real estate agents. They are located in areas with much higher population density (250 persons per square km vs. 12 persons per square km in group 1) and are much closer to the city center of Barcelona. Dwellings in not regulated municipalities that share common border with regulated municipalities across all these variables occupy an intermediate position. Despite these differences, we expect that to large extent they can be controlled for by hedonic regressions.

Figure 5 depicts the predicted rents for two identical dwellings belonging to the control group including only neighbor municipalities and to the treatment group.

The dynamics displayed in Figure 5 are very similar to those shown in Figure 4. The only noticeable difference is a much smaller reduction of predicted rent for the dwelling in the control group. This change is not statistically significant as the coefficient at the variable `Enactment_2020` in the column (6) of Table 4 shows compared to the same coefficient in column (3).

Given the relatively large differences between the control and treatment dwellings, even if only dwellings from unregulated neighbor dwellings are included into the control group, we decided to use yet another definition of the control group. For this purpose, we take advantage

Figure 5: Regulated and unregulated fitted rents, 2017–2022 (control group including only neighbor municipalities)



Note: The black line depicts the fitted monthly rent for a dwelling in unregulated municipalities that share common border with regulated ones, while the greenish line shows the fitted monthly rent for a similar dwelling in regulated municipalities. The grey shaded area corresponds to the period during which the rent control was valid in Catalonia.

of the exception for large dwellings provided for in the rent control law. Namely, the dwellings with floor area exceeding 150 m<sup>2</sup> can be freed from the regulation. This decision is left to the regulated municipalities. However, the vast majority of them made use of this exception.<sup>16</sup> Such dwellings are considered as luxury ones and their tenants are likely to be very well off people who apparently do not need any special legal protection. Moreover, the number of such dwellings is very limited.

Thus, we defined the control group as dwellings located in regulated municipalities and having the floor area above 150 m<sup>2</sup>. The treatment group is defined as dwellings also located in regulated municipalities and having the floor area between 140 and 150 m<sup>2</sup>. Figure 6 compares the average characteristics of large dwellings (floor area > 150 m<sup>2</sup>), almost large dwellings (between 140 and 150 m<sup>2</sup>), and small dwellings (area < 140 m<sup>2</sup>).

The small dwellings, apart from being substantially smaller, are less likely to have a lift or parking space, have higher square meter price, are more likely to be located in the neighborhoods with higher population density, and are of a higher quality. The almost large dwellings differ from the large ones in terms of some characteristics, but are generally much more similar to them than the dwellings in unregulated municipalities, even in those that share common border with regulated municipalities. Thus, almost large dwellings appear to be more appropriate to be included into the control group. Table 6 reports the estimation results obtained for control and treatment groups defined based on the floor size of dwellings in regulated municipalities.

When treatment and control groups are defined more precisely, no or very weak effects of rent control could be found. In model (2), the enactment of rent control leads to a similar decrease of both regulated and unregulated rents. In model (3) that also accounts for the revocation, no statistically significant effects can be seen at all.

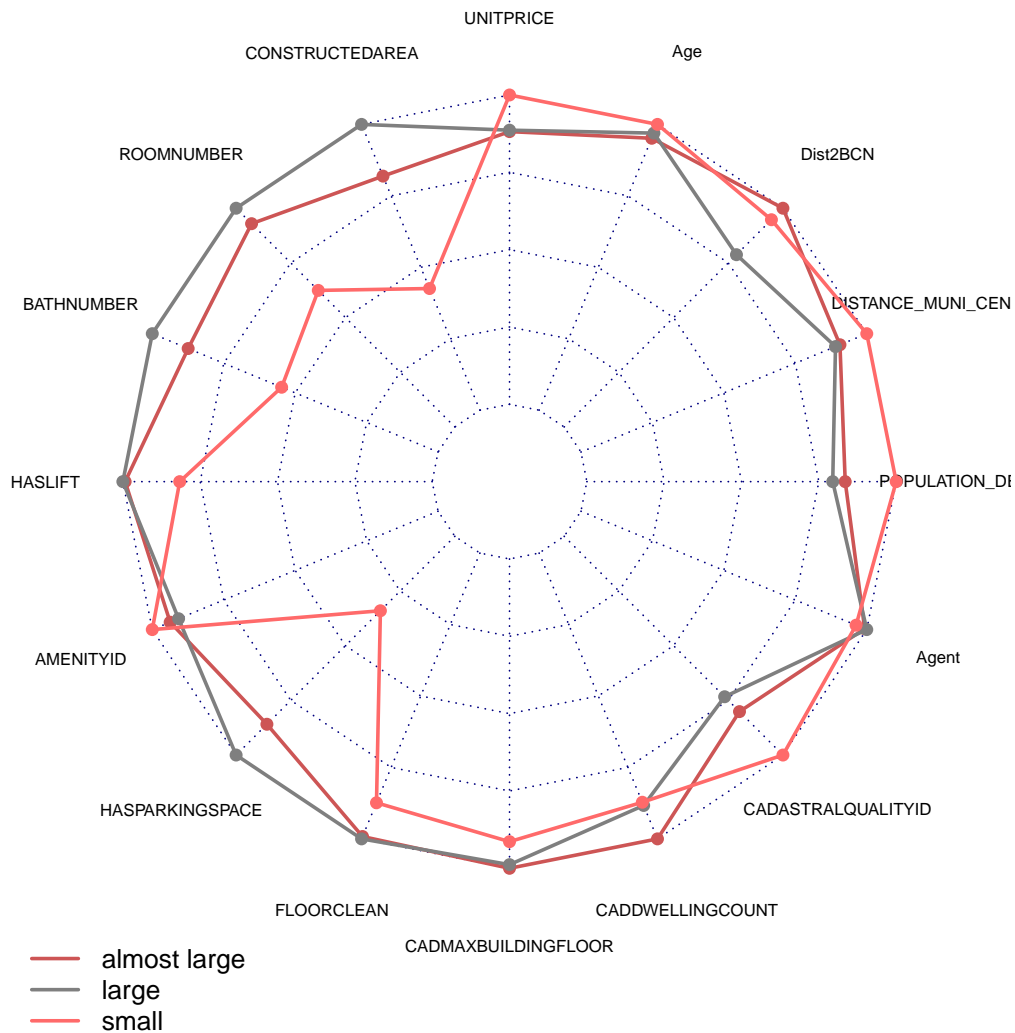
#### *4.1.2. Quantity effects*

Typically, one would expect a reduction of supply of regulated dwellings. To test this hypothesis we employ a panel-data model estimated at the level of municipalities and at the weekly frequency:

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<sup>16</sup>Only the following five municipalities did not take advantage of this exception: Barcelona, Castelldefels, Montcada i Reixac, Ripollet, Sant Cugat del Vallès. Nevertheless, they account for the lion's share of observations of the regulated municipalities.

Figure 6: Comparison of rental dwellings from control and treatment groups



The dark grey colored lines denote large dwellings in regulated municipalities that are excepted from rent control. The dark red color stands for almost large dwellings that are under control, while light red color denotes the smaller dwellings that are subject to rent control.

Table 6: Estimation results of hedonic model for rents: large and almost large dwellings

	<i>Dependent variable: log of rent</i>		
	(1)	(2)	(3)
Constant	6.189*** (0.097)	6.044*** (0.120)	6.001*** (0.176)
Enactment_2020		-0.068 (0.055)	-0.061 (0.059)
Revocation_2022			0.040 (0.128)
Regulated		0.230** (0.111)	0.247 (0.180)
Regulated_Enactment_2020		0.059 (0.067)	0.056 (0.072)
Regulated_Revoc			-0.018 (0.151)
ROOMNUMBER	0.006 (0.007)	0.005 (0.007)	0.005 (0.007)
BATHNUMBER	0.159*** (0.009)	0.159*** (0.009)	0.159*** (0.009)
CONSTRUCTEDAREA	0.003*** (0.0003)	0.003*** (0.0003)	0.003*** (0.0003)
Supplierreal estate agent	0.068*** (0.016)	0.068*** (0.016)	0.068*** (0.016)
HASLIFT	0.029** (0.013)	0.029** (0.013)	0.029** (0.013)
HASPARKINGSPACE	0.101*** (0.011)	0.100*** (0.011)	0.101*** (0.011)
Constr_year1901-1936	0.053 (0.043)	0.052 (0.043)	0.052 (0.043)
Constr_year1937-1975	0.014 (0.034)	0.013 (0.034)	0.012 (0.034)
Constr_year1976-2000	0.028 (0.034)	0.028 (0.034)	0.027 (0.034)
Constr_year2001-	0.040 (0.035)	0.040 (0.035)	0.040 (0.035)
POPULATION_DENSITY	-0.0002*** (0.0001)	-0.0002*** (0.0001)	-0.0002*** (0.0001)
DISTANCE_MUNI_CENTER	0.095*** (0.003)	0.095*** (0.003)	0.095*** (0.003)
Dist2BCN	-0.006*** (0.0001)	-0.006*** (0.0001)	-0.006*** (0.0001)
COAST_WALK_10M	0.124* (0.075)	0.127* (0.075)	0.125* (0.075)
COVID19_restrict	-0.00003 (0.001)	-0.0001 (0.001)	-0.00003 (0.001)
Polynomial spline trends	✓	✓	✓
Observations	3,469	3,469	3,469
Adjusted R <sup>2</sup>	0.547	0.547	0.547

Note: \*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

$$y_{it} = \delta_1 I_{it}^{intr} + \delta_2 I_{it}^{rev} + \delta_3 I_{it}^{intr} \times Tr_{it} + \delta_4 I_{it}^{rev} \times Tr_{it} + x_{it}\beta + ft_i + u_i + \varepsilon_{it} \quad (2)$$

where  $y_{it}$  is the quantity of interest (transaction volume, i.e., the number of dwellings offered for rent or for sale);  $I_{it}^{intr}$  is the law introduction dummy;  $I_{it}^{ann}$  is the law revocation dummy;  $Tr_{it}$  is the dummy for the treatment group;  $ft_i$  is a cubic B-spline;  $x_{it}$  is a vector of control variables;  $u_i$  is the municipality fixed effect; and  $\varepsilon_{it}$  is a random disturbance.

Table 7 reports the estimation results of the above model for rental dwellings.

Although all regulation dummies have negative signs, none of them is statistically significant. Interestingly, COVID-19 containment measures appear to have a negative and statistically significant impact on the supply of rental dwellings.

Figure 7 shows the evolution of the number of advertisements of rental dwellings in regulated and not regulated municipalities: The supply of dwellings in regulated areas is about 10 times larger than that in the not regulated areas. Almost half of the ads for regulated dwellings are those from Barcelona municipality. The introduction of rent control led to a decline of the ads of regulated dwellings, while the number of not regulated dwellings stabilized at a higher level.

## 4.2. Dynamics of sales market

### 4.2.1. Price effects

Here, we focus on the dynamics of selling housing prices. Table 8 reports the estimation results of a hedonic model of sales prices. Again, we consider separately models estimated for control group including dwellings from all unregulated municipalities (columns (1) through (3)) and models with control group comprised only of unregulated neighbor municipalities (columns (4) through (6)).

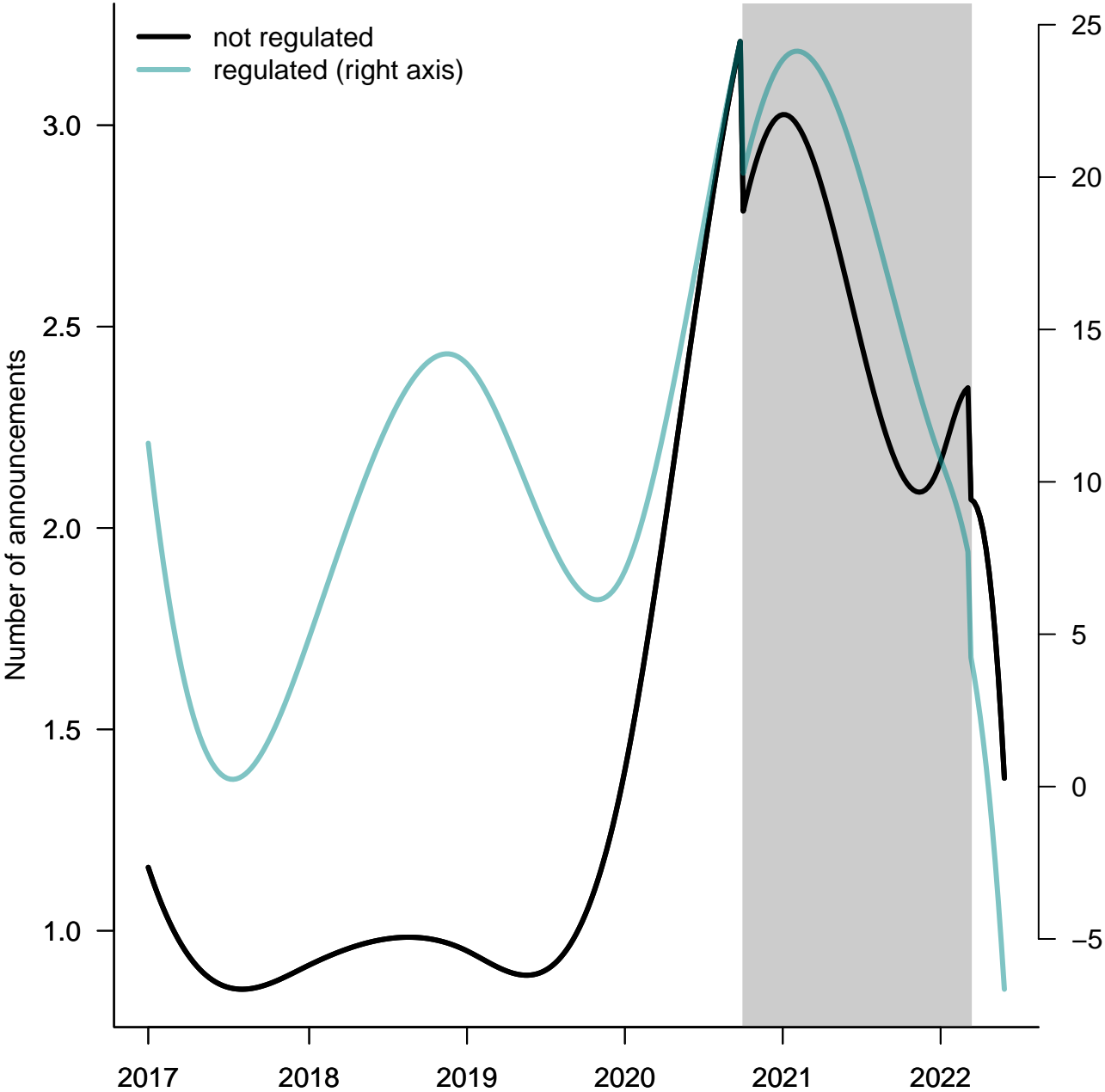
The variables controlling for the typical dwelling characteristics, such as their physical condition and location, have the expected coefficients that do not differ a lot from those obtained for the rental dwellings; see Table 4. In models (2) and (3), the enactment of rent control in 2020 led to an increase of selling prices in unregulated municipalities, while prices in regulated regions seem to remain unchanged. In models (5) and (6), where control group is chosen more carefully, no statistically significant price effects related to the introduction of rent control can be observed. Interestingly, the revocation of rent control in Spring 2022 appears to increase the

Table 7: Estimation results of panel-data model for supply of rental dwellings

	<i>Dependent variable: number of advertisements</i>			
	(1)	(2)	(3)	(4)
Enactment_2020		-0.467 (0.760)	-0.229 (0.801)	-0.455 (0.940)
Revocation_2022				-0.735 (1.678)
Regulated_Enactment_2020			-2.348 (2.487)	-4.295 (2.875)
Regulated_Revoc				-6.972 (5.166)
COVID19_restrict	-0.025** (0.012)	-0.026** (0.012)	-0.026** (0.012)	-0.028** (0.012)
Poly_1_Unreg	-0.021 (1.504)	0.067 (1.511)	0.012 (1.512)	-0.956 (2.642)
Poly_2_Unreg	-0.492 (1.584)	-0.342 (1.602)	-0.431 (1.605)	-1.356 (2.616)
Poly_3_Unreg	-0.176 (1.508)	-0.145 (1.508)	-0.170 (1.509)	-1.177 (2.717)
Poly_4_Unreg	-0.260 (1.462)	-0.056 (1.498)	-0.173 (1.504)	-1.060 (2.486)
Poly_5_Unreg	-0.401 (1.374)	-0.475 (1.379)	-0.450 (1.380)	-1.542 (2.795)
Poly_6_Unreg	2.755 (1.980)	3.384 (2.230)	3.124 (2.246)	2.716 (2.570)
Poly_7_Unreg	0.017 (1.347)	0.798 (1.852)	0.395 (1.900)	-0.389 (2.626)
Poly_8_Unreg	1.239 (1.908)	1.618 (2.005)	1.450 (2.013)	1.056 (2.263)
Poly_1_Reg	20.404*** (4.434)	20.491*** (4.437)	20.982*** (4.467)	11.166 (7.674)
Poly_2_Reg	4.470 (4.659)	4.620 (4.666)	5.403 (4.739)	-3.939 (7.597)
Poly_3_Reg	13.716*** (4.454)	13.746*** (4.454)	13.965*** (4.460)	3.712 (7.899)
Poly_4_Reg	29.119*** (4.287)	29.323*** (4.300)	30.351*** (4.436)	21.405*** (7.212)
Poly_5_Reg	6.350 (4.021)	6.275 (4.023)	6.051 (4.030)	-4.917 (8.050)
Poly_6_Reg	41.441*** (4.770)	42.068*** (4.878)	44.383*** (5.459)	37.678*** (6.979)
Poly_7_Reg	19.740*** (3.998)	20.521*** (4.195)	24.087*** (5.644)	15.687** (7.780)
Poly_8_Reg	13.756** (5.491)	14.134** (5.526)	15.625*** (5.747)	10.442 (6.643)
Observations	200,647	200,647	200,647	200,647
Adjusted R <sup>2</sup>	-0.002	-0.002	-0.002	-0.002

Note: \*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Figure 7: Number of advertisements of regulated and unregulated dwellings, 2017–2022



Note: The black line depicts the fitted number of rental advertisements per week in unregulated municipalities (left axis), while the greenish line shows the fitted weekly number of advertisements in regulated municipalities (right axis). The grey shaded area corresponds to the period during which the rent control was valid in Catalonia.



Table 8: Estimation results of hedonic model for sales prices

	Dependent variable: log of rental price					
	control group: all			control group: only neighbors		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	11.459*** (0.006)	11.378*** (0.009)	11.286*** (0.019)	11.523*** (0.006)	11.441*** (0.011)	11.379*** (0.025)
Enactment_2020		0.041*** (0.007)	0.067*** (0.009)		-0.002 (0.010)	0.015 (0.012)
Revocation_2022			0.084*** (0.015)			0.056*** (0.021)
Regulated		0.116*** (0.009)	0.197*** (0.020)		0.099*** (0.011)	0.139*** (0.026)
Regulated_Enactment_2020		-0.039*** (0.008)	-0.061*** (0.010)		-0.001 (0.011)	-0.012 (0.013)
Regulated_Revoc			-0.076*** (0.017)			-0.038* (0.022)
ROOMNUMBER	-0.047*** (0.001)	-0.047*** (0.001)	-0.047*** (0.001)	-0.042*** (0.001)	-0.042*** (0.001)	-0.042*** (0.001)
BATHNUMBER	0.260*** (0.001)	0.260*** (0.001)	0.260*** (0.001)	0.246*** (0.001)	0.246*** (0.001)	0.246*** (0.001)
CONSTRUCTEDAREA	0.007*** (0.00002)	0.007*** (0.00002)	0.007*** (0.00002)	0.007*** (0.00002)	0.007*** (0.00002)	0.007*** (0.00002)
Supplierreal estate agent	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
HASLIFT	0.276*** (0.001)	0.276*** (0.001)	0.276*** (0.001)	0.296*** (0.001)	0.296*** (0.001)	0.296*** (0.001)
HASPARKINGSPACE	0.151*** (0.001)	0.151*** (0.001)	0.151*** (0.001)	0.126*** (0.001)	0.126*** (0.001)	0.126*** (0.001)
Constr_year1901-1936	-0.041*** (0.003)	-0.041*** (0.003)	-0.041*** (0.003)	-0.049*** (0.003)	-0.049*** (0.003)	-0.049*** (0.003)
Constr_year1937-1975	-0.287*** (0.003)	-0.287*** (0.003)	-0.287*** (0.003)	-0.309*** (0.003)	-0.309*** (0.003)	-0.309*** (0.003)
Constr_year1976-2000	-0.252*** (0.003)	-0.252*** (0.003)	-0.252*** (0.003)	-0.287*** (0.003)	-0.287*** (0.003)	-0.287*** (0.003)
Constr_year2001-	-0.264*** (0.003)	-0.263*** (0.003)	-0.263*** (0.003)	-0.267*** (0.003)	-0.267*** (0.003)	-0.267*** (0.003)
POPULATION_DENSITY	0.0003*** (0.00000)	0.0003*** (0.00000)	0.0003*** (0.00000)	0.0001*** (0.00000)	0.0001*** (0.00000)	0.0001*** (0.00000)
DISTANCE_MUNI_CENTER	0.025*** (0.0004)	0.025*** (0.0004)	0.025*** (0.0004)	0.028*** (0.0004)	0.028*** (0.0004)	0.028*** (0.0004)
Dist2BCN	-0.007*** (0.00002)	-0.006*** (0.00002)	-0.006*** (0.00002)	-0.008*** (0.00002)	-0.008*** (0.00002)	-0.008*** (0.00002)
COAST_WALK_10M	0.331*** (0.005)	0.337*** (0.005)	0.337*** (0.005)	0.335*** (0.006)	0.338*** (0.006)	0.338*** (0.006)
COVID19_restrict	-0.0001* (0.0001)	-0.0001* (0.0001)	-0.00004 (0.0001)	-0.00001 (0.0001)	-0.00004 (0.0001)	0.00003 (0.0001)
Poly_1_Unreg	-0.199*** (0.007)	-0.118*** (0.010)	-0.024 (0.020)	-0.194*** (0.009)	-0.111*** (0.013)	-0.049* (0.026)
Poly_2_Unreg	-0.123*** (0.010)	-0.052*** (0.012)	0.036* (0.020)	-0.134*** (0.012)	-0.056*** (0.015)	0.003 (0.026)
Poly_3_Unreg	-0.099*** (0.010)	-0.006 (0.012)	0.094*** (0.022)	-0.146*** (0.012)	-0.058*** (0.016)	0.009 (0.029)
Poly_4_Unreg	-0.017** (0.008)	0.044*** (0.010)	0.126*** (0.018)	-0.055*** (0.010)	0.019 (0.014)	0.074*** (0.024)
Poly_5_Unreg	-0.071*** (0.009)	0.040*** (0.011)	0.150*** (0.023)	-0.079*** (0.010)	0.015 (0.015)	0.089*** (0.031)
Poly_6_Unreg	-0.004 (0.009)	0.001 (0.014)	0.039* (0.016)	-0.024* (0.011)	0.034* (0.018)	0.057*** (0.021)
Poly_7_Unreg	0.047*** (0.010)	0.117*** (0.018)	0.211*** (0.025)	0.007 (0.011)	0.141*** (0.024)	0.203*** (0.033)
Poly_1_Reg	-0.159*** (0.006)	-0.195*** (0.007)	-0.183*** (0.012)	-0.177*** (0.006)	-0.194*** (0.006)	-0.172*** (0.012)
Poly_2_Reg	-0.118*** (0.007)	-0.152*** (0.008)	-0.141*** (0.012)	-0.127*** (0.007)	-0.143*** (0.007)	-0.122*** (0.012)
Poly_3_Reg	-0.027*** (0.007)	-0.064*** (0.008)	-0.052*** (0.013)	-0.050*** (0.007)	-0.069*** (0.007)	-0.045*** (0.013)
Poly_4_Reg	0.043*** (0.006)	0.011 (0.007)	0.022* (0.011)	0.026*** (0.006)	0.011* (0.006)	0.031*** (0.011)
Poly_5_Reg	0.041*** (0.007)	0.001 (0.008)	0.016 (0.014)	0.015** (0.007)	-0.006 (0.007)	0.020 (0.013)
Poly_6_Reg	0.037*** (0.007)	0.013 (0.009)	0.010 (0.009)	0.015** (0.007)	0.011 (0.008)	0.013 (0.009)
Poly_7_Reg	0.084*** (0.008)	0.024** (0.011)	0.035** (0.015)	0.052*** (0.008)	0.030*** (0.010)	0.051*** (0.014)
Observations	614,548	614,548	614,548	536,283	536,283	536,283
Adjusted R <sup>2</sup>	0.611	0.611	0.611	0.651	0.652	0.652

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

prices for dwellings for sale in unregulated municipalities by 6–8%, whereas it raised prices in regulated municipalities by only 0.8–1.6%.

As in section 4.1, we compare here the characteristics of dwellings both in control and in treatment groups. Table 9 shows key descriptive statistics of the three groups of dwellings: 1) dwellings in not regulated municipalities that are not immediate neighbors of regulated municipalities; 2) dwellings in not regulated municipalities that are neighbors of regulated municipalities; and 3) dwellings in regulated municipalities.

Table 9: Average values of variables for control and treatment groups: dwellings for sale

Variable	Not regulated	Not regulated, neighbor	Regulated
PRICE	142,603.8	162,391.5	253,527.3
UNITPRICE	1684.20	1843.49	2756.39
CONSTRUCTEDAREA	88.91	90.14	90.56
ROOMNUMBER	2.55	2.67	2.87
BATHNUMBER	1.45	1.48	1.45
HASLIFT	0.55	0.65	0.70
AMENITYID	2.59	2.53	2.46
HASPARKINGSPACE	0.31	0.31	0.17
FLOORCLEAN	1.76	1.97	2.59
CADCONSTRUCTIONYEAR	1986.1	1988.2	1971.7
CADMAXBUILDINGFLOOR	3.49	3.87	5.71
CADDWELLINGCOUNT	16.45	23.81	26.10
CADASTRALQUALITYID	4.87	4.96	4.80
Agent	0.87	0.89	0.93
COAST_CAR_10M	0.03	0.04	0.02
COAST_WALK_10M	0.03	0.02	0.01
COAST_WALK_5M	0.03	0.02	0.01
POPULATION_DENSITY	13.06	25.14	206.01
DISTANCE_MUNI_CENTER	0.002	0.002	0.002
Dist2BCN	92.46	63.62	25.40

As expected, dwellings in regulated dwellings are much more expensive and closer to Plaza

Catalunya than dwellings from both control groups. Similarly, to the rental dwellings from regulated municipalities, they are located in areas with much higher population density and are likely to have lift but less likely to have a parking place due to more crowded conditions in bigger settlements. They are also more likely to be located in higher-rise buildings and be somewhat older. However, unlike the rental dwellings, the dwellings for sale in regulated municipalities appear to be slightly larger than their counterparts in the unregulated municipalities.

Table 10 reports the regression coefficients estimated for control and treatment groups defined based on the floor size of dwellings in regulated municipalities.

Similarly to the same models estimated for the rental dwellings, we do not find almost any statistically significant effects of rent control for dwellings for sale. The coefficients describing the introduction of rent control are not significant. The only statistically significant coefficient is that corresponding to the revocation of treatment-group dwellings: it is positive implying a jump in sales prices after the rent control was revoked.

#### *4.2.2. Quantity effects*

To measure the potential impact of rent control on the supply of dwellings for sale, we use the same panel-data model as defined in equation (2). The estimation results for various specifications of this model are reported in Table 11.

According to the models in columns (3) and (4), the introduction of rent control did not affect the supply of dwellings for sale in unregulated municipalities. However, it increased substantially the supply of dwellings for sale in regulated municipalities. This is an indication of a possible shift in supply from rental to owner-occupied dwellings. The landlords, who are not satisfied with rents fixed at lower levels, prefer to sell them.

Figure 8 shows the evolution of the number of advertisements of dwellings for sale in regulated and not regulated municipalities.

The number of dwellings for sale jumped immediately at the introduction of rent control in both regulated and unregulated municipalities. However, in the former, the effect was much stronger. The revocation of rent control seems to have no noticeable effects on the supply of dwellings for sale.

Table 10: Estimation results of hedonic model for dwellings for sale: large and almost large dwellings

	<i>Dependent variable: log of rent</i>		
	(1)	(2)	(3)
Constant	11.485*** (0.046)	11.483*** (0.060)	11.587*** (0.115)
Enactment_2020		-0.012 (0.042)	-0.036 (0.048)
Revocation_2022			-0.102 (0.091)
Regulated		0.003 (0.054)	-0.177 (0.122)
Regulated_Enactment_2020		-0.021 (0.050)	0.024 (0.056)
Regulated_Revoc			0.172 (0.105)
ROOMNUMBER	0.011*** (0.004)	0.011*** (0.004)	0.011*** (0.004)
BATHNUMBER	0.236*** (0.005)	0.236*** (0.005)	0.236*** (0.005)
CONSTRUCTEDAREA	0.003*** (0.0001)	0.003*** (0.0001)	0.003*** (0.0001)
Supplierreal estate agent	0.058*** (0.011)	0.058*** (0.011)	0.058*** (0.011)
HASLIFT	0.247*** (0.008)	0.247*** (0.008)	0.247*** (0.008)
HASPARKINGSPACE	0.085*** (0.007)	0.085*** (0.007)	0.085*** (0.007)
Constr_year1901-1936	0.028 (0.031)	0.028 (0.031)	0.028 (0.031)
Constr_year1937-1975	-0.049** (0.024)	-0.049** (0.024)	-0.049** (0.024)
Constr_year1976-2000	-0.017 (0.024)	-0.017 (0.024)	-0.017 (0.024)
Constr_year2001-	-0.008 (0.024)	-0.008 (0.024)	-0.008 (0.024)
POPULATION_DENSITY	-0.0004*** (0.00003)	-0.0004*** (0.00003)	-0.0004*** (0.00003)
DISTANCE_MUNI_CENTER	0.057*** (0.002)	0.057*** (0.002)	0.057*** (0.002)
Dist2BCN	-0.005*** (0.0001)	-0.005*** (0.0001)	-0.005*** (0.0001)
COAST_WALK_10M	0.436*** (0.028)	0.436*** (0.028)	0.435*** (0.028)
COVID19_restrict	-0.0004 (0.0004)	-0.0005 (0.0004)	-0.0004 (0.0004)
Polynomial spline trends	✓	✓	✓
Observations	16,681	16,681	16,681
Adjusted R <sup>2</sup>	0.415	0.415	0.415

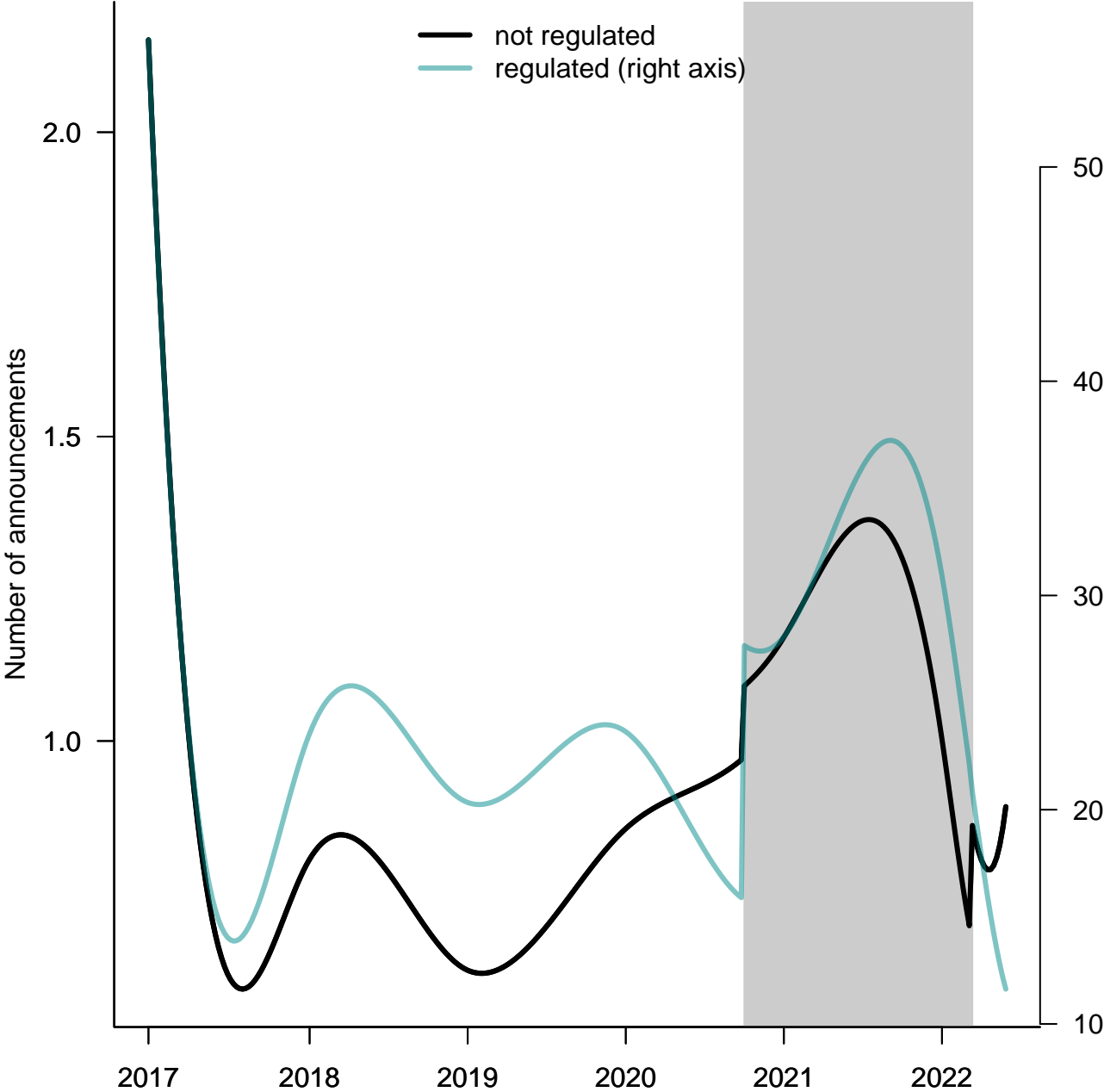
Note: \*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 11: Estimation results of panel-data model for supply of dwellings for sale

	<i>Dependent variable: number of advertisements</i>			
	(1)	(2)	(3)	(4)
Enactment_2020		0.761*	0.012	0.117
		(0.456)	(0.477)	(0.560)
Revocation_2022				0.308
				(1.000)
Regulated_Enactment_2020			8.594***	11.749***
			(1.601)	(1.850)
Regulated_Revoc				11.299***
				(3.325)
COVID19_restrict	-0.009	-0.007	-0.007	-0.005
	(0.007)	(0.007)	(0.007)	(0.008)
Poly_1_Unreg	1.114	0.970	1.145	1.568
	(0.896)	(0.900)	(0.901)	(1.575)
Poly_2_Unreg	-0.997	-1.242	-0.963	-0.556
	(0.944)	(0.955)	(0.956)	(1.559)
Poly_3_Unreg	0.193	0.143	0.221	0.660
	(0.898)	(0.899)	(0.899)	(1.619)
Poly_4_Unreg	-0.621	-0.952	-0.586	-0.196
	(0.871)	(0.893)	(0.896)	(1.482)
Poly_5_Unreg	-0.151	-0.029	-0.108	0.375
	(0.819)	(0.822)	(0.822)	(1.666)
Poly_6_Unreg	0.461	-0.565	0.252	0.300
	(1.185)	(1.336)	(1.344)	(1.534)
Poly_7_Unreg	0.706	-0.565	0.701	1.020
	(0.802)	(1.107)	(1.132)	(1.565)
Poly_8_Unreg	-0.314	-0.931	-0.404	-0.292
	(1.138)	(1.196)	(1.200)	(1.349)
Poly_1_Reg	41.551***	41.409***	39.586***	54.347***
	(2.876)	(2.878)	(2.897)	(4.976)
Poly_2_Reg	-15.733***	-15.977***	-18.890***	-4.843
	(3.022)	(3.026)	(3.074)	(4.926)
Poly_3_Reg	23.029***	22.981***	22.165***	37.585***
	(2.889)	(2.889)	(2.893)	(5.122)
Poly_4_Reg	4.109	3.776	-0.044	13.408***
	(2.781)	(2.788)	(2.877)	(4.677)
Poly_5_Reg	13.350***	13.473***	14.306***	30.792***
	(2.608)	(2.609)	(2.613)	(5.219)
Poly_6_Reg	3.472	2.450	-6.157*	4.094
	(3.081)	(3.141)	(3.527)	(4.520)
Poly_7_Reg	39.967***	38.693***	25.435***	38.100***
	(2.593)	(2.704)	(3.661)	(5.047)
Poly_8_Reg	2.290	1.674	-3.870	4.003
	(3.560)	(3.579)	(3.725)	(4.308)
Observations	236,305	236,305	236,305	236,305
Adjusted R <sup>2</sup>	-0.0003	-0.0003	-0.0002	-0.0001

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Figure 8: Number of advertisements of regulated and unregulated dwellings for sale, 2017–2022



Note: The black line depicts the fitted number of sales advertisements per week in unregulated municipalities (left axis), while the greenish line shows the fitted weekly number of advertisements in regulated municipalities (right axis). The grey shaded area corresponds to the period during which the rent control was valid in Catalonia.

### 4.3. New construction

Rent control can affect not only the supply of the existing dwellings but also the changes in the housing stock. In particular, it can reduce the housing construction through diminishing returns and, therefore, the willingness to build. Table 12 compares monthly dwelling starts and completions average by no-rent-control and rent-control periods by Catalonia’s provinces. For the sake of comparison, we also show these indicators for whole Spain and for Madrid.

Table 12: Average monthly dwelling starts and completions, January 2019 – March 2022

Region	Starts			Completions		
	no rent control	rent control	change, %	no rent control	rent control	change, %
Spain	7272.2	8106.4	111.5	6014.8	6986.9	116.2
Comunidad de Madrid	1443.6	1624.9	112.6	1318.5	1348.5	102.3
Catalonia	966.4	907	93.9	829.7	946.2	114.0
Barcelona	721.0	670.1	92.9	629.4	693.7	110.2
Girona	91.7	126.1	137.5	109.3	99.6	91.1
Lleida	56.0	45.8	81.9	46.3	55.6	120.1
Tarragona	97.8	65.1	66.5	44.8	97.2	217.2

Sources: Ministerio de Transportes, Movilidad y Agenda Urbana and own calculations.

Notes: “no rent control” starts for the period between January 2019 and September 2020, while “rent control” denotes the period between October 2020 and March 2022. “Change” stands for a percentage change of average starts (completions) during rent control with respect to average starts (completions) prior to it.

During rent control, housing completions in whole Catalonia increased at roughly the same rate as nationwide: 114% and 116%, respectively. In Tarragona province, the rate was much higher (217%), while in Girona province, 9% less dwellings were completed during rent control than immediately before it. However, one can argue, that due to a lengthy construction process, the number of completions can be more affected by the decisions made before rent control was introduced. Therefore, the number of housing starts can be more informative, since the corresponding decisions are much more recent. Indeed, during the rent control, in Catalonia 6% less dwellings were started than prior to it, compared to the whole country or Madrid, where during the rent control period, the starts increased by 12–13%. One exception is again Girona province, where dwelling starts jumped by almost 40%. However, this can be also a result of the relatively small numbers (on average 90–100 dwellings started per month) in all provinces outside of Barcelona province that accounts for three-fourths of housing construction

in Catalonia. In addition, the province level data merge together housing starts and completions in the regulated and unregulated municipalities. Hence, it is impossible to tell apart the effects at the municipal level. In other words, we cannot see whether the declines in starts are due to less dwelling starts in regulated municipalities only or whether the same or the opposite takes place in the unregulated municipalities.

## 5. Discussion

In this section, we summarize and discuss the outcomes of our study of Catalonia’s rent control and their political implications. Table 13 presents both expected effects of rent control (see our hypotheses formulated in section 1) and effects found in this study.

Table 13: Summary of effects of introduction and revocation of rent control

Market segment	Expected		Found	
	Price	Supply	Price %	Supply 10 <sup>3</sup> dwellings
Regulated rental dwellings				
introduction	-	-	[-6,-7]	0
revocation	+	+	[1,3]	0
Unregulated rental dwellings				
introduction	+	+/0	[0,-4]	0
revocation	-	-/0	[15,16]	0
Regulated dwellings for sale				
introduction	-	+	0	[9,12]
revocation	+	-	[0.8,1.6]	12
Unregulated dwellings for sale				
introduction	+	+/0	[0,7]	0
revocation	-	-/0	[6,8]	0

Note: The values under the heading “Found” represent the results obtained in this study and are taken from Tables 4, 7, 8, and 11. The numbers in square brackets refer to the range of the corresponding coefficient estimates. If only one number is written, it means that the estimates are approximately equal to this number.

As seen, the effects the introduction of rent control found here in nine out 16 cases are those stipulated in our hypotheses. In particular, the introduction of rent control led to a decrease in rents for regulated dwellings, while its revocation caused the rents to rise again. The rental price effect that we found is comparable to but slightly larger than that found by [Monràs and Montalvo \(2022\)](#): -6-7% vs. -5%, respectively. In two cases, no effect is found and these are



supply effects. The literature is also not unambiguous on the supply effects of rent control (Kholodilin, 2022). In two other cases, we find the effects with a sign which is opposite to that stipulated in our hypotheses: we implicitly assumed that after revocation both rental and selling prices of unregulated dwellings will decline. However, this did not happen and the prices increased even more.

However, if models with more precisely defined control and treatment groups are used, no rent control effects on prices of rental dwellings and dwellings for sale can be found.

## 6. Concluding remarks

In this study, we investigated the effects of a short-live second-generation rent control policy in Catalonia. We find that the introduction of rent control in 2020 led to a strong decline of prices and a moderate reduction of quantities both in regulated and unregulated municipalities. By contrast, the revocation of rent controls in 2022 resulted in a dramatic increase of rents and a further reduction of supply.

Our results are to a large extent in line with both theoretical and empirical literature on the effects of rent control (Kholodilin, 2022). They also conform with the results obtained by Monràs and Montalvo (2022) who analyzed the introduction of rent control in Catalonia in 2020. In addition, we find an evidence of declining dwelling starts after introduction of rent control. Although the Catalonia's model of rent control provides for some exceptions for the new construction, they are not really very attractive from the point of view of builders, because they have a very short horizon and rather tight rent increase possibilities.

Thus, the net effects of rent control are not unambiguous. The reduction of rents is obtained at the cost of declining housing supply. Therefore, it would be difficult to advocate this policy as a way of guaranteeing the housing affordability. In the medium and long run, a lack of construction could even exacerbate the housing shortage.

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