ORIGINAL ARTICLE

Attracting new audiences to high culture: an analysis of live broadcasted performing arts at cinema theaters

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Abstract
The aim of this paper is to analyze the potential contribution of broadcasting live performing arts in movie theaters to the democratization of high culture. To accomplish this, we analyze the profile of attendees to these events to explore whether this new form of cultural consumption can attract individuals who do not normally attend live performances, thereby renewing high-brow audiences. Using data from the Spanish Survey of Cultural Habits and Practices in Spain (2018–2019), we find that individuals who frequently attend movies are more likely to attend live opera broadcasts in movie theaters, even those who do not consume live opera or even do not listen to opera at all. This is a positive insight suggesting that this initiative may be successful to engage new audiences to high culture.

1 Introduction

Cultural consumption is unevenly distributed among the population, and cultural practices have traditionally varied across income and education levels. Moreover, these disparities tend to be more pronounced in highbrow cultural consumption (Almeida et al., 2020). With the introduction of new technologies, cultural managers and policy makers hope that increased access to digital contents will foster the

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democratization of culture, reducing these inequalities. This would be the case if the digital option reached certain groups whose levels of consumption have so far been low, as observed by Ateca-Amestoy and Castiglione (2016). By increasing accessibility to cultural contents, new technologies may help to remove certain barriers that limit cultural consumption, mainly economic and supply restrictions. However, at the same time, new barriers are likely to arise, such as those related to access to new technologies and digital skills. As argued by Mihelj et al. (2019) and De la Vega et al. (2020), digitalization may just increase consumption of those who already consume live culture, not attracting new consumers and, possibly, reinforcing patterns of inequality in access to culture (Weingartner, 2021). Therefore, bringing new digital consumers to live consumption may be more difficult than some optimistic analysts think and, consequently, could be a major challenge facing the cultural sector.

Although the digitalization of cultural contents has changed cultural consumption patterns and transformed the nature of the main cultural industries (music, publishing, audiovisual and videogames), new technologies have had an important but lower impact on more traditional cultural sectors, such as visual and performing arts. For many traditional cultural institutions, new technologies are a mere instrument to keep their business almost as usual. Even if they may, for instance, have an online booking and ticket sales system or a more functional webpage, most of their revenues are still linked to traditional channels. Previous evidence has found some degree of complementarity between live and digital engagement with performing arts and heritage institutions, suggesting that digitization of cultural contents has not contributed to changing the profile of consumers but rather reinforces consumption patterns, increasing the divide between different groups of cultural consumers (see, for instance, Evrard and Krebs (2018) for the Louvre Museum in Paris, De la Vega et al. (2020) for highbrow performing arts in Spain or Ateca-Amestoy (2019) for heritage institutions in the UE). Nevertheless, a bunch of highbrow institutions have been able to break the old paradigm and use new technologies to design new ways to reach new publics and increase revenues.

The Metropolitan Opera House in New York is a good example of how a first mover can take advantage of new technologies in the cultural industry to create and develop a brand-new market in highbrow culture, namely live opera performances broadcasted in high-definition to movie theaters. Its success is so impressive that, even during the 2019–20 season, highly affected by the lockdown and the Covid-19 pandemic, the MET obtained more than 17 million dollars in operating revenues from HD Theatrical broadcastings and, more importantly, reached an additional audience of more than 1.5 million people all over the world (MET annual report, 2020). This may be seen as a way of democratizing and popularizing opera, since supply constraints and prices faced by consumers, despite many declarations of intent to achieve social inclusion in highbrow culture made by cultural policymakers, remain too high for the disadvantaged groups (Albinsson, 2021). Moreover, since in this case cultural content is delivered without the need for consumers to know how to handle these new technologies, the digital divide is not relevant and the fears of Mihelj et al. (2019) or De la Vega et al. (2020) might be unfounded.

In any case, appreciation of more complex art forms, such as opera, requires a certain endowment of cultural capital that differs across socioeconomic groups

(Bourdieu, 1985; Notten et al., 2015; Suarez-Fernandez et al., 2020). One of the main means by which tastes for the arts are formed is education, which also helps to overcome psychological barriers (Towse, 2011). Indeed, empirical analyzes systematically find that attendance to opera, theater and other arts events is significantly higher among more educated individuals (O'Hagan, 2017; Suarez-Fernandez et al., 2020). This makes the demand for high-culture much lower than for popular culture, with consumers having to allocate their leisure time between alternative uses, but under increasing pressure from a virtually unlimited digital supply of popular culture.

In this paper we investigate the profile of consumers attending live performances in movie theaters using digital distribution channels. In particular, we analyze whether individuals attending live operas at cinemas are traditional opera consumers, with a taste for the opera already developed and the cultural capital needed to appreciate this form of art, or whether there are new consumers, who are familiar with going to the cinema theaters and do not have to face an emotional barrier that might exist when visiting opera houses (i.e., the traditional venue). Although it is likely that these individuals still face an intellectual barrier, as Towse (2011) argues, information technology may be used to provide information about "the theater, the production, cast, rehearsing and so on", that could lead to wider appreciation of opera. Therefore, our aim is to check whether this new form of opera consumption contributes to democratize its consumption.

Using data from the last wave of Survey of Cultural Habits and Practices in Spain (SCHP 2018–2019), we find that individuals who go to the movies more often are also more prone to attend live performances broadcasted in movie theaters. More interesting, this result holds for the subsample of individuals who do not attend live opera or who do not listen to opera at all, suggesting that the use of new technologies to deliver opera in cinema theaters may be an effective tool to bring new audiences to highbrow culture.

The remainder of the article is structured as follows. Section 2 outlines the background of the research question while Sect. 3 introduces the database used. Section 4 presents the empirical specification, and the most relevant results are displayed in Sect. 5. The final section concludes by discussing the main results and the policy implications of this research.

2 Background

The need to finance and promote culture is much larger when there is no industry behind to produce, market and profit from it. This could be especially true in the case of opera and other highbrow performing arts whose consumption is not so popular. In the second half of the twentieth century, the cost disease and the fall in the demand for opera, associated to a strong competition with other entertainment activities, led opera to rely heavily on direct public subsidies on final prices and production and, in the Anglo-Saxon model, to the existence of tax benefits associated with public and private initiatives. In any case, direct and indirect public funds were key for opera survival in many cities.

However, private initiative can also help to facilitate access to these cultural manifestations if profits can be obtained. In fact, that happened when technological developments enabled high-quality broadcasts of live real-time performances in a range of venues around the world (Throsby & Bakhshi, 2010). Producers have benefited from the increasing miniaturization of digital cameras and microphones, which are also more powerful and less expensive (Pavlik, 2005). Digital technology and robotics allow instantaneous computer-based processing of live performances, where cameras track, pan, zoom, or cut almost every aspect of the production and audience (Heyer, 2008), creating a closer experience to a live performance than traditional broadcasting. These developments, together with the progressive digitalization of cinema theaters, allow for a reduction in the broadcasting costs of live performances.

All this takes place in a context in which movie theaters need alternative content, as the demand for cinema in terms of number of tickets has stagnated or even declined in most Western countries during the last 20 years, leading to a severe underutilization problem, with theaters operating, on average, at half capacity during Sunday peak hours (Weinberg et al., 2021).

When the Met started to broadcast live in 2006, this was a completely new market that also required high reputation for the opera house producing the broadcasted plays to attract potential attendants to a mix of live and digital performances. Obviously, the Metropolitan was an opera house that clearly met this requirement and is now an example of success in creating and developing a new business model for the opera that uses new technologies to digitally broadcast its operas to more than 70 countries. Similar initiatives were followed by other renowned institutions, such as the Royal Opera House in London or the Vienna State Opera, all stating that their main motivation was to reach a wider audience and to give visibility and publicity to opera. In addition to achieving these aims, these initiatives are also bringing new revenues to these institutions (Tuck & Abrahams, 2015).

Attending broadcast live performances can be considered a mixture of traditional performing arts consumption (people going out to the theater for a live performance) and modern digital consumption (using HD digital distribution means). Although live opera may be considered an irreplaceable product, Attard (2022) provides evidence that "opera cinema is deliberately constructed and sold as the next-best-thing to the stage". The opera cinema is described in the BBC[1] as an exhilarating alternative to live opera, where the atmosphere is perfectly captured, with ambient noise from the opera house. The audience can see the performers in close up and appreciate details that would miss in even the best seats in the house. Evidence of this is the fact that the standard practice of clapping in opera houses is carried over to opera cinema (Attard, 2022). This experience is further enriched by the additional content offered in the intermissions, featuring a behind-the-scenes look at the production with live interviews with performers and opera directors, as well as moments of narrative explanation and previews of coming productions.

The key question is what types of audiences opera broadcast in cinema theaters would attract. The "rational addiction model" (Stigler & Becker, 1977) assumes that

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[1] Burton-Hill (2015).

there is a significant inertia in cultural consumption, such that past consumption of cultural goods has a positive effect on current consumption. Being this true, opera attendance at cinema theaters could be a way of satisfying traditional consumers' demand for opera, but also a gateway to highbrow cultural consumption if cinema consumers decide to attend opera at their local movie theaters. In this regard, audience surveys conducted in the US and UK show that opera cinema had little effect on audience diversification in terms of age and socio-economic characteristics (Attard, 2022).

A related issue is how to attract new audiences to live-streamed operas in cinema theaters. De la Vega et al. (2020) suggest that, given the strong complementarity between different types of cultural consumption channels, traditional cultural organizations could benefit from running online promotions of their live cultural products. In our case, this would be similar to the use of on-site physical promotions in cinemas to attract moviegoers to live operas.

Movie theaters are excellent places to marketing films to be released by means of posters, trailers and other promotions. And, in fact, distributors have exploited them since the beginning of the industry. Obviously, theaters programming operas on screen also follow this strategy. Hence, regular movie-goers, regardless of their interest in opera, are aware of the operas to be released in the theaters they attend. In view of the potential of these initiatives to attract new publics to high-brow cultural practices, our aim is to test whether it has actually been successful to do so. Therefore, we examine whether people who attend films more frequently in movie theaters are also more likely to attend live broadcasted performing arts in these venues, once live attendance is controlled for.

3 Data and descriptive statistics

To analyze the profile of consumers attending live performances in movie theaters using digital distribution channels, we use data provided by the 2018–19 Survey of Cultural Habits and Practices in Spain (SCHP-2018), conducted by the Ministry of Culture and Sport of Spain. The survey covers the most relevant areas of cultural consumption, including cinema, concerts, theater and opera. Information was collected quarterly between March 2018 and February 2019, in order to capture the expected seasonality of cultural activities during a year. A random population sample was interviewed in each quarter, resulting in a total of 15,455 respondents. The final sample is representative of the Spanish population in terms of gender, age, educational level, employment status, family responsibilities and region of residence. This database is appropriate for our purpose, as it includes information on participation and intensity of consumption of cinema, opera and other performing arts. Specifically, individuals are asked how many times they attended each cultural activity in the last quarter, providing information on frequency of participation. Of particular interest is the question "In the last year, excluding films, have you visited a cinema to attend any other type of recorded or live-streamed performances?", being the possible answers: (a) a concert; (b) other performing arts (opera, etc.); (c) sports event; (d) other performances. We focus on answers given to the "other performing arts" option, as an indicator of attendance to highbrow performances broadcast in cinemas.

The information obtained by visiting the websites of the largest cinemas that broadcast performances in Spain confirms that the majority of live movie theater transmissions are opera representations. Consequently, we consider individuals' declared attendance at live opera as a proxy for attendance to similar live performances. Therefore, the main variables of interest in our analysis are those related to the individual's attendance at live opera, performances broadcast in cinemas, and frequency of cinema attendance. As additional controls, we include a measure of the supply of opera broadcasted in cinemas in the area, socio-demographic variables, health status and self-declared interest in different cultural activities. Table 1 defines all the variables used in the analysis and Table 2 displays the summary statistics for the entire sample.

As aggregate data may not be too informative, Table 3 provides a comparison of the profile of *new* consumers (those who only attend opera at the cinema) with *traditional* consumers (only attend live opera) and *omnivores* (attend opera both live and at the cinema). *New* consumers, who can be considered the new audiences due to live broadcast opera, do not differ significantly from those who already consume opera in terms of gender, age, marital status or the number of children at home. These results are similar to those found in survey studies (Attard, 2022). However, *new* consumers in our data are less likely to have tertiary education, suggesting that opera broadcast in cinemas attracts less educated audiences. Additionally, the *new* audience group includes a higher proportion of employees and people with serious health limitations than the *traditional* opera group. This may be seen as preliminary evidence that opera broadcast in cinemas has the potential to attract new audiences.

Table 4 provides further evidence that attendants to Live in HD opera are in fact new audiences. The table shows the number of individuals in the sample who report attending live and/or broadcast opera and whether they listen to recorded opera,[2] with their declared interest in opera. According to the data, only 10.6% of individuals who declare attending live opera, also attend broadcast opera in movie theaters. However, it is worth noting that the self-reported interest in opera for this group of people is significantly higher (9.39 to 8.77) than that of those who do not attend broadcast opera (8.12 to 7.18). These figures contrast with data for the US, where most Live in HD viewers are already opera enthusiasts and have previously attended live opera (Shugoll, 2008).

On the other hand, 65.8% of people who attend opera in movie theaters do not attend live opera. Moreover, 57.6% of those who attend opera in movie theaters, neither listen to recorded opera nor attend live opera, and their self-declared interest in opera is significantly lower (4.09) than that of live opera goers and mere listeners (6.95). This means that they are a distinct group from other opera consumers. By attracting this type of new audiences, live opera broadcasting in cinemas could have the potential to enlarge the performing arts audience by bringing a new, less expert audience (Fraser and Fraser, 2013).

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[2] Individuals are asked about the type of music they listened to in physical format or on digital platform in the previous quarter. The list of possible answers covers over 20 music genres.

Table 1 Variable definition and measurement

Name	Definition
Opera at cinema	Dummy: 1 if the respondent attended broadcasted opera in theaters in the last year 0 otherwise
Live opera	Dummy: 1 if the respondent has attended live opera in the last year and 0 otherwise
Cinema 1–Cinema 7	Set of dummy variables capturing the intensity of cinema attendance in the last three months
# Cinemas broadcasting opera	Number of movie theaters broadcasting live opera per million inhabitants in the region
Regional opera season	Dummy: 1 if the region hosts an opera season (4 or more opera productions) and 0 otherwise
Second Education	Dummy: 1 if the respondent completed secondary education and 0 otherwise
Vocational Education	Dummy: 1 if the respondent completed vocational education, 0 otherwise
Tertiary Education	Dummy: 1 if the respondent graduated from a university degree or Postgraduate, 0 otherwise
Female	Dummy: 1 if the respondent is female and 0 otherwise
Age	Respondent's age
Severe health limitation	Dummy: 1 if the person self-reports an illness that severely limits his/her activity, 0 otherwise
Health limitation	Dummy: 1 if the person self-reports an illness that limits his or her activity and 0 otherwise
Self-employed	Dummy: 1 if the respondent is self-employed and 0 otherwise
Employee	Dummy: 1 if the respondent is employed and 0 otherwise
Unemployed	Dummy: 1 if the respondent is unemployed and 0 otherwise
Student	Dummy: 1 if the respondent is student and 0 otherwise
Dependent	Dummy: 1 if the respondent is single, living at home with their parents and 0 otherwise
Singled	Dummy: 1 if the person is single and/or living alone and 0 otherwise
Married	Dummy: 1 if married or in a civil union and 0 otherwise
Dependent children	Dummy: 1 if there are children under 18 residing in the household and 0 otherwise
Int_opera	Self-reported interest in opera, ranges from 0 (no interest) to 10 (maximum interest)
Int_reading	Self-reported interest in reading, ranges from 0 to 10
Int_cinema	Self-declared interest in going to the movies, ranges from 0 to 10
Int_circus	Self-declared interest in the circus, ranges from 0 to 10
Int_bullfighting	Self-declared interest in attending bullfighting events, ranges from 0 to 10
High price	Dummy: 1 if the main reason for non-attendance at the live opera is the price

Table 2 Descriptive statistics

Variable	Mean	St. Deviation
Opera at cinema	0.010	0.101
Live opera	0.033	0.178
Listen opera	0.051	0.220
Cinema 1	0.142	0.349
Cinema 2	0.106	0.308
Cinema 3	0.067	0.251
Cinema 4	0.026	0.158
Cinema 5	0.018	0.133
Cinema 6	0.023	0.150
Cinema 7	0.018	0.134
# Cinemas broadcasting opera	0.625	0.497
Regional opera season	0.541	0.498
Female	0.515	0.500
Second Education	0.426	0.494
Vocational Education	0.178	0.383
Tertiary Education	0.208	0.406
Age	46.500	18.937
Severe health limitation	0.036	0.187
Health limitation	0.159	0.366
Self-employed	0.082	0.274
Employee	0.411	0.492
Unemployed	0.105	0.306
Student	0.093	0.290
Dependent	0.191	0.393
Single	0.185	0.388
Married	0.573	0.495
Dependent children	0.260	0.438
Interest in opera	3.482	3.089
Interest in reading	6.502	2.731
Interest in cinema	6.695	2.792
Interest in circus	3.912	3.019
Interest in bullfighting	2.389	3.204
High price	0.151	0.358

4 Empirical specification

To analyze how the audio-visual sector, specifically the cinema, can contribute to the enhancement of the performing and musical arts, in this case opera, we estimate a model with two simultaneous equations. One equation models the binary decision whether to attend live opera or not, y_{1i}, and the other equation models the binary decision whether to attend performing arts broadcast in

Table 3 Comparison of opera consumer profiles

	New		Traditional		New-Trad Dif.	Omnivorous		New-Omn. Dif.
	Mean	St. Dev	Mean	St. Dev	P-value	Mean	St. Dev	P(diff=0)
Second Ed	0.396	0.492	0.315	0.465	0.135	0.278	0.452	0.153
Vocational Ed	0.198	0.401	0.172	0.378	0.553	0.130	0.339	0.297
Tertiary Education	0.341	0.477	0.465	0.499	0.030	0.574	0.499	0.006
Female	0.604	0.492	0.579	0.494	0.658	0.611	0.492	0.937
Age	47.505	18.307	46.355	17.683	0.573	52.944	16.421	0.075
Severe health limitation	0.033	0.180	0.007	0.081	0.028	0.019	0.136	0.611
Health limitation	0.110	0.314	0.086	0.281	0.466	0.148	0.359	0.503
Self-employed	0.033	0.180	0.099	0.299	0.042	0.056	0.231	0.512
Employee	0.440	0.499	0.421	0.494	0.740	0.333	0.476	0.210
Unemployed	0.077	0.268	0.093	0.290	0.636	0.056	0.231	0.626
Student	0.077	0.268	0.097	0.296	0.551	0.130	0.339	0.302
Dependent	0.220	0.416	0.165	0.372	0.211	0.111	0.317	0.100
Single	0.165	0.373	0.185	0.389	0.649	0.222	0.420	0.394
Married	0.582	0.496	0.593	0.492	0.858	0.648	0.482	0.437
Dependent children	0.253	0.437	0.200	0.401	0.264	0.185	0.392	0.352
N	91		454			54		

New are consumers who only attend opera at the cinema, do not attend live opera and do not listen to opera. *Traditional* are consumers who only attend live opera (not at movie theater). *Omnivorous* are consumers who attend opera both at live and at the cinema. The mean difference tests compare *New* with *Traditional* and *Omnivorous* consumers, respectively

Table 4 Self-declared interest in opera and opera attendance

		Opera at cinema			
		No		Yes	
Live opera		Listen opera	No listen opera	Listen opera	No listen opera
No	Declared interest (mean)	6.952	3.176	7.385	4.088
		(2.737)	(2.927)	(1.805)	(3.101)
	No. individuals	619	14,224	13	91
Yes	Declared interest (mean)	8.115	7.182	9.391	8.774
		(1.655)	(2.336)	(0.839)	(1.477)
	No. Individuals	130	324	23	31

Standard deviations in parenthesis. Declared interest in opera is a categorical variable that takes values between 0 (no interest) and 10 (maximum interest)

cinemas or not, y_{2i}. We propose a bivariate probit model, where both decisions are estimated simultaneously allowing the error terms to be correlated. The specification is as follows:

$$y_{1i}^* = \beta_1 x_{1i} + \varepsilon_{1i}$$

$$y_{2i}^* = \beta_2 x_{2i} + \varepsilon_{2i}$$

where y_{1i}^* and y_{2i}^* are latent variables that reflect (unobserved) preferences for opera broadcast in cinemas and live opera, respectively; x_{1i} and x_{2i} are vectors of explanatory variables; β_1 and β_2 are vectors of unknown parameters to be estimated and the error terms are assumed to be bivariate normally distributed with zero-mean, unit variances and a correlation coefficient ρ. If ρ is equal to zero, the two equations are independent and can be estimated by two separate probit models. But if the correlation turns out significant, whether positive or negative, suggesting that the unobservable elements behind both decisions are correlated, the appropriate estimation procedure is the bivariate probit model.

The binary choice variable y_{1i} takes the value one if the individual has attended the opera broadcast in cinemas and zero otherwise:

$$y_{1i} = \begin{cases} 1 & \text{if the individual has attended the opera broadcast in cinemas } (y_{1i}^* > 0) \\ 0 & \text{otherwise } (y_{1i}^* \le 0) \end{cases}$$

(1)

Similarly, the binary choice variable y_{2i} takes the value one if the individual has attended live opera and zero otherwise.

$$y_{2i} = \begin{cases} 1 & \text{if the individual has attended the live opera } (y_{2i}^* > 0) \\ 0 & \text{otherwise } (y_{2i}^* \le 0) \end{cases}$$

(2)

Since we want to focus on close substitute practices, we exclude mere opera listening, as it could be carried out simultaneously with other domestic activities and the visual component of the performance is not relevant. Regarding the determinants of each equation, we assume that both the decision to attend live opera live and to attend opera broadcast in cinemas depend on a similar vector of covariates. First, we include a set of socio-demographic variables comprising the individual's age, gender, education level, occupation, household composition and self-declared health status. We also use information on the different types of restrictions to cultural consumption faced by the respondents and their self-declared interest in other cultural activities, i.e.,, reading, cinema, circus and bullfighting. While including declared interest in opera would lead to endogeneity problems, we consider individuals' stated preferences for other activities, such as reading, that are strongly related with cultural interest in general (Fernandez-Blanco et al., 2017). Additionally, we include region of residence fixed effects to account for geographic variability.

To identify potential spillover effects associated to the venue and its impact on new opera audiences at cinema theaters, we take advantage of the information regarding traditional movie attendants. As argued above, cinema goers are more

exposed to the information about the operas broadcasted in the theaters they attend. We measure the intensity of this exposure using individual's movie attendance, in an attempt to control for the positive correlation observed in the demand of different cultural goods, that is, the potential high demand for cinema observed for traditional opera consumers.

Finally, in the equation modeling the decision to attend live opera, Eq. (2), we consider whether there is an opera house in region where the individual lives, and the number of movie theaters in the region of residence broadcasting live opera per million inhabitants, as measures of the supply in the area.

5 Results

The results of the estimation of the bivariate probit model for cinema and live opera consumption are shown in Table 5.[3] The value of the correlation coefficient ρ is 0.489 and it is statistically different from zero, suggesting that the estimates obtained from a univariate decision framework are likely to be inefficient. The positive value of ρ indicates that unobserved factors that drive an individual to attend live opera are correlated with an increase in the probability of attending opera broadcast in cinemas. These omitted factors could be related to unobserved preferences, motivation or cultural capital, among others.

Socio-economic characteristics could explain the formation of individual tastes, the availability of time for cultural consumption and budget constraints, and thus affect consumption decisions. Higher levels of education tend to increase the likelihood of attending opera, both live and broadcast in cinemas. The positive correlation between education and cultural consumption, especially high culture, has been repeatedly found in the literature (Suarez-Fernandez et al., 2020; Ateca-Amestoy and Castiglione, 2022). More educated people are more likely to have the cultural capital needed to understand and appreciate highbrow cultural goods.

According to the (slightly) greater self-declared interest in opera by women compared to men,[4] females attending live or broadcast opera represent 60% of the total. However, once we control for other sociodemographic characteristics, we find no significant effect of gender on the probability of attending opera, either live or at the cinema. Moreover, declared interest in opera for those who actually attend live opera does not differ by gender,[5] suggesting that other characteristics (such as education), and not gender, explain engagement in highbrow activities.

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[3] Given our small number of cinema opera attendants, it could be assumed that we are dealing with a "rare event" issue. As a robustness check, we separately estimated each of the equations of the bivariate probit using binary general extreme value models and compared the estimated marginal effects. The results are very similar and can be found in Table 7 in the "Appendix". We are very grateful for one anonymous referee for this suggestion.

[4] The average self-declared interest is 3.91 in the case of women compared to 3.02 for men. This difference is statistically significant at 5 percent.

[5] Conditional on attending cinema opera, the declared interest is 6.50 for females and 5.33 for males; while for those who attend traditional live opera these figures are 7.66 and 7.56, respectively.

Table 5 Estimated bivariate probit model

	Opera at cine		Live opera	
	Coeff.	t-test	Coeff.	t-test
Cinema 1	0.218**	[2.18]	0.283***	[4.24]
Cinema 2	0.327***	[3.14]	0.345***	[4.78]
Cinema 3	0.382***	[3.26]	0.410***	[5.23]
Cinema 4	0.530***	[3.45]	0.471***	[4.23]
Cinema 5	0.316	[1.47]	0.494***	[3.87]
Cinema 6	0.591***	[4.01]	0.579***	[5.11]
Cinema 7	0.823***	[5.60]	0.773***	[7.03]
# Cinemas broadcasting opera	0.360	[1.47]	–	–
Regional opera season	0.355	[1.57]	0.359**	[2.03]
Second Ed	0.431***	[3.10]	0.359***	[3.63]
Vocational Ed	0.506***	[3.22]	0.465***	[4.25]
Tertiary Education	0.694***	[4.66]	0.777***	[7.42]
Female	0.084	[1.23]	0.021	[0.45]
Age	0.025**	[1.98]	0.008	[0.88]
Age Sq	−0.011	[−0.90]	0.002	[0.23]
Severe health limitation	−0.125	[−0.63]	−0.570***	[−2.86]
Health limitation	−0.058	[−0.58]	−0.207***	[−2.73]
Self-employed	−0.422**	[−2.46]	0.015	[0.15]
Employee	−0.155	[−1.46]	−0.136*	[−1.71]
Unemployed	−0.231	[−1.60]	−0.078	[−0.78]
Student	0.088	[0.45]	0.238*	[1.85]
Dependent	0.456**	[2.10]	−0.139	[−1.11]
Single	0.210	[1.00]	0.014	[0.13]
Married	0.273	[1.35]	0.058	[0.56]
Dependent children	−0.002	[−0.03]	−0.243***	[−4.09]
Int_reading	0.027*	[1.69]	0.072***	[6.13]
Int_cinema	0.049***	[2.68]	0.031***	[2.70]
Int_circus	0.002	[0.18]	0.009	[1.17]
Int_bullfighting	−0.015	[−1.37]	0.020***	[2.68]
High price	0.182**	[2.33]	0.562***	[11.01]
Constant	−5.367***	[−10.3]	−4.018***	[−13.01]
Fixed effects by regions	Yes		Yes	
ρ	0.489***	[11.84]		
N			15,455	
Wald [χ^2 (90)]			869.83	
Wald of ρ=0 [$\chi^2(1)$]			97.04	
AIC			5314.7	
BIC			6025.8	

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Table 6 Estimated probabilities conditional on cinema and live opera attendance

Freq. of cinema attendance	Pr(Opera at cinema = 1)		Pr(Opera at cinema = 1 | Live opera = 0)	
	Probability	t-student	Probability	t-student
0	0.006	6.88	0.005	6.40
1	0.010	4.99	0.008	4.48
2	0.014	4.89	0.010	4.32
3	0.015	4.27	0.011	3.82
4	0.022	3.20	0.016	2.92
5	0.013	2.03	0.009	1.80
6	0.025	3.43	0.017	3.00
7	0.040	3.76	0.028	3.26

Regarding age, we find a positive and significant effect of age on opera consumption broadcast in movie theaters, but not on live consumption. As expected, limitations due to health reasons reduce the probability of attending live opera. Certainly, this activity takes place outside the home and good health plays an important role in participation decisions (Scherger, 2009).

Employment status seems to have an important influence on opera consumption, an expected result given the importance of monetary and time constraints for cultural consumption. Concretely, the self-employed are less likely to consume opera broadcast in movie theaters, and employees are less likely to consume live opera.

Family responsibilities are another evidence that the use of time is an important factor in cultural consumption. On the one hand, single individuals without children, living at home with their parents (*Dependent*) are more likely to consume opera broadcast in cinemas. On the other hand, people living with young children are less likely to attend live opera.

With respect to self-reported interest in other cultural activities, we find that people interested in cinema have a higher probability of attending both live and broadcast opera. People interested in reading and bullfighting are also more prone to attend live opera.

Although the coefficient on high price is positive, its interpretation is not straightforward. Those who attend and are more interested in opera are the ones who state that high price is a deterrent for attending more often, while those who are not interested do not identify price as a limitation. Thus, the coefficient turns out to be positive. Finally, supply conditions considerably influence attendance. Indeed, in regions with more cinemas broadcasting live opera, attendance tends to be higher, and the likelihood of live attendance is significantly higher in regions where there is an opera house.

To interpret our results more thoroughly, Table 6 displays the estimated probability of attending opera broadcast at the cinema, conditional on the frequency of attendance at a movie theater to watch a movie (column 1). As expected, the probability of attending opera in movie theaters increases with individuals' frequency of cinema attendance. For example, a person who went to the movies only once in the last quarter has a 1 percent probability of attending opera broadcast in cinemas,

while an individual who attended the cinema four times in the previous quarter is twice as likely, and one who attended seven times is four times as likely. If this result were driven by the fact that higher status individuals, who also tend to consume a wider range of cultural goods (Weingartner, 2021), were those attracted to broadcast opera, then new technologies would be preserving or increasing inequalities in cultural consumption.

However, when we focus on the group of individuals who declare attending broadcasted performances in cinemas, but not live opera, we still find that the probability of attending opera broadcasts increases with cinema attendance frequency (column 2 of Table 6). Therefore, it seems that live opera broadcasting in cinemas has the potential to attract new and, probably, less expert audiences. In sum, our results suggest that movie theaters may be appropriate venues to successfully market and promote highbrow performing arts consumption to a new public.[6]

6 Discussion and conclusions

One of the hopes of cultural managers and policy makers is the idea that the almost universal availability of digital contents can encourage the democratization of culture by reaching certain groups with low levels of cultural consumption.

While democratization may be relatively easy in the case of popular culture, with a large industry behind, the so-called high culture faces a different scenario. The production and distribution of high culture is not controlled by large holdings and, in Europe, it is strongly linked to public funding. Moreover, the consumption of highbrow culture requires a certain endowment of cultural capital that differs across socioeconomic groups. This makes the demand for high-culture, both live and online, much lower than for popular culture.

An interesting initiative is that of the Metropolitan Opera House in New York, that started to use new technologies to digitally broadcast its operas live and has reached audiences in more than 70 countries since 2006. Other highbrow institutions have followed a similar strategy, increasing access to a wider range of high-quality cultural contents. Building on this idea, we analyze the impact of cinema attendance on the demand for live opera broadcast at movie theaters. Using data from the 2018–2019 Survey of Cultural Habits and Practices in Spain, we estimate a bivariate probit model for consumption of opera in cinema and live. According to our results, the probability of attending opera in movie theaters increases as individuals' cinema attendance increases. More interesting, this result does not only hold for live opera consumers. In fact, when we focus on the sub-group of individuals who declare not attending live opera, we still find a positive association between cinema attendance frequency and

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[6] As a robustness check, we have estimated a similar bivariate probit model for those who attend broadcasted opera at cinemas and those who listen to opera. The estimated marginal effects of cinema attendance on cinema opera, also conditional of not listening to opera, are shown in Table 8 in the "Appendix". It can be seen that also among those who do not listen to opera at all, those who attend movies more often are more likely to attend opera at cinemas. We are very grateful for one anonymous referee for this suggestion.

the probability of attending opera broadcast in cinemas. This result suggests that cinemas are excellent places to promote and advertise opera and other performing arts to be broadcast live on their screens, as they have proven successful in attracting new audiences and may help reduce inequalities in cultural consumption.

Although these results seem encouraging, we should keep in mind that appreciation of highbrow culture requires a certain amount of cutural capital and that mere live broadcast of performances in cinemas may not be enough to mitigate the lack of this capital. In this regard, there are ways in which highbrow institutions can help to develop individuals' tastes for these forms of art. For instance, the content offered in the intermissions might include additional materials aimed at reducing the educational barrier. An interesting initiative by the Met is the development of a nationwide program for students to attend Live in HD transmissions for free in their schools.

Furthermore, if broadcast performances are, at least partly, a substitute for live opera, the success of cinema opera may prompt touring opera companies to visit cities where there is no opera house, or even encourage local opera houses to extend their opera season.

Additionally, given that the most renowned opera houses are the ones that apply new technologies to a larger extent, it can be argued that audiences may get used to top-quality productions, leading to a potential displacement of audiences from live operas at the local opera house to broadcast performances. Although our data do not allow us to examine this issue, evidence for other countries does not find evidence of cannibalization (Holmes, 2014; Van Eeden, 2011; Wise, 2013).

Finally, although beyond the scope of this paper, a major challenge faced by policymakers would be to bring potential new audience of broadcast opera to live opera. While Van Eeden (2011) finds no evidence in the US that live in HD opera attracts new audiences to opera houses, this process may take some time and deserves further research.

To incentivize this process, local opera houses could, for instance, benefit from running promotions in nearby movie theaters that broadcast opera. This policy would increase the visibility of their own opera productions and other related activities, enhancing moviegoers' exposure to the scheduled operas. Opera houses could also offer discounts at the cinemas for attending a particular show, encouraging, for example, attendance for non-aficionados. All this could attract new audiences to the local opera house, including those who may not have considered attending live performances before.

Appendix

See Tables 7 and 8.

Table 7 Comparison of estimated marginal effects from standard probit vs. binary general extreme value models

	Opera at cine				Live opera			
	Probit		Bin. Gen. Extreme Value Estimations		Probit		Bin. Gen. Extreme Value Estimations	
	dy/dx	z	dy/dx	z	dy/dx	z	dy/dx	z
Cinema 1	0.00457	1.95	0.00388	1.54	0.01623	3.84	0.01595	3.76
Cinema 2	0.00753	2.53	0.00741	2.39	0.02039	4.09	0.02016	4.05
Cinema 3	0.00968	2.50	0.00888	2.23	0.02517	4.19	0.02451	3.98
Cinema 4	0.01622	2.32	0.01805	2.10	0.03198	3.18	0.03187	3.17
Cinema 5	0.00680	1.05	0.00732	1.03	0.03371	2.82	0.03293	2.74
Cinema 6	0.01803	2.53	0.01770	2.54	0.04085	3.57	0.04141	3.54
Cinema 7	0.03301	3.06	0.02676	2.99	0.06493	4.56	0.06601	4.53
# Cinemas broadcasting opera	0.01128	2.66	0.01027	1.85	–	–	–	–
Second Ed	0.00203	1.21	0.00208	1.11	0.00093	0.33	0.00091	0.32
Vocational Ed	0.01067	3.05	0.01429	2.24	0.02250	3.67	0.02104	3.20
Tertiary Education	0.01267	3.20	0.01626	2.48	0.02941	4.31	0.02813	3.96
Female	0.01704	4.43	0.02030	3.27	0.04898	7.43	0.04787	7.09
Age	0.00067	2.15	0.00077	1.98	0.00055	1.03	0.00060	1.11
Age Sq	−0.00030	−1.03	−0.00037	−1.09	0.00006	0.11	−2.93e−06	−0.01
Severe health limitation	−0.00266	−0.55	−0.00007	−0.01	−0.03483	−2.81	−0.03465	−2.93
Health limitation	−0.00133	−0.54	−0.00062	−0.22	−0.01229	−2.60	−0.01211	−2.62
Self-employed	−0.00970	−2.25	−0.01071	−2.06	0.00041	0.07	−0.00027	−0.04
Employee	−0.00353	−1.33	−0.00288	−0.90	−0.00911	−1.84	−0.00958	−1.90
Unemployed	−0.00527	−1.46	−0.00576	−1.44	−0.00548	−0.88	−0.00562	−0.91
Student	0.00374	0.77	0.00535	0.88	0.01556	1.92	0.01556	1.94
Dependent	0.01130	2.09	0.01350	2.09	−0.00946	−1.21	−0.00941	−1.21
Single	0.00561	1.09	0.00857	1.38	0.00042	0.06	0.00008	0.01
Married	0.00715	1.43	0.00944	1.62	0.00292	0.45	0.00248	0.38
Dependent children	−3.1e−06	−0.00	0.00061	0.26	−0.01481	−3.96	−0.01479	−4.02
Int_reading	0.00064	1.62	0.00071	1.41	0.00458	6.04	0.00444	5.67
Int_cinema	0.00132	2.88	0.00150	2.73	0.00204	2.81	0.00204	2.87
Int_circus	0.00006	0.22	−0.00001	−0.05	0.00051	1.02	0.00054	1.07
Int_bullfighting	−0.00038	−1.34	−0.00039	−1.27	0.00114	2.46	0.00115	2.51
High price	0.00527	2.13	0.00533	2.05	0.04617	8.75	0.04636	8.81

Table 8 Estimated probabilities conditional on cinema and opera listening

Freq. of cinema attendance	Pr(Opera at cinema = 1)		Pr(Opera at cinema = 1 | opera listening = 0)	
	Probability	t-student	Probability	t-student
0	0.006	6.88	0.005	6.26
1	0.010	4.96	0.009	4.81
2	0.013	4.85	0.011	4.56
3	0.015	4.24	0.013	4.09
4	0.022	3.21	0.020	3.13
5	0.013	2.02	0.011	1.92
6	0.024	3.47	0.021	3.35
7	0.040	3.71	0.034	3.51

Declarations

Conflict of interest All authors certify that they have no affiliations with or involvement in any organization or entity with any interest in the subject matter or materials discussed in this manuscript. Therefore, the authors declare that they have no conflict of interest.

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