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Socioeconomic and territorial dynamics of bullfighting in contemporary Spain

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ABSTRACT

This paper explores the territorial, economic, and social factors that affect the evolution of bullfighting festivities in Spain. Using data from the Ministry of Culture and Sports, we employ panel data regression models to analyze bullfighting celebrations from 2011 to 2019 before the COVID pandemic. The main findings include the significant role of public interest and attendance in bullfights, the heterogeneity of regions responses to the decline in festivities, and the influence of rural depopulation on this decline. Additionally, political factors, particularly support for animal welfare parties, negatively affect bullfighting celebrations, while economic indicators show no significant impact during the study period.

1. Introduction

Bullfighting is recognized as an Intangible Cultural Heritage of Spain[3] and several other countries worldwide. However, it has been undergoing a decline similar to other cultural traditions, influenced by globalization, shifts in population habits, and emerging viewpoints opposed to animal-involved celebrations. Since the 2008 economic crisis, the frequency of bullfighting celebrations in official bullrings (the so-called '*corridas*') in Spain has seen a significant and continuous decrease (see Fig. 1). Despite the positive evolution of popular festivities in which bulls are involved, data from the Ministry of Culture and Sports indicates that, between 2007 and 2019, there was a 61 % reduction in bullring events.[4] This paper focuses on the type of bullfighting celebrations taking place in bullrings, a more sophisticated and regulated form or bullfight. In the remaining of the paper we will refer to bullfights as a synonym of formal celebrations in established arenas and following traditions and regulations.

Inquiring into the reasons behind the decline in bullfighting celebrations in Spain is relevant for several reasons. Firstly, these festivities hold considerable importance in Spanish law due to their status as cultural heritage. Consequently, the National Plan for the Safeguarding of Intangible Cultural Heritage advocates for research aimed at preserving this cultural expression. Secondly, bullfights in Spain represent a unique cultural phenomenon with notable touristic and economic impacts at both regional and local levels. Economically, they span from the primary sector, including bulls, cattle ranches, and rural labor, to the tertiary sector, involving entrepreneurs, bullfighters, and other related activities. Thirdly, academic exploration of Spanish bullfighting has primarily focused on its anthropological and sociological dimensions, examining its essence and societal implications. Economic factors, such as labor market dynamics and the effects of various bullfighting events, have received less attention. To date, there is a lack of academic literature specifically examining the factors influencing the evolution of bullfighting celebrations in Spain.

This paper aims to identify the social, territorial, and economic factors that have influenced the evolution of bullfighting celebrations (the so-called '*corridas*') in Spain in recent years. Using data on provincial bullfighting celebrations provided by the Ministry of Culture and Sports, we employ a panel data model to discern the factors affecting the trend of bullfights from 2011 to 2019, before the COVID stoppage.

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[3] The Spanish parliament declared it cultural heritage on November 12, 2013 (Law 18/2013).

[4] 2007 constitutes the initial year of the series and is taken as the maximum reference of celebrations in the historical series according to other unofficial statistics (such as those published by the 6TOROS6 magazine).

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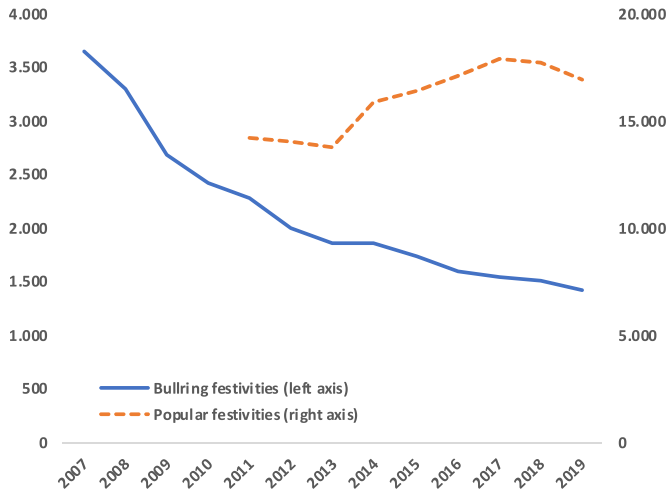

Fig. 1. Evolution of bullfighting celebrations in Spain, 2007–2019. Source: Own elaboration based on data from Spanish Ministry of Culture and Sports, Bullfighting Affairs Statistics.

Our findings indicate a significant positive correlation between bullfighting events and factors such as attendance and interest in bullfighting. We observe a more pronounced decline in festivities in provinces experiencing the greatest increase in average age and in the number of municipalities with either fewer than 100 inhabitants or more than 50,000 inhabitants. Notably, the impact of declining population sizes in smaller municipalities is more pronounced outside Madrid, highlighting the influence of rural depopulation on bullfighting activities. In regions with a strong tradition of bullfighting, where attendance has dropped significantly, there is a lesser decline in festivities, suggesting a form of 'resistance' in these areas. Regions with a weaker bullfighting tradition are more affected by the diminishing interest in the practice, thus exacerbating the overall downward trend. As anticipated, there is a notable negative correlation between the number of festivities and support for anti-bullfighting political parties. Surprisingly, economic indicators such as unemployment rates, the construction sector's contribution to GDP, and provincial economic growth do not significantly influence the dynamics of bullfighting celebrations.

The remainder of the paper is organized as follows: Section 2 provides a concise review of the existing literature related to the subject. Section 3 details the data sources used and offers a descriptive analysis of the data. In Section 4, we describe the empirical model employed and discuss the results obtained from the estimations. Section 5 concludes the paper with a summary of our findings and insights.

2. Literature review

From a social science perspective, academic research on bullfighting in Spain has predominantly focused on anthropological and sociological aspects. Key works by Pitt Rivers (1984) and Marvin (1988) have endeavored to provide a humanistic understanding of bullfighting, analyzing its essence and significance in terms of social relationships.

The economic aspect of bullfighting has also been a subject of study. The economic impact of bullfighting celebrations has been recognized in various academic studies internationally, including those in China (Chio, 2018), Turkey (Kiliçarslan & Kocabulut, 2017), and Japan (Ishikawa, 2009). Regarding Spain, some research has concentrated on the overall economic impact of bullfighting (Gutiérrez-López, 2013; Medina, 2015, 2016), as well as the local effects of specific bullfighting festivals, such as the Toro de Olivenza fair (Sanchez-Rivero et al., 2021). Additionally, the labor market for bullfighters has been examined from legal (Hurtado González, 2013) and economic (Royuela, 2011) perspectives.

The economic dimension of Lidia cattle ranching has received comparatively more attention (López Martínez, 2002, 2014; Purroy, 2005; Caballero de la Calle, 2005; Ruiz Abad, 2005), partly due to the sector's greater professionalization, as seen in organizations like the *Unión de Toros de Lidia*. More recent studies include works from Royuela (2019, 2020). Despite the extensive literature mentioned, we have yet to find a comprehensive study that identifies the factors influencing the evolution of bullfighting in Spain.

3. Data and descriptive analysis

In this paper, we focus on analyzing the bullfighting celebrations held in various provinces of Spain from 2011 to 2019. The data regarding these celebrations is sourced from the Ministry of Culture and Sports, specifically their Statistics of Bullfighting Affairs.[5] It is important to note that the geographical scope of this analysis is limited to the provincial level, as the available data does not permit a more localized, and ideally more detailed, examination. As highlighted in the introduction, there has been a consistent decline in the number of bullfighting events, although the rate of this decline varies across different provinces. Table 1 illustrates the evolution of bullfighting festivities in the Spanish provinces over the 2011–2019 period.[6]

Madrid consistently hosts most bullfighting events in Spain, followed by several provinces in Castilla-La Mancha and Castilla y Leonó, such as Toledo, Salamanca, Cuenca, and Ávila. Notably, Málaga stands out: it was the third province in terms of the number of celebrations during the average of the 2011–2012 period but dropped to the 26th position in the 2018–2019 biennium. When considering the number of celebrations per 100,000 inhabitants, the provinces with the highest frequency of bullfighting events in Spain are Ávila, Cuenca, and Segovia. In the more recent years, for instance, Ávila has held around 70 annual festivities, which equates to 44 events per 100,000 inhabitants.

Apart from Huelva and Lugo, all other provinces experienced a decrease in the number of festivities during the period under analysis.

[5] Official statistics can be accessed through the CULTURABase portal http://www.culturaydeporte.gob.es/servicios-al-ciudadano/estadisticas/cultura/mc/culturabase/portada.html

[6] The regions of Islas Canarias and Catalunya are excluded (even though celebrations were held in Barcelona in 2011, including this province implies econometric complications for subsequent analyses, which advises its exclusion from the comparison), as well as the province of Ourense (with an only celebration in 2011) and the autonomous city of Ceuta.

Table 1
Evolution of bullfighting celebrations, by province. 2011–2019.

	Average festivities		Festivities per 100.000 pop.		Population 2019
	2011 -2012	2018 -2019	2011 -2012	2018 -2019	
Araba/Álava	9.5	0	2.97	0.00	328,574
Albacete	72.5	49.5	18.09	12.70	389,648
Alicante/Alacant	19	7	1.03	0.38	1,873,586
Almería	19	16	2.76	2.28	710,902
Ávila	97.5	69.5	56.98	43.47	158,849
Badajoz	89	51	12.88	7.56	671,115
Balears, Illes	4.5	0.5	0.41	0.04	1,198,081
Burgos	41	30.5	11.04	8.57	355,409
Cáceres	57.5	37	13.96	9.36	391,730
Cádiz	45	28.5	3.62	2.28	1,251,443
Castellón/Castelló	18	7	3.04	1.23	572,931
Ciudad Real	78	46.5	14.85	9.34	494,163
Córdoba	30.5	15.5	3.80	1.97	784,430
Coruña, A	4	0	0.35	0.00	1,121,539
Cuenca	100.5	59	46.88	29.43	199,574
Granada	52.5	34.5	5.70	3.76	921,698
Guadalajara	98.5	48	38.34	18.73	260,392
Gipuzkoa	14	11	1.98	1.55	714,415
Huelva	22.5	23	4.33	4.40	526,605
Huesca	7.5	6	3.32	2.74	219,669
Jaén	51	39	7.66	6.13	630,122
León	7.5	4.5	1.52	0.97	460,484
Rioja, La	30.5	23	9.51	7.36	314,441
Lugo	0.5	0.5	0.14	0.15	328,764
Madrid	313.5	252.5	4.88	3.86	6,686,513
Málaga	101	19	6.33	1.15	1,670,596
Murcia	55	33	3.76	2.24	1,495,084
Navarra	49	41.5	7.67	6.45	652,561
Asturias	7	6	0.65	0.58	1,020,039
Palencia	22	13.5	12.93	8.35	160,227
Pontevedra	4.5	3	0.47	0.32	941,838
Salamanca	96	85	27.49	25.49	331,385
Cantabria	15	10.5	2.54	1.81	581,877
Segovia	75	60.5	46.12	39.24	154,020
Sevilla	55.5	49.5	2.88	2.55	1,952,646
Soria	23.5	19	24.91	21.21	89,587
Teruel	28	22	19.62	16.45	133,061
Toledo	148.5	127.5	21.09	18.56	694,923
Valencia/València	43	31.5	1.68	1.25	2,553,105
Valladolid	46.5	31	8.74	5.95	520,234
Bizkaia	17	14.5	1.47	1.28	1,138,930
Zamora	30	23	15.70	13.08	172,535
Zaragoza	32.5	22.5	3.34	2.34	971,549
Melilla	2	1	2.46	1.18	84,399
Total	**2,135**	**1,473**	**5.81**	**4.03**	**36,883,673**

Source: Own elaboration based on data from Ministry of Culture and Sports, Statistics of Bullfighting Affairs.

Fig. 2 illustrates the evolution of bullfighting events per 100,000 inhabitants from the 2011/2012 biennium to 2018/2019, in comparison to the initial levels in 2011/2012. It is evident that the decline in festivities is proportional to the initial frequency of events. In other words, provinces that initially hosted more events witnessed a larger decrease. This negative correlation is particularly noticeable in provinces with smaller population sizes, with Guadalajara, Cuenca, Ávila, and Segovia showing the most significant reductions in bullfighting events.

As we will explore in the results section, it's noteworthy that the substantial decrease in festivities in the provinces most associated with bullfighting correlates with a smaller decline in public attendance. We conducted several bivariate analyses to examine the association

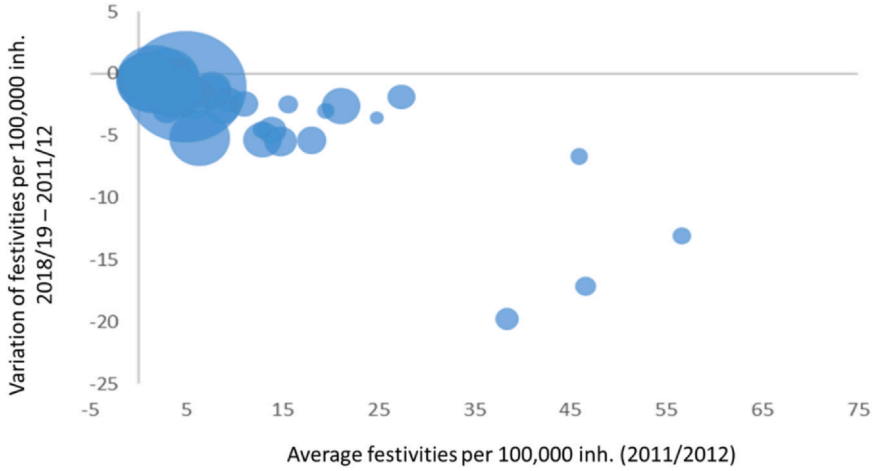

Fig. 2. Evolution of festivities per 100,000 inhabitants with respect to initial level. Note: The size of each bubble indicates the population size of each province in 2019. Source: Own elaboration based on data from Ministry of Culture and Sports, Statistics of Bullfighting Affairs.

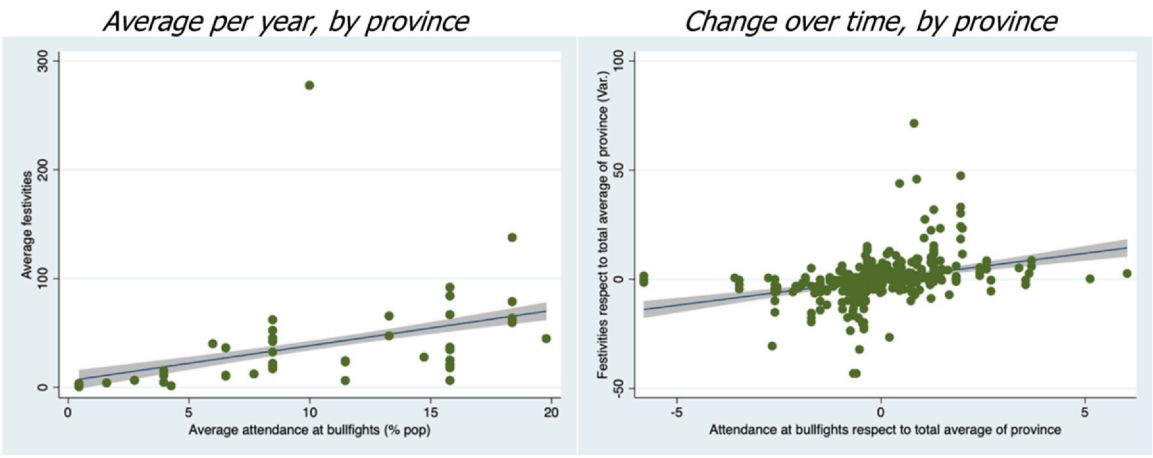

Fig. 3. Bullfighting festivities and attendance at bullfights. Source: Own elaboration based on data from Ministry of Culture and Sports.

between the frequency of bullfighting festivities and factors identified in previous studies as relevant to their evolution. Utilizing panel data, which includes both provincial information and its temporal progression, allows for a dual approach in our analysis. Firstly, we examine the average data across provinces to identify patterns, such as whether higher unemployment levels correlate with fewer celebrations. Secondly, we analyze the data longitudinally to see, for example, if areas with the most significant increases in unemployment also experience the most substantial declines in festivities. Among the key factors potentially influencing the frequency of bullfighting events is spectator turnout, which closely links to the public's interest in bullfighting. Other elements, like economic growth, demographic changes, and social structures, can also impact the celebration of these events. Additionally, the voting patterns of citizens, considering political parties' stances on bullfighting, offer another interesting dimension for analysis.

To assess factors related to spectator turnout and interest in festivities, we used regional-level data on attendance at bullfights and interest in bullfighting from the Survey of Cultural Habits and Practices (EHPC), provided by the Ministry of Culture and Sport. We focused on the last three waves of this survey, corresponding to the periods 2010–2011, 2014–2015, and 2018–2019. For each survey wave, we reference the second year (i.e., 2011, 2015, and 2019), interpolating data for the years between these periods.[7]

Fig. 3 presents scatter plots showing the average and temporal evolution of the total number of celebrations against the variable of attendance at bullfights. It reveals a positive association between the frequency of bullfighting events and the proportion of people attending these events. This correlation is much more pronounced when examining the average for the 44 provinces analyzed (left plot) than when comparing the temporal changes across the 44 provinces over the 9 years (right plot).

Indeed, the observed positive association between bullfighting celebrations and attendance might be influenced by other factors, such as demographic and territorial structural elements. In terms of demographics, we consider factors like the population size and average age for each province. For territorial aspects, we assess the impact of the number of municipalities in a province based on their population size. The data on both population size and territorial factors are sourced from the National Statistics Institute (INE), specifically the Continuous Census Statistics.[8]

While demographic factors are commonly studied, the emphasis on analyzing territorial structure is based on two hypotheses. The first hypothesis is that bullfights are often linked to the patron saint festivities of towns. The second is the expectation that as towns depopulate, leading to more municipalities with insufficient population to sustain bullfights, the number of celebrations is likely to decrease. Fig. 4

[7] See additional notes on the database in the appendix.

[8] Scatter graphs of the variable celebration of bullfights and demographic variables are included in the online supplementary material.

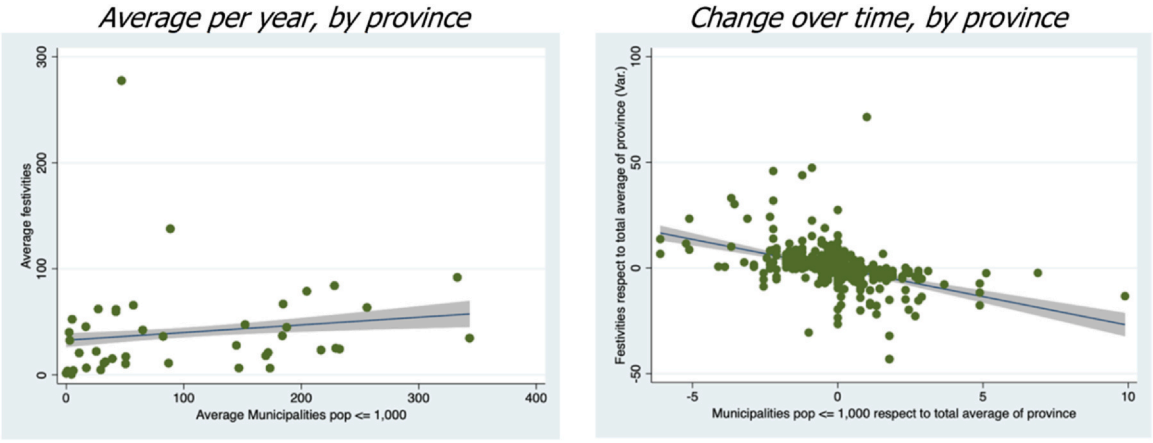

Fig. 4. Bullfighting festivities and territorial structure. Source: Own elaboration based on data from Ministry of Culture and Sports and National Statistics Institute (INE).

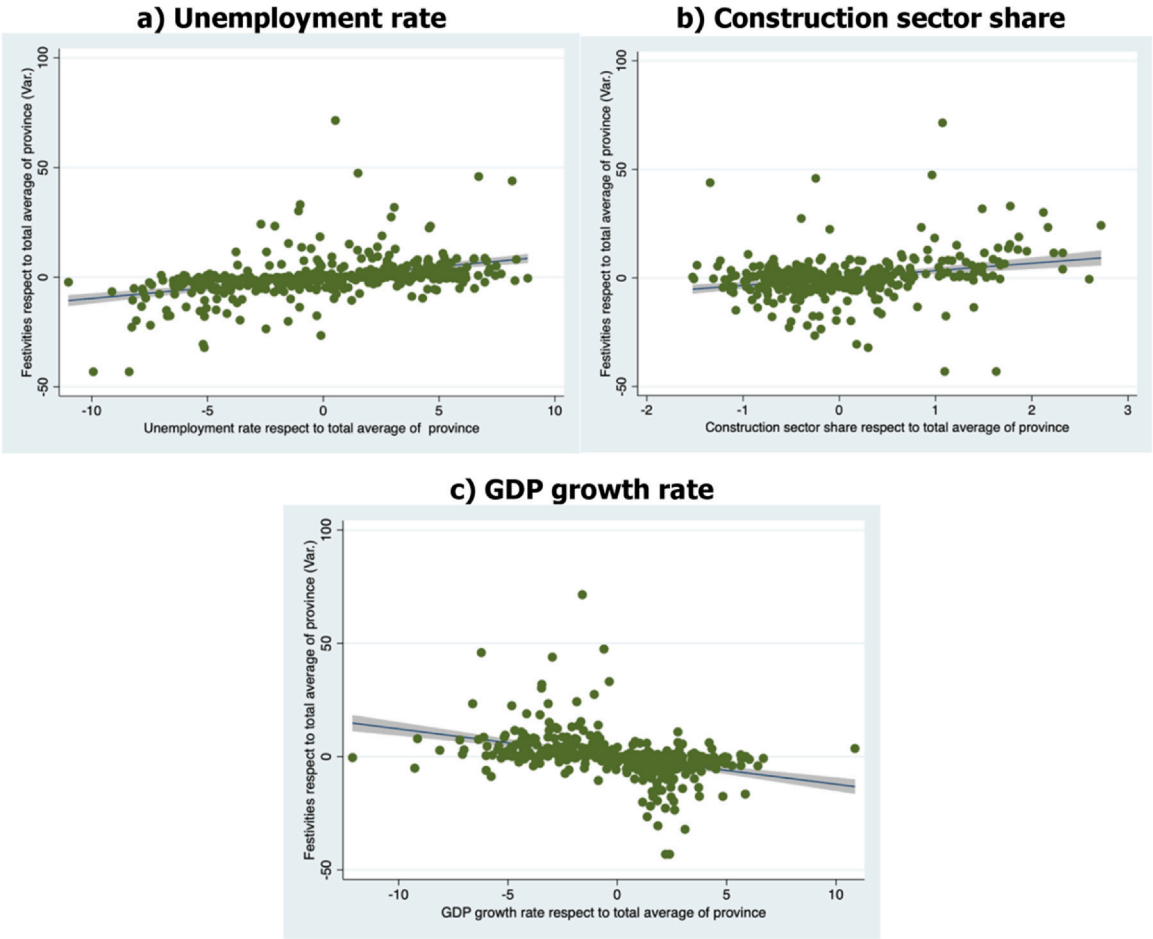

Fig. 5. Bullfighting festivities and economic indicators (*Change over time, by province*). Source: Own elaboration based on data from Ministry of Culture and Sports and National Statistics Institute (INE).

displays scatter plots relating the number of bullfighting celebrations to the number of municipalities with less than 1000 inhabitants. The left column suggests that the greater the number of municipalities in a province, the higher the potential for bullfighting events. The second hypothesis is more convincingly supported in the right column: as the number of sparsely populated towns increases, the frequency of celebrations decreases.

It's crucial to acknowledge that these associations do not imply causality. The observed relationships could be interpreted inversely, suggesting that when a municipality ceases to host bullfighting events, it might indicate a decline in the vitality necessary to sustain its population. This aspect certainly warrants a more detailed investigation, which is beyond the scope of this current study.

Regarding the economic indicators relevant to our analysis, we include the unemployment rate, the rate of economic growth, and a variable representing the economic cycle, such as the proportion of economic activity linked to the construction sector. The unemployment rate data is sourced from the INE's Active Population Survey, while

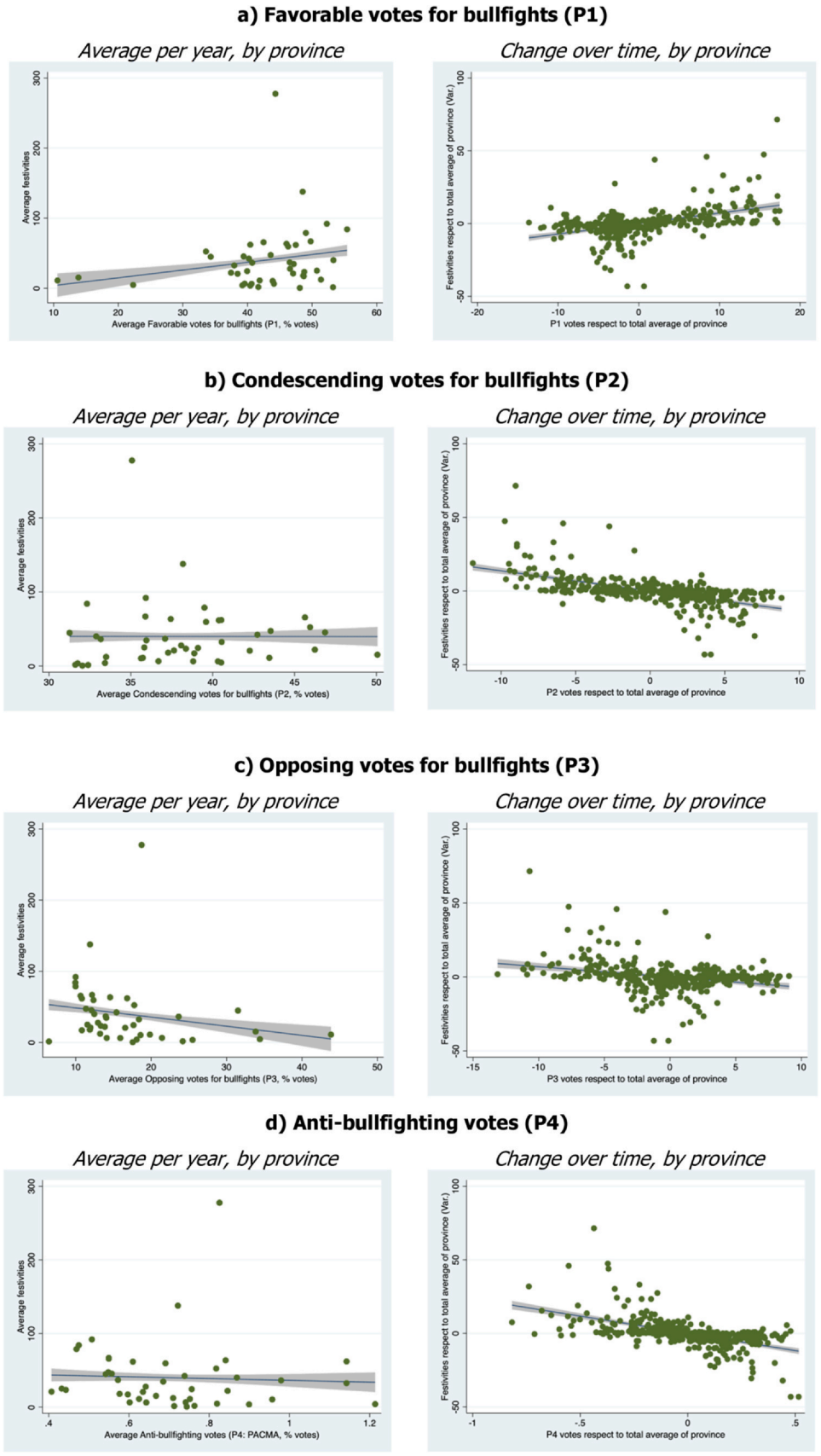

Fig. 6. Bullfighting festivities and votes to different political parties. Source: Own elaboration based on data from Ministry of Culture and Sports, Ministry of the Interior, and Social Explorer.

Table 2
Descriptive statistics.

Variable	Mean	Standard deviation			Min	Max
		Overall	Between	Within		
Festivities	40	47.4	46.9	9.8	0	349
Attendance at bullfights (%)	10.5	5.8	5.7	1.4	0.2	21.3
Interest in bullfighting (0−10)	3	0.8	0.8	0.2	1.2	4.2
Population interested (%, int > 0)	54.1	12.3	11.8	3.7	27.7	72
Bullfighting fans (%, int > =5)	35.7	10.4	10.3	2.1	13.6	49.8
Population	13.2	0.9	0.9	0	11.3	15.7
Average age	41.8	3.2	3.1	0.7	32.2	49.4
Municipalities pop < =100	27.5	43	43.3	3.6	0	180
Municipalities 100 < pop < =500	53.6	55.2	55.7	2.9	0	240
Municipalities 500 < pop < =1000	19.4	14.1	14.1	1.8	0	61
Municipalities pop > 50,000	2.5	3.4	3.4	0.2	0	23
Unemployment rate (%)	20.5	7.4	6.2	4.2	7.2	42.3
Construction sector (% GDP)	6.9	1.5	1.3	0.8	3.3	11.6
GDP growth rate (%)	1.4	3.2	0.6	3.2	-10.7	12.3
P1 votes (%)	42.6	11	9.1	6.4	7.5	70.5
P2 votes (%)	38.2	6.2	4.6	4.2	21	56.4
P3 votes (%)	16.7	8.5	7.5	4.2	0	48.9
P4 votes (%)	0.7	0.3	0.2	0.2	0	1.7

Source: Own elaboration based on data from Ministry of Culture and Sports, Ministry of the Interior, National Statistics Institute (INE), and Social Explorer.

information on GDP growth rate and the sectoral composition of each province is obtained from the INE's Regional Accounts.[9] Fig. 5 illustrates the linear association between the frequency of bullfighting festivities and these three economic indicators.

While the construction sector displays a positive correlation with bullfighting festivities as anticipated, the associations with the unemployment rate and the rate of economic growth are unexpectedly positive and negative, respectively. During the period of economic recovery in Spain, where the unemployment rate started decreasing from around 2013–2014 (varying by province), the findings suggest that in areas with more significant economic recovery, the number of festivities experienced a larger decline. Although this result appears to be a spurious correlation, it is nonetheless important to consider it in our model.

The political landscape could also be a significant factor influencing the frequency of bullfighting festivities. To assess this, we examined the provincial outcomes of Spain's general elections in 2011, 2015, 2016, and both elections in 2019. The data, sourced from Social Explorer and the Ministry of the Interior, represents the proportion of votes for each candidate relative to the total number of valid votes. Given that elections do not occur annually, we interpolated the voting data for each province and year to capture the medium-term trends in voter preferences and attitudes.[10] The votes of the parties have been clustered according to whether they are more or less prone to bullfighting, resulting in the following groups:[11]

- **P1** - Parties openly favorable to bullfighting: PP + VOX + UPYD + Partido Regionalista de Cantabria + Teruel Existe.
- **P2** - Parties favorable to bullfighting, but which tend to abstain from certain votes: PSOE + Ciudadanos + PNV + Geroa Bai.
- **P3a** - Parties that are not favorable to bullfighting, but that do not openly propose the prohibition, that tolerate them in localities where they govern and the bullfighting has roots, while they attack and prohibit them in others: IU + Podemos (and confluences) + EH Bildu + Compromís.
- **P3b**- Parties openly opposed to bullfighting, which are in favor of its total or partial ban: Más País + BNG
- **P4** - Party whose fundamental identity is anti-bullfighting: PACMA

To ensure better territorial and temporal representation, the party groups P3a and P3b have been combined into a single category, labeled "P3-Parties against bullfighting." Fig. 6 displays the average results across provinces in the left column and the results accounting for changes over time in the right column. Examining the first column, we observe a trend where more bullfights are celebrated in provinces where, on average, parties favorable to bullfighting (P1) and those with a more lenient stance towards it (P2) receive more votes. Conversely, in provinces where parties opposed to bullfighting or where PACMA (a party known for its stance against bullfighting) garners the most votes, the fewest bullfights are celebrated.

The analysis of the right column enables us to observe that regions with more celebrations tend to be those where parties from block P1 achieve better results each year. Conversely, in areas where parties from blocks P2, P3, and P4 gain more votes, there are fewer celebrations. This pattern suggests that the political (or electoral) variable is a significant factor to consider in explaining the evolution of bullfighting celebrations in Spain. The descriptive statistics for all variables utilized in this study are summarized in Table 2.[12]

4. Empirical model

Previous correlation analyses might be obscuring other simultaneous aspects, casting doubt on the actual association. While not aiming to conduct a causal analysis, we present a regression analysis below. This analysis helps isolate certain factors from others, enabling us to identify partial correlations that more accurately pinpoint the true associations of elements influencing the occurrence of bullfighting festivities. The regression model explains the celebration of bullfights ($\boldsymbol{Festivities}_{pt}$) in province $\boldsymbol{p}$ in year $\boldsymbol{t}$

$$\boldsymbol{Festivities}_{pt} = \sigma \boldsymbol{W}_{pt} + \theta \boldsymbol{Y}_{pt} + \beta \boldsymbol{X}_{pt} + \delta \boldsymbol{Z}_{pt} + \varphi_p + \pi_t + \varepsilon_{irt}$$

[9] The data for the year 2019 was estimated. The estimation procedure is described in the Appendix.

[10] Alternatively, for the years between elections, the vote associated with the last election has been considered, trying to capture the "legislature effect", since it is the elected politicians who actually make the changes to the legal regulations that govern us. As no differences were observed in the results of the estimates, the first procedure was maintained.

[11] This type of clustering is openly subjective and arbitrary, which is why it is perfectly objectionable and modifiable. However, sensitivity analyzes have been done with various combinations and the fundamental results of the analysis do not change.

[12] Correlations between all the variables are shown in the online supplementary material.

Table 3
Panel model using the variable Attendance at bullfights, 2011–2019.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Attendance at bullfights	2.379***	0.00760	-0.360	-0.394	-0.413	-0.333	-1.408***	1.103	-1.307**	-0.989
	(0.640)	(0.348)	(0.342)	(0.332)	(0.359)	(0.344)	(0.494)	(0.605)	(0.504)	(1.383)
Population (ln)			-182.5	-187.0**	-156.6**	-123.3*	-139.5	-109.0**	-80.57	-80.50
			(108.8)	(70.69)	(63.01)	(64.04)	(92.47)	(47.42)	(107.0)	(95.87)
Average age			-15.71***	-15.03***	-12.00**	-10.36**	-5.986	-6.351	-14.80***	-5.738
			(4.598)	(4.139)	(4.848)	(4.102)	(6.782)	(5.895)	(5.208)	(8.077)
Municipalities pop < =100			-1.963**	-1.975**	-1.853**	-2.128***	-1.926*		-0.453	-3.045
			(0.923)	(0.781)	(0.768)	(0.764)	(0.975)		(0.934)	(2.003)
Municipalities 100 < pop < =500			-1.227	-1.234	-1.161	-1.474*	-1.358	0.204	0.0795	-3.379*
			(0.917)	(0.827)	(0.786)	(0.784)	(0.916)	(2.136)	(0.776)	(1.939)
Municipalities 500 < pop < =1000			-0.938	-0.926	-0.928*	-1.123**	-1.121	0.189	-0.289	-0.732
			(0.581)	(0.566)	(0.544)	(0.550)	(0.692)	(2.314)	(0.788)	(0.624)
Municipalities pop > 50,000			-7.659**	-7.811**	-7.420**	3.262	-5.241	-1.330	-4.894*	-2.585
			(3.394)	(3.336)	(3.365)	(4.280)	(3.403)	(1.945)	(2.436)	(2.751)
Unemployment rate				0.194	0.170	0.218	0.109	0.491	0.200	-0.309
				(0.497)	(0.441)	(0.436)	(0.469)	(0.451)	(0.255)	(0.541)
Construction sector share				0.646	0.529	0.0444	1.036	1.954	4.394***	-3.333
				(1.965)	(2.256)	(2.145)	(2.482)	(1.892)	(1.065)	(3.709)
GDP growth rate				-0.0256	0.0242	-0.00701	-0.00587	0.118	0.220	0.0332
				(0.100)	(0.0889)	(0.0922)	(0.113)	(0.197)	(0.215)	(0.151)
P1 votes					0.301	0.487	-0.614	-0.127	-0.638	0.846
					(0.338)	(0.324)	(0.528)	(0.403)	(0.440)	(0.883)
P2 votes					-0.105	0.395	-2.331**	-0.286	-1.940*	1.174
					(0.592)	(0.537)	(1.059)	(0.435)	(0.998)	(1.375)
P3 votes					0.423	1.208	-1.202	0.702	-0.849	0.832
					(0.989)	(1.009)	(1.297)	(0.552)	(1.257)	(0.977)
P4 votes					-6.684	-10.26	-12.39	1.955	-41.78**	-21.20
					(11.80)	(11.59)	(16.43)	(9.009)	(15.76)	(23.56)
2012		-6.248***	-0.751	-1.143	-1.079	-3.041	2.790	-1.517	4.545	-0.157
		(1.993)	(2.333)	(3.589)	(5.645)	(5.739)	(6.640)	(2.913)	(4.696)	(6.249)
2013		-9.405***	2.077	1.877	1.600	-3.907	10.42	-3.858	17.07*	-1.726
		(2.016)	(3.186)	(6.328)	(11.21)	(11.09)	(13.28)	(4.849)	(9.111)	(11.77)
2014		-9.175***	6.679*	6.596	6.253	-2.226	19.73	-3.538	29.79**	-0.225
		(1.781)	(3.460)	(7.046)	(14.82)	(14.36)	(18.16)	(5.725)	(13.70)	(15.31)
2015		-12.17***	7.713*	7.933	7.491	-2.783	25.35	-5.958	35.94*	-0.251
		(2.226)	(4.454)	(6.295)	(16.57)	(16.08)	(21.05)	(7.320)	(17.62)	(17.53)
2016		-15.31***	9.073*	9.471	9.752	3.431	22.28	-1.762	39.08**	6.792
		(2.960)	(5.023)	(6.213)	(11.98)	(11.57)	(16.83)	(6.471)	(14.79)	(13.99)
2017		-16.33***	12.40**	13.17**	13.14	6.774	25.32	0.529	43.55***	5.248
		(3.084)	(5.755)	(6.203)	(11.48)	(10.84)	(16.26)	(6.048)	(14.50)	(11.58)
2018		-17.05***	15.49**	16.33**	16.10	10.01	27.62*	3.568	45.49***	4.816
		(3.186)	(6.597)	(6.371)	(10.77)	(9.976)	(15.51)	(6.697)	(14.21)	(10.73)
2019		-19.23***	17.16**	17.86***	17.44*	11.44	27.51*	6.229	44.75***	4.536
		(3.495)	(7.644)	(6.346)	(9.736)	(8.867)	(14.57)	(7.652)	(13.48)	(10.92)
Observations	396	396	396	396	396	387	306	90	207	189
R-squared	0.118	0.347	0.474	0.475	0.487	0.509	0.526	0.533	0.654	0.495
Number of provinces	44	44	44	44	44	43	34	10	23	21

Note: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1

From several factors:

- Attendance at bullfights and interest in bullfights, measured at the regional level ($\boldsymbol{W_{pt}}$)
- Population and territorial structure aspects: population size of each province, average age, and number of municipalities according to different groups of inhabitants ($\boldsymbol{Y_{pt}}$)
- Economic aspects: unemployment rate, GDP growth rate, and share of economic activity linked to the construction sector ($\boldsymbol{X_{pt}}$)
- Political factors: Voting for the different political formations ($\boldsymbol{Z_{pt}}$)

Fixed effects for province (φ_p) and time (π_t) are included to account for unobservable factors unique to each region or time period. Consequently, the models are estimated using a linear fixed effects panel model. The population variable is expressed in logarithmic form. Table 3 displays the results concerning the analysis of the total number of celebrations and the attendance variable at these events. In addition to the primary variable of interest in bullfights (column 1), the analysis sequentially incorporates temporal fixed effects (column 2), variables for population and territorial structure (column 3), economic factors (column 4), and political variables (column 5). Column (6) replicates the regression from the previous column, with the exclusion of data from the province of Madrid.

Finally, differentiated regressions are added by groups of provinces, belonging to provinces with more or less interest in bullfighting. Column (7) reports the results for the most bullfighting provinces, indicated as such according to the results of the percentage of the population that attended at bullfights in 2006 according to the EHPC, and (8) for the rest.[13] Columns (9) and (10) use an alternative grouping of the provinces.[14] Next, we describe the main results following the order of inclusion of the explanatory groups of variables.

[13] Those in which at least 10 % of the population attended the bullfights in 2006 are considered to be more bullfighting. The provinces are those the regions of Andalucía, Aragón, Cantabria, Castilla y León, Castilla-La Mancha, Comunitat Valenciana, Extremadura, Comunidad de Madrid, Comunidad Foral de Navarra and La Rioja.

[14] Due to the fall in attendance, according to the EHPC of the following years, Andalucía and Comunitat Valenciana are excluded as more bullfighting regions.

Table 4
Panel model using different variables related to Interest in bullfighting, 2014–2019.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Interest in bullfighting (0 − 10)	8.369***	2.312	-1.784	-0.340	-2.194	-2.249	-2.616	8.291**	-4.510*	24.78**
	(2.752)	(2.368)	(3.198)	(3.852)	(3.295)	(3.110)	(3.891)	(3.573)	(2.551)	(11.83)
Observations	220	220	220	220	220	215	170	50	115	105
R-squared	0.095	0.236	0.333	0.384	0.417	0.421	0.451	0.711	0.589	0.532
Number of provinces	44	44	44	44	44	43	34	10	23	21
Population interested (%, int > 0)	0.558***	0.286*	0.127	0.124	-0.0146	-0.00247	-0.0973	0.735**	-0.130	0.529
	(0.151)	(0.143)	(0.256)	(0.233)	(0.217)	(0.200)	(0.240)	(0.301)	(0.162)	(0.319)
Observations	220	220	220	220	220	215	170	50	115	105
R-squared	0.187	0.258	0.333	0.386	0.414	0.418	0.449	0.742	0.579	0.520
Number of provinces	44	44	44	44	44	43	34	10	23	21
Bullfighting fans (%, int > =5)	0.518**	0.150	-0.144	-0.0270	-0.155	-0.165	-0.178	0.321*	-0.446*	1.582**
	(0.234)	(0.172)	(0.236)	(0.289)	(0.245)	(0.233)	(0.317)	(0.157)	(0.231)	(0.739)
Observations	220	220	220	220	220	215	170	50	115	105
R-squared	0.050	0.234	0.333	0.384	0.416	0.421	0.450	0.693	0.594	0.535
Number of provinces	44	44	44	44	44	43	34	10	23	21
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population and territorial structure variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economic variables	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Political variables	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1

The initial results reveal a positive and significant relationship between the frequency of bullfighting events and attendance. However, this significance dissipates when temporary fixed effects are included, suggesting a general decline in attendance that predominantly explains the reduction of festivities in each province. The inclusion of additional variables (columns 2–5) does not alter the significance of the primary variable of interest.

When examining population and territorial structure factors, a sharper decline in festivities is noted in provinces with a significant increase in average age and in the number of municipalities with fewer than 100 inhabitants or more than 50,000. Notably, when Madrid is excluded (column 6), the significance of cities with over 50,000 inhabitants diminishes, while the impact of smaller municipalities becomes more pronounced and significant. This indicates that the phenomenon of 'empty Spain' significantly contributes to the decline of festivities in the country's interior.

Regarding economic factors, variables like the unemployment rate, the construction sector's share in the economy, and the provincial economic growth rate show non-significant results. The inclusion of these variables renders the population size statistically significant, suggesting that provinces with increasing population sizes experience fewer celebrations. This could be attributed to urban concentration and the shifting distribution of population and economic activities.

Political variables exhibit insignificant results (column 5). This finding challenges the assumption of parameter homogeneity (uniform behavior across provinces). Therefore, the model is re-estimated for groups of provinces based on bullfighting popularity. Results show that in provinces where bullfighting is more popular (columns 7 and 9), a significant decline in attendance does not correspond to a similar decrease in festivities, indicating a form of regional 'resistance'.

Some variables, like population age and economic cycle, are significant only in certain provincial groups, particularly in the more bullfighting-inclined ones (column 9). Where significant, the territorial structure always negatively impacts. Political variables now present some significant results. Surprisingly, increased support for parties traditionally in favor of bullfighting (P2) shows a negative correlation in these regions, possibly reflecting a shift in these parties' stance. Conversely, a negative and significant correlation is observed for anti-bullfighting votes (P4) in bullfighting regions, indicating a rise in anti-bullfighting sentiment.

Table 4 displays model results using various bullfighting interest variables instead of attendance for 2015–2019. The results align with those from the attendance models, showing a positive and significant link between bullfighting interest and festivities. Less bullfighting-oriented regions are more affected by the decline in interest (columns 8 and 10), exacerbating the general downward trend.

The proportion of the population interested in bullfighting is a key explanatory factor for festivities, with the model in column 1 fitting nearly 20 %. After accounting for additional factors, Bullfighting fans (interest ≥ 5) emerge as a crucial explanatory element, both in sustaining festivities in bullfighting provinces (column 9) and as a catalyst for the decline in less bullfighting regions (columns 8 and 10).

5. Conclusions

In this study, we examine the territorial, economic, and social factors that have significantly influenced the evolution of bullfighting festivities in Spain in recent years.

Using data on bullfighting celebrations from the Ministry of Culture and Sports, we conduct a series of panel data regression models. Through these models, we find that attendance at bullfights and the public's interest in bullfighting are crucial in explaining the reduced frequency of bullfights in Spain. Additionally, we observe distinct regional behaviors, with the provinces most enthusiastic about bullfighting showing substantial resistance to the decline in festivities, in contrast to the least enthusiastic provinces, which experience the most significant drop. Consequently, there is a strong impact of the cultural idiosyncrasy of every territory in the differentiated factors behind the evolution of bullfights. Bullfights are usually linked to local celebrations and consequently the territorial structure plays a crucial role; an increase in the number of municipalities with less than 100 or more than 50,000 inhabitants corresponds to fewer festivities. Notably, the rise in smaller municipalities is especially significant and impactful outside of Madrid, highlighting the adverse effects of rural Spain's depopulation on bullfighting celebrations.

The political landscape also significantly influences these festivities. Regions with stronger support for parties advocating animal welfare ideologies see a negative impact on bullfighting celebrations, aligning with expectations. Conversely, economic factors do not significantly explain the dynamics of these festivities in Spain during the study period.

The decline in bullring celebrations is compensated by the resilience of popular festivities with bulls, what opens a new direction of research, to understand the substitution of the more sophisticated form of bullfight, the *'corrida'*, by popular festivals, in which local people has a closer contact with the bull. Further investigations in this area can provide new insights in the more popular way of this intangible cultural practice.

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CRediT authorship contribution statement

Carlos M Belloni: Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Vicente Royuela:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

Appendix: Additional notes on the database

• *Attendance and interest in the bullfights*

The data on attendance and interest in the bullfights extracted from the EHPC are not disaggregated by province, so the average value of its respective Autonomous Community was considered for each province. The provinces of Ceuta and Melilla have the same percentage of attendees to the bullfights in each year, since in the EHPC they constitute the same Autonomous Community.

• *Provincial GDP growth rate*

The provincial GDP growth rate in 2019 was obtained through the weighted average between the 2018 sectoral composition, and the growth rate of each aggregate economic sector of the Autonomous Community to which the province belongs.

• *Construction sector share*

For the year 2019, accounting data at the provincial level were not available. The share of the construction sector in the economic activity of the province was estimated using the sectoral growth rate of the Autonomous Community to which the province belongs.

• *Definition of political parties*

The data on votes for political parties correspond to the following electoral instances:

- 2011: Votes for candidates. November 20, 2011
- 2015: Votes for candidates. December 20, 2015
- 2016: Votes for candidates. June 26, 2016
- 2019a: Votes for candidates. April 28, 2019
- 2019n: Votes for candidates. November 10, 2019

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.rspp.2024.100077.

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