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A look at the Spanish film industry and its level of persistence

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This paper explores the Spanish film industry to analyze the evolution of Spanish movie theater revenues up to December 2021 using both aggregated and disaggregated data by area of origin. Based on fractional integration methods, the results showed a change in persistence in the series as a result of the Covid-19 pandemic. Lower degrees of persistence are observed in the aggregated data and in the series related with the US, implying shorter effects of shocks in these cases. Nevertheless, a substantial increase in persistence after the Covid-19 is observed in all series.

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Introduction: confinement and movie theaters

As was the case with all sectors of the economy, the Covid pandemic severely impacted the Spanish cinema industry, and it was only with the de-escalation of the initial ‘State of Alarm’ in Spain that cinemas gradually reopened to the public.

The first significant release in cinemas, with the largest box office, was the film *Tenet* (2020). Box office revenues under these difficult circumstances were considered “poor” and thereafter release via streaming platforms was used as a way to avoid further postponement of film releases from major studios (Zamora, 2020)¹. The consolidation of streaming platforms as an alternative for the release of films displaced traditional cinemas and revolutionized the scheduling of cinema distribution channels. Notable examples are the cases of *Mulan* (2020) and *Soul* (2020), released on Disney+, and *Wonder Woman 1984* (2020), released on HBO Max² while examples of direct-to-streaming releases include *Black Widow*, following on *Mulan* on Disney+. This strategy placed users “in the center” in meeting the demand for audio-visual content and generating profits from films which, in the absence of a cinema release, would incur losses (Neira, 2021a; b).

The restrictions imposed by confinement were accompanied by business decisions on the exploitation of film productions in detriment of the movie theater sector. The Spanish Cinema Federation (*Federación de Cines de España*, FECE) outlined the needs of the sector which had incurred losses of over 100 million euros due to closures, and forecasted a further 43.5 million in losses due to occupancy limitations and other safety measures. Within this context, the industry sought various forms of financial assistance and presented a safety protocol for movie theaters (FECE, 2020a).

FECE also launched the #YoVoyAlCine campaign to encourage movie-going as a safe activity, explaining the safety measures adopted in cinemas ranging from no-contact service to the cleaning and disinfecting of screening rooms (FECE, 2020b). At this time, Spanish exhibitors emphasized the importance of reopening cinemas not only for the movie theater sector itself but also as a dynamising factor for other types of consumption. They also highlighted that Spanish cinemas were among the first in Europe to implement safety measures against Covid-19 (FECE, 2020c). Despite the public perception of the safety of cinema-going compared to other activities (FECE, 2020d)³, the cancellation in August 2020 of the theater release of *Mulan* in favor of the Disney+ platform caused a great deal of concern throughout the sector. This underscored the importance of the relationship between Hollywood studios and the Spanish theater sector (FECE, 2020e), especially as Covid safety measures proved effective in the first months of reopening (FECE, 2020f). However, in December 2020, Warner announced the simultaneous release in 2021 of various blockbusters in both theaters and on HBO Max, drawing criticism from exhibitors (Burtch et al. 2021).

It is important to note the economic importance of the movie theater industry within Spain: 1) every euro generated directly by exhibitors contributes 2.67 euros to the economy; 2) the sector contributes 616.8 million euros to the audio-visual sector and 440 million euros in tax revenues; 3) the sector accounts for 32,681 jobs and 2086 companies; 4) the gross added value for each spectator is 17.77 euros (FECE, 2020g)⁴.

In this context of falling theater attendance and growing use of alternative release strategies, one may ask when Spanish exhibitors will return to pre-COVID-19 levels or even question the viability of Spanish movie theaters if the major Hollywood productions (blockbusters) can be exploited entirely via streaming platforms.

For this paper we analyze the financial figures of Spanish cinemas in recent decades in order to determine the impact of COVID-19 on the sector and to identify the challenges the sector

faces, especially considering the dependence of Spanish theaters on Hollywood studios and the threat posed by streaming platforms.

The objectives of this work are as follows:

- To highlight the importance of Hollywood cinema in the Spanish theater sector (O1).
- To highlight the impact of streaming platforms during the Covid-19 pandemic (O2).
- To analyze the present and future impact of the pandemic on the Spanish exhibitors (O3).

The following section addresses the first two objectives; econometric research will help illustrate the performance of Spanish cinemas and their response to recent economic shocks. Our approach will focus on the analysis of time series to identify the key behavior of the exhibition sector between 2008 and 2021. In particular, an updated methodology based on time series analysis will be implemented to determine, based on historical data, if exogenous shocks in the series have transitory or permanent effects.

Section 2 provides a review of existing literature on the weight of Hollywood blockbusters in the Spanish movie theater sector and the influence of streaming platforms during the pandemic; Section 3 is devoted to the time series methodology used in this paper; Section 4 describes the collected data while Section 5 offers empirical results. A discussion and conclusions are provided in the final section.

Literature review

The weight of the blockbuster in the Spanish movie theater sector. Traditionally, movie theaters are where the success or failure of a film is decided; they are the first window of exploitation of a film (although not all films are released in theaters) and where the brand of the film producer is forged (Miñarro, 2013). In Spain, cinema is perceived in terms of the nationality of the film production rather than the business model of exhibition (Gómez-Escalonilla and Riesco, 2017) which, as noted, is an important contributor to the Spanish economy and closely tied to other business activities (restaurants, for example). The focus on box office receipts of Spanish film productions overlooks the fact that the sector depends on foreign productions to generate revenues and ensure survival.

The movie theater industry in Spain generally operated under a family business model and cinema was part of the business of these groups. This changed in the 1980’s when new, more specialized players entered the sector, for example, Cinesa and Yelmo. The 21st century saw the entrance of new operators, both national and international, with a number of company mergers⁵ to minimize costs and increase profits. Family operated, single and multiscreen movie theaters gave way to multiplexes, megaplexes and cityplexes, located in large shopping centers where movie-going is combined with other consumer activities. Thus, movie theaters, once emblematic of big cities, took on a different character (Álvarez and López, 2006; Perales and Marín, 2012; Deltell and García, 2013; García, 2015)⁶.

In Spain, American film productions dominate the playbill and major studios impose their will through their subsidiaries. The reality is an oligopoly of film distribution that imposes release dates and acquisition by lot, including lower quality films (Krauel et al. 2019). This also results in a homogenization of products, centered on commercial films (blockbusters) and leaving little space for other types of films. A study by Lluch (2017) found that, in line with the findings of Swami et al. (1999), Eliashberg et al. (2006) and Vogel (2014), exhibitors face a highly challenging

environment, forced to choose from among an ever-increasing number of films. Further challenges are the scheduling imposed by distributors, which sets the length of time a film must be screened regardless of audience reception, and the division of box office revenues that only becomes favorable to the exhibitor well after release and when the film is no longer promoted with advertising. The *majors* may also require distributors to screen a film throughout their assigned territory, a demand in turn imposed on exhibitors who may screen more modest films with better results at a later date (Miñarro, 2013)⁷. According to Lluch (2017), this means that the success of movie theaters depends largely on their location, the number of screens they have and their availability at any given time.

Revenues are derived from ticket sales, concession sales (popcorn and refreshments) and advertising (Álvarez and López, 2006; Epstein, 2007; García, 2015); given their high operating costs (maintenance, contracting, staff training, rent, etc.) and the arduous task of programming sessions (Eliashberg et al. 2006), it is essential for theaters to present an attractive range of films which include blockbusters.

According to Martín (2018), the American film industry has significant power to assert their will in foreign markets: the vertical integration of multinationals, barriers to enter international markets, economies of scale and the *star system*, all dominate markets in terms of aesthetics (reaching a heterogeneous, global audience), politics (extending the notion of the “self-made man”) and economics (promoting the “American way of life”)⁸.

The power of Hollywood within the Spanish market is felt through its investments in promotion, managing market risk through positioning, playability and salability (Miller et al. 2015), promoting a mainstream culture (considered good or bad: culture for everyone vs low-brow entertainment) based on market studies with the fundamental aim of attracting large audiences with unique content (Martel, 2011) and major releases (Vila and Rodríguez, 2019).

The blockbuster has been part of the logic Hollywood since the “Golden Age” of the industry, reformulated over time and perpetuating the notion of the “high concept movie” which courts controversy while offering a simplistic or childish vision of film (Deleyto, 2003)⁹. As Augros (2000) plainly states: “*high-concept movies* are the easiest to sell” (80). However, as Thompson (1999) notes, while Hollywood films may exploit clichés, they may also often contain other readings or meanings apart from the main action of the film (335-336). This idea is also proposed by Johnson (2005) who suggests that large-scale productions tend to oblige the spectator to make an effort to follow the plot (129-130), lending themselves to certain narratives: (1) spectacular, open to multiple possibilities and reflections (King, 2000); (2) increasingly complex, combining digital and interactive effects (Loriguillo-López and Sorolla-Romero, 2015); (3) dynamic, modifying genre stereotypes, as observed by Blanco (2020) in his analysis of *Dunkirk* (Nolan, 2017); and (4) reformulating products through remakes (Gómez-Escalonilla and Riesco, 2017). Special effects are another important aspect of the blockbuster, if not the essence of the product then certainly a major ingredient (Rubio, 2007) that can be both superficial and also cultural or educational¹⁰. The internet is also enlisted as an essential tool, for example, to promote the Marvel cinema universe, and to provide greater accessibility to movie screens through advance online ticket purchases (Díaz et al. 2019).

American films also have a distinct seasonality in Spain, with greater attendance during vacation periods and a more stable, faithful audience throughout the year (Epstein, 2007; Vila and Rodríguez, 2019). Data from the *Film Yearbook* of the Ministry of Culture and Sport (n.d.a) clearly shows the predominance of

American cinema during the period from 2008 to 2021, with an annual market share of 50 to 70%. Kogen (2005) was confident that the digitalization of the film industry would stabilize the market and allow Spanish cinema productions to emerge from the American shadow. To date this has not been the case.

Streaming, theaters and COVID-19. The difficulties experienced by cinemas during the pandemic only accentuated the problems plaguing the audio-visual sector in Spain and elsewhere (Mikos, 2020; Reséndiz, 2020) with the growing consumption not only of *streaming* on-demand (61.2% according to AIMC, 2021, 7) but also online television (Mikos, 2020). Patnaik et al. (2021)¹¹ point to the significant rise in the number of OTT subscribers as evidence of a clear trend towards simultaneous releases in theaters and OTT; so-called Day-and-Date release involves the simultaneous use of various channels, in this case, cinemas and platforms (Miñarro, 2013) in an increasingly uneasy coexistence.

Hughes (2020) notes how *streaming* releases have lower costs for the *majors*, especially in terms of marketing (also noted by Roig et al. 2021) and may not necessarily be detrimental to the movie theater sector if it were reorganized (Ayanbadejo, 2020). This emphasizes the importance of advertising in reactivating movie-going in the wake of the pandemic; something which, as noted above, was achieved in Spain after the initial confinement period. However, advertising is also increasingly important to OTT thanks to product placement (Arjona, 2021) and increasing investment in advertising in this market may be detrimental to movie theaters.

The concurrence of theaters and OTT is, however, becoming increasingly common. In recent years, studios have experimented with simultaneous releases on various platforms without any significant harm to theater revenues. Within a period of a few weeks, Netflix released successful films in theaters and via *streaming*, such as *Roma* (2018) or *The Irishman* (2019), which translated into reduced revenues for theaters in favor of greater consumer convenience (Neira, 2020b, 29-30). This stoked fears in Hollywood of lost box office revenues and the risk of possible boycotts by principal exhibitors (Hadida et al. 2021, 220). Nonetheless, a study by Liang et al. (2020) found that the *majors* have been applying this strategy in South Korea since 2013, with early Super Premium (SP) releases in theaters without any significant losses.¹² This may point the way towards new business models for the sector.

Streaming offers qualities that are lacking in the off-line experience. A study by Song (2021) compared Netflix and Amazon Prime Video in terms of five aspects of innovation and, while the study found Netflix to be superior to Amazon, the study revealed the most significant impact of OTT on the entertainment industry: costs, business organization and the personalization of services that provide consumers with many more entertainment alternatives. Regardless of any safety concerns, Lluch (2017, p. 207) predicts theaters will continue to lose ground to OTT given the high cost of theater tickets, limited offer and time constraints compared to the convenience and wider choice of viewing options at an affordable price¹³, with search engines that allows consumers to refine their preferences. Lamkhede and Das (2019) found that Netflix users browse the catalogue with three intentions: to resume viewing (they are looking for a specific program or film), to search (using specific search terms) and to explore (using generic search terms for general results, like the genre). They can also find content by language and create personalized catalogues through algorithms and data on user preferences (Lobato, 2019) satisfying their desires for films no longer in theaters (Rodelo, 2020, 31).

For Hadida et al. (2021) this consumption follows a “convenience institutional logic”, where consumer preferences

take precedence over “commitment institutional logic”, based on attracting the consumer to the movie theater. Thus, the OTT platforms have more freedom to produce and distribute content (with larger or smaller budgets), which obliges the *majors* to invest more money in attractive blockbusters for theaters. These authors suggest four possible future scenarios: (1) the logic of commitment prevails and the *majors* ignore OTT to prioritize large-scale productions through franchises, sequels and remakes; (2) based on the data, studios offer a greater variety of products on their own or through third party platforms while OTT encroaches further on theaters; (3) the logic of convenience prevails, diminishing the need for theater releases or even turning to *streaming* release; and 4) a new logic which conditions the experience of cinema consumption.

Speculation aside, the impact of OTT platforms on cinema consumption is clear, especially in the wake of the COVID-19 pandemic. However, a study of the Indian market by Devaki and Babu (2021) found that while the number of subscribers and their loyalty to OTT platforms increased, cinema attendance did not decline in the case of big-budget productions (blockbusters) even despite the streaming releases.

Nonetheless, the power of the OTT platforms is growing in many countries. According to Vlassis (2021), Netflix provides funding to the principal film producers in the countries where it operates (for example, Spain), demonstrating their commitment to the audio-visual sector and cinema production both inside and outside the US¹⁴. For this author, these and other political-economic actors strengthen the hand of OTT on a global level, while also entrenching inequities due to the lack of transparent data, leading to what Kim (2021) describes as “an asymmetrical relationship between local players and US-led global distribution platforms” (12)¹⁵.

The future of theaters. The Spanish case. Horváth and Balázs (2020) approach the cinema marketing mix by adding 3 aspects to the traditional “4Ps” (product, place, price, promotion): physical environment, process and people. Aspects such as the quality of viewing, waiting times and spaces and customer service are key elements in consumer choice either in theaters, at home or anywhere with internet access.

What is the medium-term and long-term future of theaters in Spain? Prior to the pandemic, movie-going was the principal cultural activity of the Spanish public (Ministry of Culture and Sport, 2019) despite the traditionally low penetration in the market (AIMC, 2020, 11). The frequency of cinema attendance, while remaining low, showed little change in Spain between 2019 and 2020 (AIMC, 2020, 59; 2021, 59), and so it is to be expected that consumers will continue going to movie theaters with the same frequency post-pandemic, although this may change if the OTT offer more attractive and varied content than theaters¹⁶.

Amorim and Teixeira (2021) fear that the experience of artistic contemplation is losing its meaning in the digital age but, as Neves (2019) points out referring to cinema, this has now become the mode of consumption of younger generations. The capacity (and need) for the abstraction of reality, to perceive the cinematic atmosphere (filmic and spatial), will depend on the personal experience of the viewer, but will nevertheless persist. In fact, the study *Los españoles y el cine* (AMC Networks International Southern Europe, 2021) found that Spanish consumers prefer to watch films in the company of others.

Movie theaters must transform themselves to offer added value to the consumer experience, with greater emphasis on virtual and augmented reality (Ayanbadejo, 2020, 15; Hadida et al. 2021, 233), digital channels for data collection and interactivity (Halinan and Reynolds, 2021) and the personalization of cinema offerings

(Linares-Palomar and Baraybar-Fernández, 2017). Meanwhile, cinemas are already transcending their traditional role, providing spaces for filming, private screenings, private events and even broadcasting live performances (ballet, opera, concerts, etc).¹⁷ Movie theaters must adapt to what the consumer experience requires.

Given the changes brought by the pandemic, and the challenges of competing on-line platforms, we will analyze the persistence in sales of the Spanish movie theaters.

Our review of existing literature found no papers investigating the Spanish film industry from a time series viewpoint or the impact of exogenous shocks like the Covid 19 pandemic. These are in fact the main objectives of this work, formulated in the following hypotheses:

- I. Shocks to the Spanish cinema sector are transitory, diminishing by themselves over time, versus the alternative,
- II. Shocks to the Spanish cinema sector are permanent, requiring decisive action to recover their original trends.

In addressing these hypotheses we use fractional integration techniques, briefly explained in the following section.

Methodology. A fractional framework

The study relies on historical data and makes use of time series techniques based on fractional integration. This method is based on the idea that a series (e.g., x_t , $t = 1, 2, \dots$) may require a number of differences to render it stationary, and this number of differences may be a fractional value. In other words, a time series is said to be fractionally integrated, or integrated of order d , and denoted as $I(d)$, if it can be expressed as:

$$(1 - B)^d x_t = u_t, \quad t = 1, 2, \dots, \quad (1)$$

where B is the backshift operator, i.e., $B^k x_t = x_{t-k}$, and u_t is integrated of order 0 or $I(0)$, also denoted short memory, which is a covariance stationary process where the spectral density function is positive and finite at the zero frequency, possibly displaying weak autocorrelation as in Auto Regressive Moving Average (ARMA) models. The parameter d can be any real value, including potential fractional numbers. Moreover, the fractional structure in (1) is fairly general and includes, as cases of particular interest, the classical stationary and nonstationary models when $d = 0$ and 1 respectively. Following the standard literature on unit root models (Bhargava, 1986; Schmidt and Phillips, 1992; and others) we allow for deterministic terms; thus, x_t in (1) can be the errors in a regression model of form:

$$y_t = \alpha + \beta t + x_t, \quad t = 1, 2, \dots, \quad (2)$$

where y_t represents the observed data, in our case, total monthly revenues, and α and β are the unknown coefficients referring respectively to an intercept (i.e., a constant) and a (linear) time trend.

In the context of $I(d)$ models, the differencing parameter d plays a crucial role in noting that the polynomial in the left-hand-side in (1) can be expressed in terms of its Binomial expansion, such that for any real value d ,

$$(1 - B)^d = \sum_{j=0}^{\infty} \binom{d}{j} (-1)^j B^j = 1 - dB + \frac{d(d-1)}{2} B^2 - \dots,$$

and thus, Eq. (1) can be expressed as

$$x_t = dx_{t-1} - \frac{d(d-1)}{2} x_{t-2} + \dots + u_t,$$

implying that the higher the d value, the higher the level of association between observations, even if they are far apart in time. On the other hand, (1) also admits a $MA(\infty)$ representation, and d values below 1 imply mean reversion or transitory shocks,

unlike $d \geq 1$ indicating a lack of mean reversion and permanency of shocks.

The estimation is conducted via the Whittle function using a testing approach developed by Robinson (1994) and expressed in the frequency domain (see, e.g., Gil-Alana and Robinson 1997).

As mentioned above, the two hypothesis, (I) and (II), are tested based on fractional integration. Thus, if the order of integration, d , is smaller than 1, shocks will have a transitory nature; if d is equal to or higher than 1, shocks are permanent in nature.

In the empirical application carried out in Section 5, we consider the following model,

$$y_t = \alpha + \beta t + x_t, \quad (1 - L)^d x_t = u_t, \quad t = 1, 2, \dots, \quad (3)$$

and based on the monthly nature of the series under investigation, we suppose u_t follows a seasonal (monthly) AR process of the form,

$$u_t = \phi u_{t-12} + \varepsilon_t, \quad t = 1, 2, \dots, \quad (4)$$

where ε_t is a white noise process. Allowing higher AR and MA orders in the specification of the seasonal model in (4) did not alter the main conclusions reported in the paper.

Note that the specification given by Eq. (3) is very general and would include the classical ARMA and ARIMA models when $d = 0$ and 1 respectively if u_t in (3) is in fact an ARMA model. However, as mentioned, a seasonal AR process as in (4) seems to be sufficient to describe the time dependence, noting that since d may be any real value, the time structure may be almost fully described by the fractional process. Note that the polynomial in L in Eq. (3) can be expressed for any real value d in terms of its Mc Laurin's form:

$$(1 - L)^d = \sum_{j=0}^{\infty} \binom{d}{j} (-1)^j L^j = 1 - dL + \frac{d(d-1)}{2} L^2 - \dots$$

and then, x_t can be expressed in terms of both infinite AR and MA processes, in the latter case with the coefficients decaying hyperbolically to zero.

Data

The data corresponds to the total monthly revenues in euros, both for Spanish and foreign cinemas. We also use data on market share to determine how much revenue corresponds to feature films from Spain, the European Union (including United Kingdom in 2020 and 2021, despite Brexit),¹⁸ the United States, Latin America and other countries.

The period ranges from January 2008 to December 2021, analyzing the influence of the Covid-19 shock and how the data behaved in previous shocks, such as during the financial crisis of 2008. Based on the results, possible alternative future scenarios are also proposed.

The dataset was obtained directly from the website of the Ministry of Culture and Sport of Spain, specifically from data and statistics on cinema exhibition collected in the Film Yearbook,¹⁹ published periodically by the Institute of Cinematography and Audiovisual Arts (ICAA).

The year 2020, with historical lows due to the pandemic, especially in the months of February and March, had a negative impact on the box office trends. These minimums reflect quantities at a global level, since Latin America has a lower contribution to the total box office, followed by "other countries". Spain and the rest EU have a very similar behavior, with a mean of approximately 6-7 million (see descriptive statistics in Table 1). Finally, as expected, the US showed the highest gross figures, accounting for the greatest contribution to the Total Box Office.

Table 2 shows the almost perfect correlation between total revenue and the US, although Spain and the rest EU also have a

very high correlation. The three cinema sectors also have a very high correlation with each other, with similar behavior. The same is the case with Latin America and Other countries, showing a high correlation with each other, although in this case figures are low or very low in terms of global figures. In fact, there is no correlation between the year and these two groups. There is a negative correlation in the case of the US, Spain and the rest EU; that is, the cinema revenues decrease year after year, with a lower correlation found, curiously, in the case of Spain. Therefore, although the revenue of national films also decreased, this decrease was smaller, perhaps indicating greater loyalty on the part of national cinema consumers.

Empirical results

In order to determine the impact of Covid-19 on the film industry in Spain, we start by presenting the results with the data ending at December 2019, a few months before the first cases appeared in Spain. Tables 3 and 4 refer to the original data, while Tables 5 and 6 present their corresponding logged values.

The estimates reported in Tables 3 and 5 correspond to the differencing parameter d in Eq. (3) and its associated 95% confidence band, under the three classical assumptions in the context of unit root models, i.e., (i) with no regressors, i.e., imposing $\alpha = \beta = 0$ in (3); (ii) including a constant (i.e. with $\beta = 0$ in (3)); and (iii) including a constant and a linear time trend, and we report in bold in the tables the selected specification for each series depending on these terms. Tables 4 and 6 report the estimated parameters for these selected models.

Starting with the original data, we observe that the time trend is not required in any single case, while the intercept is statistically significant in all cases. Focusing on the estimated values of the differencing parameter, d , we observe that the values are all within the interval (0, 1) supporting long memory, mean reversion and fractional integration; however, we also observe a large degree of heterogeneity across the series, with d values ranging from low values in the case of the US (0.28), medium values in case of Spain (0.41) and the EU (0.46), with the highest values corresponding to Latin America (0.59) and Others (0.60). Overall, in the aggregate data, the estimate of d is approximately 0.16, which is clearly influenced by the US data.

Tables 5 and 6 are similar to Tables 3 and 4 but referred to the logged data. The conclusions are the same, with the lowest level of persistence found in the case of the US ($d = 0.28$), followed by Spain (0.48) and the EU (0.51) and highest values in Latin America (0.62) and Others (0.74). In all series the estimates of d are in the interval (0, 1) supporting long memory ($d > 0$), fractional integration (fractional d) and reversion to the mean ($d < 1$).

Thus, according to these preliminary results, long memory and fractional integration take place in all series, with the orders of integration ranging in the interval (0, 1) in all cases. Thus, mean reversion occurs in all series, although the degree of adjustment of the shocks differs from one series to another. The highest degree of dependence, and thus the longest effects of shocks, are found in Latin American and Other regions, while the lowest and thus most transitory shocks occur in case of the US and total data. According to these results, a negative shock in the data, caused for example by the pandemic should have worse (longer lasting) consequences in case of Latin America and Others than in the US.

Looking at the influence on the Covid 19 pandemic, we replicated our results but with the data ending in December 2021. Tables 7 and 8 refer to the original data, while Tables 9 and 10 to the logged transformed values.

Starting with the original data, we observe that the time trend is now required only in case of the US data with a significant time trend coefficient. Seasonality is also relevant in

Table 1 Descriptive statistics.

	Spain	Rest EU	US	Latin America	Other countries	Total Box Office
N	168	168	168	96	168	168
Mean	6.80	6.70	7.38	4.72	5.95	7.56
Std. Deviation	0.49	0.51	0.53	0.60	0.50	0.51
Minimum	2.52	2.33	2.86	0.68	1.90	3.13
Maximum	7.19	7.15	7.78	5.34	6.60	7.93

Log10-transformed data. Source: the authors, based on collected data.

Table 2 Correlation matrix.

	Year	Spain	Rest EU	US	Latin America	Other countries	Total box office
Year	P.	1	-0.279**	-0.474**	-0.527**	0.133	-0.007
	Sig.		0.000	0.000	0.000	0.197	0.929
Spain	P.	-0.279**	1	0.807**	0.723**	0.372**	0.351**
	Sig.	0.000		0.000	0.000	0.000	0.000
Rest EU	P.	-0.474**	0.807**	1	0.811**	0.561**	0.171*
	Sig.	0.000	0.000		0.000	0.000	0.027
US	P.	-0.527**	0.723**	0.811**	1	0.300**	0.054
	Sig.	0.000	0.000	0.000		0.003	0.486
Latin America	P.	0.133	0.372**	0.561**	0.300**	1	0.735**
	Sig.	0.197	0.000	0.000	0.003		0.000
Other countries	P.	-0.007	0.351**	0.171*	0.054	0.735**	1
	Sig.	0.929	0.000	0.027	0.486	0.000	
Total box office	P.	-0.497**	0.838**	0.884**	0.979**	0.389**	1
	Sig.	0.000	0.000	0.000	0.000	0.000	
N	168	168	168	168	168	168	

P. = Pearson's correlation. Sig. = Sig. (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). Source: the authors, based on collected data.

Table 3 Estimates of the differencing parameter: Data ending at December 2019.

Series (original data)	No terms	An intercept	An intercept and a time trend
SPAIN	0.52 (0.37, 0.70)	0.41 (0.27, 0.61)	0.41 (0.26, 0.61)
EU	0.58 (0.45, 0.73)	0.46 (0.33, 0.63)	0.45 (0.32, 0.63)
USA	0.53 (0.41, 0.68)	0.28 (0.18, 0.42)	0.28 (0.18, 0.42)
LATIN AMERICA	0.60 (0.40, 0.86)	0.59 (0.42, 0.84)	0.59 (0.42, 0.84)
OTHERS	0.63 (0.53, 0.76)	0.60 (0.51, 0.72)	0.60 (0.51, 0.72)
TOTAL	0.50 (0.36, 0.66)	0.16 (0.04, 0.33)	0.16 (0.04, 0.33)

We report the estimates of d in Eq. (3). In parenthesis, the 95% confidence bands for the values of the differencing parameter. In bold, the values corresponding to the selected model for each series. Source: the authors, based on collected data.

Table 4 Estimated coefficients of the selected models in Table 3.

Series	d (95% band)	Intercept (t-value)	Seasonal AR
SPAIN	0.41 (0.27, 0.61)	7783661.67 (8.16)	0.288
EU	0.46 (0.33, 0.63)	66951718.90 (7.07)	0.290
USA	0.28 (0.18, 0.42)	34510708.34 (16.44)	0.510
LATIN AMERICA	0.59 (0.42, 0.84)	70021.843 (3.85)	-0.071
OTHERS	0.60 (0.51, 0.72)	1131487.75 (3.40)	0.391
TOTAL	0.16 (0.04, 0.33)	50108923.31 (27.87)	0.520

The second column reports the estimates of the differencing parameter d in Eq. (3) along with their 95% confidence bands. The values in column 3 are the intercept (i.e., α in Eq. (3)) and its corresponding t-value, while the last column reports the seasonal AR coefficient (i.e., ϕ in Eq. (4)). Source: the authors, based on collected data.

this series as well as for the total series. Focusing on the d values, we observe that the estimated values of the differencing parameter are now homogeneous across all series, with the values ranging in the interval from 0.54 (EU) to 0.65 (Latin America). In case of the logged values (Tables 9 and 10) the same conclusions hold though now the decreasing trend in the

US data is not significant, and the estimated d values are slightly higher, ranging from 0.63 (Latin America) to 0.72 (USA).

Thus, the results show that the Covid-19 pandemic increased the level of dependence in the series, showing a substantial increase in the degree of integration especially in case of the US.

Table 5 Estimates of the differencing parameter: Data ending at December 2019.

Series (logged data)	No terms	An intercept	An intercept and a time trend
SPAIN	0.96 (0.85, 1.11)	0.48 (0.33, 0.67)	0.48 (0.33, 0.68)
EU	0.96 (0.85, 1.11)	0.51 (0.38, 0.68)	0.50 (0.37, 0.68)
USA	0.97 (0.86, 1.11)	0.28 (0.19, 0.42)	0.29 (0.19, 0.42)
LATIN AMERICA	0.92 (0.78, 1.13)	0.62 (0.43, 0.88)	0.62 (0.43, 0.88)
OTHERS	0.96 (0.85, 1.10)	0.74 (0.64, 0.89)	0.74 (0.64, 0.89)
TOTAL	0.96 (0.85, 1.11)	0.14 (0.03, 0.30)	0.14 (0.02, 0.30)

We report the estimates of d in Eq. (3). In parenthesis, the 95% confidence bands for the values of the differencing parameter. In bold, the values corresponding to the selected model for each series.

Table 6 Estimated coefficients of the selected models in Table 5.

Series	d (95% band)	Intercept (t-value)	Seasonal AR
SPAIN	0.48 (0.33, 0.67)	15.8116 (111.62)	0.357
EU	0.51 (0.38, 0.68)	15.6896 (98.51)	0.360
USA	0.28 (0.19, 0.42)	17.3285 (270.79)	0.534
LATIN AMERICA	0.62 (0.43, 0.88)	11.1330 (45.52)	0.117
OTHERS	0.74 (0.64, 0.89)	13.9358 (48.02)	0.339
TOTAL	0.14 (0.03, 0.30)	17.7053 (526.09)	0.552

The second column reports the estimates of the differencing parameter d in Eq. (3) along with their 95% confidence bands. The values in column 3 are the intercept (i.e., α in Eq. (3)) and its corresponding t-value, while the last column reports the seasonal AR coefficient (i.e., ϕ in Eq. (4)). Source: the authors, based on collected data.

Table 7 Estimates of the differencing parameter: Data ending at December 2021.

Series (original data)	No terms	An intercept	An intercept and a time trend
SPAIN	0.62 (0.51, 0.78)	0.56 (0.44, 0.71)	0.55 (0.42, 0.71)
EU	0.62 (0.52, 0.77)	0.54 (0.44, 0.68)	0.52 (0.41, 0.68)
USA	0.70 (0.60, 0.83)	0.58 (0.49, 0.71)	0.58 (0.49, 0.71)
LATIN AMERICA	0.64 (0.47, 0.89)	0.65 (0.48, 0.93)	0.65 (0.49, 0.93)
OTHERS	0.62 (0.52, 0.77)	0.60 (0.50, 0.74)	0.60 (0.50, 0.74)
TOTAL	0.67 (0.57, 0.81)	0.55 (0.45, 0.67)	0.52 (0.42, 0.66)

We report the estimates of d in Eq. (3). In parenthesis, the 95% confidence bands for the values of the differencing parameter. In bold, the selected model for each series. Source: the authors, based on collected data.

Table 8 Estimated coefficients of the selected models in Table 7.

Series	d (95% band)	Intercept (t-value)	Trend (t-value)	Seasonal
SPAIN	0.56 (0.44, 0.71)	6974448.1 (4.66)	-	0.260
EU	0.54 (0.44, 0.68)	6382407.2 (5.39)	-	0.267
USA	0.58 (0.49, 0.71)	387941440.2 (6.40)	-155648.27(1.7)	0.432
LATIN AM.	0.65 (0.48, 0.93)	69229.40 (2.97)	-	-0.217
OTHERS	0.60 (0.50, 0.74)	1127377.5 (2.91)	-	0.233
TOTAL	0.52 (0.42, 0.66)	55087608.9 (6.62)	-197340.73 (-1.77)	0.448

The second column reports the estimates of the differencing parameter d in Eq. (3) along with their 95% confidence bands. The values in column 3 are the intercept (i.e., α in Eq. (3)) and its corresponding t-value, while the last column reports the seasonal AR coefficient (i.e., ϕ in Eq. (4)). Source: the authors, based on collected data.

Table 9 Estimates of the differencing parameter: Data ending at December 2021.

Series (logged data)	No terms	An intercept	An intercept and a time trend
SPAIN	0.92 (0.80, 1.09)	0.67 (0.48, 0.96)	0.67 (0.47, 0.96)
EU	0.93 (0.81, 1.09)	0.67 (0.49, 0.96)	0.67 (0.47, 0.96)
USA	0.94 (0.82, 1.10)	0.72 (0.54, 0.99)	0.71 (0.53, 0.99)
LATIN AMERICA	0.87 (0.70, 1.14)	0.63 (0.37, 1.09)	0.63 (0.35, 1.09)
OTHERS	0.92 (0.80, 1.09)	0.65 (0.46, 0.95)	0.65 (0.46, 0.95)
TOTAL	0.94 (0.82, 1.10)	0.69 (0.51, 0.98)	0.69 (0.50, 0.98)

We report the estimates of d in Eq. (3). In parenthesis, the 95% confidence bands for the values of the differencing parameter. In bold, the selected model for each series. Source: the authors, based on collected data.

Table 10 Estimated coefficients of the selected models in Table 9.

Series	d (95% band)	Intercept (t-value)	Trend (t-value)	Seasonal
SPAIN	0.67 (0.48, 0.96)	15.692 (21.05)	-	0.032
EU	0.67 (0.49, 0.96)	15.633 (20.92)	-	0.038
USA	0.72 (0.54, 0.99)	17.363 (22.96)	-	0.060
LATIN AM	0.63 (0.37, 1.09)	11.040 (11.65)	-	-0.074
OTHERS	0.65 (0.46, 0.95)	13.845 (18.72)	-	0.040
TOTAL	0.69 (0.51, 0.98)	17.688 (23.17)	-	0.060

The second column reports the estimates of the differencing parameter d in Eq. (3) along with their 95% confidence bands. The values in column 3 are the intercept (i.e., α in Eq. (3)) and its corresponding t-value, while the last column reports the seasonal AR coefficient (i.e., ϕ in Eq. (4)). Source: the authors, based on collected data.

Finally, it is difficult to compare these results with those of other studies given the lack of similar research conducted into the persistence of Spanish film industry or with unit root methods and the fractional integration approach used in this work.

Discussion and conclusions

The initial objectives of this study were achieved through the literature review, which highlighted the importance of Hollywood cinema in the Spanish theater sector (O1), and highlighting the impact of OTT platforms during the Covid-19 pandemic (O2). The O3 has also been achieved, as shown in the empirical results which indicate that, based on pre-Covid data, longer effects of shocks and thus stronger measures should be adopted for Latin America and Other countries compared to the US and Spain. However, with Covid-19 there was a substantial increase in the degree of persistence in all cases, showing larger degrees of persistence and thus, longer effects of shocks.

Prior to Covid-19, the US and Spain series were less persistent, allowing for recovery after a negative shock. After the pandemic, all the series are highly persistent. In the event of a new shock, the effect would be equally long-lasting in all series.

The data shows a change in paradigm that responds to the initial questions: Spanish and US releases are no longer enough for economic recovery in terms of cinema box office receipts, thus making the traditional business model obsolete. As we have seen, saw previously, Covid-19 has accelerated and consolidated existing trends and the results reaffirm previous scenarios: (1) customer centric: the user decides what, when and how to watch (Neira, 2020a; Neira, 2021a); (2) former filmgoer: digital entertainment as a response to the combination of Price Sensitivity, Low Experiential Value and Safety Concerns (Quorum, 2021); and (3) margin per product is sacrificed in favor of constant monthly revenues (Neira, 2022a).

Companies enter an “experimentation mode” (Neira, 2021a), oriented towards new profitability for exhibition, alternating between and combining four models (Clark, 2021; Neira, 2022b): Theatrical (exclusive exhibition in theaters shortened from 90 to 45 days), day-and-date Premier Access (simultaneous release in cinemas and on streaming platforms with cost markup), Pay One (streaming as the primary channel with prior payment), and direct release on streaming platforms.

National theater releases no longer respond to a specific chronology of release but rather on various different scenarios that we can complete here: 1) US blockbusters that boost theater attendance (Katz, 2021), and 2) Spanish films (or others), whose profitability depends on theater exhibition, leading to releases with very different results (Clark, 2021); this is especially the case with mid-budget films which are released directly on OTT. Thus, there is a clash between “commitment institutional logic” and “convenience institutional logic” (Hadida et al. 2021), especially when technology giants like Amazon, Apple or Roku buy studios and theaters to improve or maximize their content (Jarvey, 2022).

Given the results, there are several future scenarios for Spanish movie theaters:

- The principal strategy is for Spanish movie theaters to gain market share in the release of mid-budget films (principally US films).
- To define policies focused on: 1) the regulation of OTT, creating a legal framework for the broadcast of audio-visual content under the supervision of regulatory agencies of each country, for example Ofcom in the UK (n.d.); 2) attracting audiences to return to cinemas through movie-passes or culture vouchers (Ministry of Culture and Sport n.d.b.); 3), burnishing the Spanish brand through marketing campaigns that raise the perceived value in the eyes of consumers. It can be underlined here the educational projects and EU programs that aid in the recovery and viability of cinemas, positioning them as venues not only for film exhibition but also for social, cultural and artistic events (Wilkinson, 2021).
- To expand into additional sources of revenues, as in the case of Southern Theaters (Fuster, 2021) which created its own streaming service to encourage movie rentals, positioning itself between theater and digital exhibition; or AMC with the sale of NFT associated to large releases (Neira, 2021d).

To sum up, these strategies point the way towards a new philosophy where the number of spectators or subscribers ceases to be the only metric of success, engaging other aspects such as monetization, retention and customer lifetime value (Jarvey, 2022).

This work has a number of limitations. For example, the use time series that focus exclusively on the Spanish market. Moreover, given the lack of monthly data on the market shares of the different cinema products, the respective annual market share of each year was applied across all months to establish the data series used in the paper. In addition, the methodology employed, and based on Eq. (3), can be extended to allow for potential non-linear structures within the context of fractionally integrated models, noting that these two issues are closely related. Research in this direction is currently being conducted.

Data availability

Datasets are available from the Ministry of Culture and Sport (n.d.a.). The authors wish to thank the Ministry of Culture and Sport for their collaboration in sharing data before publication.

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Notes

- ¹ *Tenet* was the highest-grossing film during the pandemic until surpassed by *Godzilla vs Kong* (2021), released not only in theaters but also in *streaming* (García 2021).

- 2 While there was an extra change for *Mulan* on Disney +, this was not the case with *Soul* (McClintock 2020). In the case of *Wonder Woman 1984*, as noted by Neira (2020a), Warner did not want to take the risk of a traditional theatrical release and opted for various channels (simultaneous theatrical and platform release).
- 3 The information drawn from a study by the consultant Simon-Krucher.
- 4 Data from 2019.
- 5 Eliashberg et al. (2006, 653-54) note how horizontal integration began in the 1990's in the United States, and that changes in the concentration of business models are not exclusive to the Spanish market.
- 6 To this can be added the drop in films and screens in the first decade of the 21st century (Pérez 2013), although there are also theaters using a co-operative, self-managing model, concerned not only about financial viability but also the cultural level of the films exhibited (see Heredero & Reyes, 2018).
- 7 Miller et al. (2015) highlight the obligation of exhibitors to acquire films by lot rather than specific films: "This economy of scale erects barriers to entry for competition in distribution allowing them to force foreign exhibitors to make block reservations: you can only get a *Spielberg* film if you also agree to take Jean-Claude Van Damme" (197).
- 8 The author cites Augros (2000) in explaining the domination of the market within the given parameters.
- 9 The author cites various studies on the development and contrasting ideas on the narrative value of the blockbuster.
- 10 Mainstream culture is important not only in generating financial returns but also in terms of cultural exchange and audio-visual literacy, as explained by Ferreras and Hernández (2018).
- 11 The study is solely of India.
- 12 Preprint. Non-revised paper.
- 13 Audience or potential audience restrictions, who in turn or more likely to consume cinema by other means, reinforces this aspect. Among those not attending the cinema express a lack of interest in other restrictions.
- 14 The author also notes other alliances, such as HBO Max with Warner Media.
- 15 Wayne (2021) states that this lack of transparency, in the case of Netflix, is due to its disruptive model of audience measurement, which is typical of a new idiosyncrasy, where Netflix is the one who determines, according to its criteria, the success or failure of its content.
- 16 Even new platforms are launched. For example, Raats and Evens (2021) analyse the platform Streamz, launched in Belgium but which needed an alliance with a global OTT such as HBO to offer a larger catalogue.
- 17 For example, see the options available at Cinesa (n.d.) in events, as well as in its Luxe and Business modalities. Fuster (2021) and Neira (2021c; d) also explain other sources for the theaters.
- 18 In the dataset of 2020 and 2021, the items from the European Union and the United Kingdom were combined.
- 19 The Film Yearbook includes the "Annual balance of cinematography in Spain, in the fields of production, distribution, exhibition and commercialization" (Ministry of Culture and Sport n.d.a). For the 2021 dataset, we asked directly to the Ministry in april 2022 by e-mail because in that moment it had not been published yet.

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Author contributions

FJG-R: design of the study, theoretical framework, recovery of the dataset, conclusions. LAG-A: design of the study, calculations applied to the dataset, results. MH-H: design of the study, calculations applied to the dataset, results, conclusions. RA-C: design of the study, revision of the study, conclusions.

Competing interests

The authors declare no competing interests.

Ethical statement

Ethical approval was not required as the study did not involve human participants.

Informed consent

Informed consent was not required.

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