Measuring emotion through quality: evaluating the musical repertoires of Spanish symphonic orchestras

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Abstract: Our goal is to assess the quality of the repertoire of Spanish symphony orchestras and to gauge the impact of a series of external variables on the decisions concerning these institutions' musical programmes. We take a sample of 20 professional symphony orchestras covering the last three seasons from 2014 to 2017. First, we seek to summarise the quality in the repertoire of the orchestras through three partial indices (contemporaneity, most well-known composers and conventionality) before constructing a composite quality indicator using Data Envelopment Analysis. The result of this indicator is subsequently considered to be a dependent variable in a regression analysis, with the aim of analysing the determinant effect on the programme quality of various external variables, some related to the internal management of the orchestras, others addressing the socio-economic contextual aspects of the area in which they are located.

Keywords: symphonic orchestras, repertoires evaluation, synthetic index of quality, data envelopment analysis, cluster analysis.

1. Introduction.

The principal objectives pursued by symphony orchestras as cultural institutions are closely linked to artistic quality and to the social impact of their musical activities. However, matters become complicated when attempting to quantify the results of these goals. Most studies advocate maximising the level of cultural experiences generated, in other words, analysing demand and the number of spectators (Zieba and O'Hagan, 2013), whilst other studies choose to assess the quality of the musical repertoire as a justification of the institution's activity and artistic goal (Pierce, 2000; Towse, 2001; Pompe et al., 2011). Whilst measuring the former is relatively straightforward, gauging the quality of the musical programme proves more complex, since this requires constructing various comparable indicators based on the features of the repertoire, such as the number of concerts, composers whose music is performed, degree of innovativeness, conventionality, etc. (O'Hagan and Neligan, 2005; Neligan, 2006; Bertaux et al., 2015). The advantage of these indicators is that, firstly, they are a management tool to evaluate said institutions' achievements (Heilbrun, 2001), but also, and in that they are comparable and could have cultural policy implications with regard to issues such as the distribution of resources or when establishing efficiency and excellence incentives (Luksetich and Huges, 2008). Finally, merely constructing a

synthetic indicator of quality might also be an expression of ensuring excitement, in that both concepts are inter-related, even though the latter obviously constitutes an individual perception. What does seem clear is that a quality repertoire tends to ensure a greater number of spectators will be drawn (Krebs and Pommerehne, 1995), although this is not always the case since there are also certain external factors which may shape consumer decisions (Abbé-Decaroux, 1990; Tamburri et al, 2015). In addition, those managing these performing arts and music institutions at times opt for more conventional programmes as a way of saving costs by offering less technically complex performances or repertoires which are less risky in box-office terms (Heilbrun, 2005).

Based on these considerations, our work involves assessing the quality of the repertoire of Spanish symphony orchestras as well as analysing the possible impact of a series of external variables on decisions concerning symphony orchestras' musical programmes. A sample of 20 professional symphony orchestras is taken, spanning the last three seasons from 2014 to 2017. In line with studies which quantify quality through these attributes of the programmed repertoire, we conduct a three-stage study. In the first stage, three descriptive indices of the features of the repertoire are constructed, each being seen to contribute a complementary perspective to the notion of excellence: technical quality and innovativeness through a "composer contemporaneity index"; prestige and recognition, reflected in the presence of a greater "best-knowns index" in the repertoire; and finally, artistic innovation and originality through a "risk index" as regards the repertoires compared, and which runs counter to what a conventional music programme would offer. This initial stage is complemented with the application of multivariate statistical techniques in an effort to group the orchestras in terms of their programming strategy and quality, based on the above-mentioned indices. At the second stage, we include a new factor compared to conventional studies since, based on the three previous indicators, we build a synthetic indicator of quality or excellence through Data Envelopment Analysis (DEA). Said mathematical programming technique has been widely used in production efficiency analyses, and is also becoming increasingly popular when devising composite indicators (Storrie and Bjurek, 2000 and Murias et al. 2006). Our study considers various hypotheses weighting the indicators so as to maximise output (quality). Finally, at the third stage, we posit a causal analysis, by applying regression analysis in an effort to ascertain the external drivers influencing the programming strategy of symphony orchestras, and which are linked both to the contextual socioeconomic features in the area where the orchestras are located (human capital, demographic level, level of income and cultural consumption, mean age, etc.) as well as factors related to the internal management of the orchestras (admission price, number of soloists and guest conductors, capacity of the concert hall, how old the symphony orchestra is, etc.)

The works is structured in five sections. Following on from this introduction, a brief bibliographical review is undertaken of the various studies that have evaluated the repertoires of performing arts and music institutions through the use of indicators. The methodological design of the research is then presented together with a description of the database for the empirical application. The fourth section provides the main results to emerge from the various stages of the study and the article draws to a close with the conclusions section.

2. Evaluating the repertoire of performing and musical arts: state of the art.

Studies evaluating the quality of the repertoires offered by performing arts and music institutions are common in cultural economics and tie in with the key issue involved in the origin of this discipline, costs disease, given that the chronic financial deficit facing such institutions is at times offset by an "artistic deficit" in the programming (Hansmann, 1981; Heilbrun, 2005). There is also abundant literature analysing the efficiency of these institutions (Gapinskit, 1980; Lange et al., 1985) in which programming and its results are obviously included as one of the main outputs. As regards specific studies evaluating the quality of the performing arts and music programming, one branch of analysis focuses on examining external perception through demand (Throsby, 1990; Abbé-Decaroux, 1994; Zieba and O'Hagan, 2013), and another on the reviews of critics and experts (Tobias, 2004; Urrutiaguer, 2004). Our study specifically centres on the works which deal with the quality of the repertoire by assessing its particular features, establishing a series of guidelines to generate indicators that are comparable amongst different institutions.

The work of DiMaggio and Stenberg (1985) is considered one of the first to estimate the degree of innovation in US theatres through a conventionality index, which is subsequently included in a regression analysis with contextual variables, supporting the existence of a positive relation between innovation in the programming and the level of cultural capital and the financial support awarded. A similar study was carried out by Ito and Domian (1987), in this case to analyse symphony orchestras in the US. They posit three indices as an approach to quality in the repertoire: ratio of best known composers, index of contemporaneity and ratio of concert type programmes. The results indicate that there is no link between the repertoire and the size of the budget, although there is with the infrastructure and capacity of the concert halls. Heilbrun (2001) and Pierce (2000) address a similar area when seeking to quantify the quality and level of risk of US opera companies. Castañer and Campos (2002) tackle the issue of innovation and artistic quality from the theoretical standpoint, based on various institutional criteria. Prominent amongst more recent works are those of Pompe et al. (2011) and Tamburri et al (2015), again focusing on the American League of Symphony Orchestras, estimating various quality indices in the programming and exploring the effects of different external variables, one new feature to be included being the risk taken by the conductor. The works of O'Hagan and Neligan (2005) and Neligan (2006) address this same two-stage methodological perspective when studying German and British theatres, respectively. Finally, Bertaux et al. (2015) take a single institution, the Cincinnati Symphony Orchestra, as the focus for their study, and apply an index of modernity based on the presence of contemporary composers.

By way of a summary, TABLE 1 recaps the approaches and variables used in the studies exploring the quality of performing arts and music programming mentioned earlier and which have served as a benchmark for our work. Where we break new ground in methodological terms is by constructing a synthetic indicator of quality based on several simple indicators which refer to the features of the music programming of Spanish symphony orchestras, so as to then compare the effects of the contextual variables. To the best of our knowledge, no studies adopt this three-pronged approach.

TABLE 1. Models used when reviewing references		
Article	**Measure of quality**	**Explanatory factors**
DiMaggio and Stenberg (1985)	Index of Conventionality	Population; Education; Unemployment rate; Employment rate in management tasks; Capacity; Ticket price; Public Institution; Management.
Ito and Domian (1987)	Index of concert; Index of best known composers; Index of Contemporaneity.	Budget.
Pierce (2000)	Index of Risk	Conservatism; Budget; Per capita rent; Public subsidy; Revenue through activities; University Graduates.
Heilbrun (2001)	Index of Contemporaneity.; Index of Conventionality; Herfindahl Index	-
Castañer and Campos (2002)	Innovation	Demand; capacity; Years in existence; Management; Origin of the funding resources;
O'Hagan and Neligan (2005)	Index of Conventionality	Public subsidy; capacity; Infrastructure; State capital; Population; Per capita rent; University Graduates
Neligan (2006)	Index of Conventionality	Public subsidy; Conservatism; season-ticket holders; Capacity; Infrastructure; Competition; Population; Per capita rent; University Graduates; Dramatic Repertoire.
Pompe et al. (2011)	Index of Conventionality	Index of conventionality of the conductor; No. of season-ticket concerts; Occupation rate; revenue by type and origin; Per capita rent; mean salary.
Tamburri et al. (2015)	Index of Conventionality;	Revenue by type; Salary; Special concerts; Years in existence; Population of the city; Average age in the area; Rent; Unemployment rate.
Bertaux et al. (2015)	Index of Modernity	-

Source: Authors' own

3. Methodological approach and database:

Having established the context for our work within the analytical framework reference, we now set out the methodological design employed in the research, which is based on an approach using three partial indicators dealing with complementary features of the symphonic repertoire, the construction of a composite indicator of quality, and the causal analysis of external variables using regression analysis. We also specify the database of Spanish symphony orchestras on which the empirical analysis is carried out.

We begin with the repertoire's partial indicators which have been designed in line with the compared references and adapted to the available information on the composers and programming of symphony orchestras in Spain. There are three indicators which are now detailed.

Index of Contemporaneity:

There are several studies which attach particular importance to how old both the works and the composers involved in the orchestras' musical repertoire are. Bertaux et al. (2015) create a complex index which takes account of the date of birth and death, together with the number of works scheduled for performance of each composer, and obtain quite a complex index of modernity as a result. We generate a more straightforward index in terms of its

calculation but which, nevertheless, yields a fairly similar result. Within each orchestra's repertoire, we seek to quantify the weight in percentage terms of the programmes devoted to contemporary composers who, in line with Ito and Domian (1987), are those born in the 20th and 21st centuries, in addition to those born in the 19th century who composed most of their work in the 20th century[1].

Its relevance when it comes to measuring quality is based on the fact that a contemporary repertoire is felt by most composers to be more complex in its performance, more intensive in terms of the work involved and the number of instruments as well as in the need for rehearsals (Felton, 1994 and Heilbrun, 2005). As a result, it is common to find the notion of contemporaneity being equated to that of quality in technical terms. Moreover, given its greater complexity compared to more standard preferences in classical musical consumption, it tends to be more daring with regard to audience attendance and revenue. Consequently, orchestras which schedule performances that tend towards the more contemporary are generally considered to be taking a greater risk.

Best-knowns index:

Once again, in line with studies such as Ito and Domian (1987), we create an index of the best known composers in the field of music throughout history. In this particular instance the aim is to calculate what percentage of an orchestra's repertoire is taken up by the ten best internationally known composers. The composers considered are Beethoven, Berlioz, Brahms, Dvorak, Bruckner, Haydn, Mahler, Mendelssohn, Mozart, Schubert, perceived as those enjoying the greatest prestige, and whose quality is beyond question given their popularity and the reputation they have forged over time (Luksetich and Hughes, 2008). As a result, this index allows us to estimate another facet of quality in the repertoire of symphony orchestras, namely their prestige and recognition. Nevertheless, despite the quality inherent in these programmes, they may be viewed as safer repertoires in terms of demand. In other words, they involve little risk and do little to innovate the programmes. Such repertoires tend to attract attendances that are above the average for more contemporary programmes or those involving less well known composers.

Index of Conventionality vs. index of risk and originality:

This is the most common index in evaluation studies which assess performing arts and music repertoires (Pompe et al., 2011). By applying it, the aim is to estimate the diversity and originality of the programme in the overall terms of the sample. Whereas most studies use the work performed as the unit of calculation, in our case and in order to make it comparable to the two other indicators, we take the composers as the unit. This is calculated for each orchestra and, taking as a reference each composer programmed, a yearly calculation is made of the number of times the composer is also scheduled to be performed by the other orchestras. The more often their works are performed during a season, the more conventional the corresponding orchestra's programme is felt to be. Taken to the extreme, a programme will be deemed totally original if the composers' work is not performed by any other orchestra, thus taking a value of 1, whereas on the other hand, it tends to grow the more often a composer's work is played in other orchestras, thus pointing to a more conventional, less original and perhaps less enterprising programme.

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[1] Included are those composers born in the last fifteen years of the 19th century and the bulk of whose work will therefore have been composed in the 20th century.

The aspect of quality measured by this indicator might also be termed as innovation, performance of which is inverse to the figure obtained in this index. An orchestra displaying a high index of conventionality will be taking only a limited risk, which runs contrary to the notion of innovation perceived as a contribution to the quality of the repertoire. The index of conventionality is thus expressed as follows:

$$CI_{it} = \frac{\sum_{i=1}^{n} P_{it}}{n_t} \qquad [1]$$

where P_i is the number of symphony orchestras in the sample that schedule the same composer and n is the total number of composers scheduled for performance by a symphony orchestra during a given period t. In contrast, the index of risk is the opposite, and is therefore interpreted inversely. In other words, a high index of risk is felt to reflect a higher quality programme.

In principle, each of the partial indicators can generate different results, yet if they are taken as a whole and given that each one refers to one perspective of what might be termed quality, they offer a complementary result of the quality in the repertoire of the symphony orchestras analysed.

After calculating the partial indicators and in an effort to create a synthetic indicator of quality, we employ DEA. This method, which was initially devised to analyse production efficiency both in the public and private sector (Seiford, 1996), has begun to be used in recent years for other purposes such as constructing composite indicators (Storrie and Bjurek, 2000 and Murias et al. 2006), and has also been applied in the field of cultural economics (Bowen et al. 2008; Rodríguez et al. 2016). DEA is a mathematical linear programming technique based on optimising a function subject to certain restrictions such as maximising a combination of outputs, based on a given combination of inputs. Its applicability for constructing a composite indicator lies in the fact that it can yield an ideal combination of outputs for a set of inputs with reference value equal to one. In our case, the function to be maximised on which DEA analysis is grounded is made up of three outputs, the three partial indicators (contemporaneity, best known composers and risk) and the inputs take a variable of the unit value for each observation as a reference, such that the resulting composite indicator corresponds to the best possible lineal combination of outputs. The advantage of applying DEA, as opposed to other methods, is that it does not require any previous weightings to be included. This is the so-called "benefit of the doubt" approach where the weightings are natural, stem from the intensity of the data themselves, and aim to secure the best combination. This favours the objectivity of the process since no prior assumptions are established (Murias et al. 2009). This flexibility in the weightings proves particularly timely in our case study, since we do not wish to attach greater importance to any of the three partial indicators given that, as pointed out previously, each of the three strategies is valid when reaching the programme quality of symphony orchestras. However, we cannot allow the weights to focus totally on one or two factors, as this might lead to an erroneous interpretation. As a result, we opted to include slight restrictions, forcing the weights to maintain a value of between 0.1 and 0.5. This ensures an appropriate combination which prevents an excess or lack of weighting of one of the simple indices. In this way, the optimisation approach might be expressed as follows

$$I_c = max_{w_{c,i}} \sum_{i=1}^{m} w_{c,i} * y_{c,i}$$

sujeto a:

$$\sum_{i=1}^{m} w_{c,i} * y_{j,i} \leq 1 \quad \forall j \epsilon \{1, \dots n\} \qquad [2]$$

$$w_{c,i} \geq 0 \quad \forall i \epsilon \{1, \dots m\}$$

$$0.1 \leq w_{c,i} \leq 0.5 \; \forall i \epsilon \{1, \dots m\} \qquad [3]$$

where *n* represents the number of units, in other words symphony orchestras, *m* the number of partial indicators, while $y_{c,i}$ represents the value of the partial indicator *i* for orchestra *c*, with w_{ci} being the respective weightings [2]. This is a basic formulation of an output-oriented DEA, where the weightings must be positive and less than one as a common restriction in DEA, to which we add a discretional condition of balanced weightings for the three indicators [3] which must be at least greater than 0.1 and never above 0.5.

DEA results are interpreted in the usual manner. Orchestras achieving the maximum combination of output will form the efficient frontier of best practices and will act as a benchmark for the others, whose improvement is measured in terms of the distance separating them from the optimum or frontier.

As regards delimiting our case study, in an effort to narrow down the sample, we only consider symphony orchestras in Spain that are professional, publicly owned and which offer a fixed music programme, such that spectators can acquire a season ticket. Said description is applicable to a total of 29 symphony orchestras in Spain from which we have excluded those that offer only a lyrical season due to the particular features of their repertoire. Finally, and based on the hand programme and information available concerning the repertoires of the symphony orchestras, the sample was reduced to a total of 20 orchestras, shown in Table 2. As regards the time interval, the data series is made up of the last three seasons of concerts: 2014/2015, 2015/2016 and 2016/2017. In order to endow the results with greater consistency, we opted to work with a panel of data, which therefore gave a total of 60 observations.

TABLE 2. Sample of symphony orchestras
City of Granada Symphony Orchestra
Malaga Philharmonic Orchestra
Galicia Philharmonic Orchestra
Madrid Regional Orchestra and Choir
Cordoba Orchestra
Extremadura Orchestra
RTVE Symphony Orchestra and Choir
Spanish National Orchestra and Choir
Royal Symphony Orchestra of Seville
Castilla y León Symphony Orchestra
Galicia Symphony Orchestra
Euskadi Symphony Orchestra
Valencia Symphony Orchestra
"City of Palma" Balearic Islands Symphony Orchestra
Bilbao Symphony Orchestra

| Tenerife Symphony Orchestra |
| Gran Canaria Symphony Orchestra |
| Barcelona and Catalonia National Symphony Orchestra |
| Madrid Symphony Orchestra |
| Pablo Sarasate Symphony Orchestra of Navarra |

Source: Authors' own

Finally, and once the synthetic indicator of quality for Spanish symphony orchestras was calculated, an estimation was made of the impact of external effects on the quality and programming strategies. Two kinds of references were considered, variables related to the internal management of the orchestras, and socio-economic variables that deal with the environment in which they are located (Table 3). The first description involves the variable *capacity*, which is under the control of the concert hall manager but which offers little room for variation given its fixed nature. Nevertheless, as pointed out by DiMaggio and Stenberg (1985), capacity, as a variable approximating the size of the infrastructure, reflects different values related to the resources available to the symphony orchestra. Secondly, we consider the variable *orchestra's years in existence*, which refers to the number of years each orchestra has been performing since it was founded. Many studies have linked long-running orchestras to a more conservative approach to programming. Another variable which depends on the management of the orchestra is the number of *guest performers*, including conductors, soloists and groups that do not form part of the orchestra itself, but who are involved in the annual programme. This variable proves particularly appropriate when quantifying one aspect of innovation aside from the actual structure of the musicians in the orchestra, and is generally related to prestige, since guest performers and conductors tend to be renowned performers and specialists in certain programmes. The variable number of concerts (*no. of concerts*), refers to the total number of concerts scheduled by the orchestras within a given season, including repeat performances. This is what the symphony orchestra is basically offering in artistic terms. A longer season will enable a wider range of alternatives to be offered. Finally, as a management variable, we include the cost of a single ticket for concerts held during the regular season (*ticket price*), taking the price allocated to the seats offering the best sound quality and the best view as a reference, these tending to be the most expensive seats. By doing this, we introduce into the analysis a possible causal effect between quality and ticket price.

The second group of external variables encompasses socio-economic aspects of the area where the orchestras are located, factors which might have a bearing on decisions concerning the music programmed. The manager may be faced with various alternatives for scheduling the programmes, and these might be influenced by such aspects as the size of the possible audience (*population density*), per capita income (*income per inhabitant)*, level of education (*human capital)*, average consumption of other kinds of cultural activities (*cultural consumption*) or even age (*mean age*). Various studies report a link between the number of inhabitants and a greater ability to introduce innovative programmes. Higher levels of educational attainment and income, variables which are inter-related in any case, are associated with a greater capacity to assimilate high quality and therefore more complex products, whereas age is inversely identified with innovative proposals, and tends to be linked to more conservative tastes. *Madrid* is added as a dichotomous control to this list of variables. It may account for behaviours related to its position as the country's capital in the sense that it draws on a larger population, whilst at the same time offering a greater number of substitutive leisure facilities, in addition to which it is home to the National Orchestra amongst others.

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It should be pointed out that all the variables have been taken in the year prior to the two that make up the season considered, given the advanced preparation with which these programmes are scheduled. In other words, for the 2014/2015 season, the dependent variables are referenced to the year 2013 and so on.

TABLE 3. List of variables used in the analysis		
Variable	**Description**	**Source**
Index of Cont	Index of Contemporaneity. Percentage of the repertoire belonging to composers born in or who composed most of their work in the 20th and 21st centuries.	Authors' own through the webpages of the symphony orchestras
Index of AC	Index of best-known composers. Percentage of the orchestra's repertoire made up of the 10 best-known composers internationally. (Beethoven, Berlioz, Brahms, Dvorak, Bruckner, Haydn, Mahler, Mendelssohn, Mozart, Schubert).	Authors' own through the webpages of the symphony orchestras
Index of Conv	Index of Conventionality. Calculation of the conventionality of the programming of each orchestra in relation to the sample.	Authors' own through the webpages of the symphony orchestras
Capacity	Total capacity of the concert hall where each orchestra's performances are held. Where there is more than one concert hall where the orchestra plays during a season, the mean is taken. Data are in thousands.	Authors' own through the webpages of the symphony orchestras
Years in existence	Years since the symphony orchestra was founded.	Authors' own
Guest performers	Conductors, performers and groups who do not belong to the orchestra, and who are invited to perform as part of a given programme. The figure is linked to the total number of concerts given by each orchestra.	Authors' own
No. of concerts	Number of concerts, including repeat performances, given by each orchestra during the season.	Authors' own
Ticket price	Cost of an individual ticket for a performance during the season. The reference is taken from the price for the best seats in terms of the view and the acoustics.	Authors' own
Cultural consumption	Spending on activities or cultural goods by households in the region where the orchestra is located.	National Statistics Institute-CULTURAbase
Human capital	Percentage of the population aged between 25 and 64 years of age with tertiary education in the region.	National Statistics Institute
Population density	Population density of the province in which the symphony orchestra is located	National Statistics Institute
Madrid	Dichotomous variable which takes the value 1 when the orchestra is located in the region of Madrid and the value 0 when it is located elsewhere.	Authors' own
Mean age	Mean age of the inhabitants in the province in which the orchestra is located	National Statistics Institute
Income per inhabitant	Disposable income per inhabitant in the region. Data taken in thousands.	National Statistics Institute – Spanish Regional Accounts

Source: Authors' own

4. **Empirical application: Evaluation of symphony orchestra repertoire in Spain.**

Having defined our approach from the theoretical standpoint, we now set out the various empirical sections, first by giving a basic descriptive analysis of the sample in order to gain an overall picture of the trends in symphony orchestra repertoire in Spain. We then address the results of implementing the three partial indices of quality, which will allow us to draw conclusions from the different programming strategies in our sample, and which we will also seek to classify through a cluster analysis. Finally, the

synthetic indicator of quality is constructed by means of Data Envelopment Analysis, and the possible drivers of quality are analysed using regression analysis with different external variables.

4.1. Descriptive analysis: indicators of quality and programming strategies.

A brief descriptive look at the overall figures in the sample of Spanish symphony orchestras over the last three seasons (Table 4) reveals that 1,894 concerts have been held with performances of a total of 2,808 works belonging to 462 different composers of 51 nationalities. Prominent are German composers who account for 24% of the total programming, followed by Austrian composers (14.5%), Russian (13.5%) and Spanish (12.3%). Of all the performances in the various programmes, only 311 works belong to living composers, 11% of the sample.

Table 4. Overall results of the sample	
Variable	**Figure**
No. of orchestras	20
No. of seasons	3
No. of concerts	1,894
No. of works in the repertoire	2,808
No. of composers	462
No. of nationalities	51
No. of living composers	172
No. of Spanish composers	145
No. of works in the repertoire of living composers	311
No. of works in the repertoire of Spanish composers	346

Source: Authors' own

Table 5 shows the main descriptive features of the variables that make up our study. A look at the data in the partial quality indicators first reveals that the mean index of contemporaneity is slightly above 50%, which in terms of quality reflects a relatively complex repertoire. As regards the preset list of well-known composers, these account for an average of 30% of the repertoire, which is again a significant feature bearing in mind that it involves only ten composers compared to the total of 462 represented in the sample. This is indicative of the fact that orchestras seek to include a certain number of "safe bets" in their programming given the prestige of the composers in the list and their ability to draw in the audiences without too much risk. Finally, given the difficulty involved in analysing it in relative terms, with regard to the index of conventionality we will merely confine ourselves to pointing out that there is significant variation within the sample, as reflected in the minimum and maximum values. In other words, Spanish symphony orchestras display extremely diverse conventionality, which we will seek to describe later on.

Table 5. Descriptive statistics				
Variable	**Minimum**	**Maximum**	**Mean**	**Std. Dev.**
Index of contemporaneity	0.114	0.714	0.507	0.128
Index of best known composers	0.113	0.548	0.300	0.098

|				
Index of conventionality	3.342	10.833	6.043	1.178
Capacity	0.946	3.295	2.012	0.686
Orchestra's years in existence	14	137	47.90	33.840
Guest musicians	0.666	3.200	1.789	0.528
No. of concerts	7	81	31.57	18.593
Ticket price	18.0	56.0	30.390	9.037
Cultural consumption	471968.71	5623777.65	2715439.022	1654856.776
Human capital	0.245	0.478	0.355	0.0842
Population density	26.2196	799.141	333.259	282.005
Madrid	0	1	.2	0.403
Mean age	39.429	45.918	42.191	1.806
Inhabitants' rent	1.059	1.867	1.437	0.295

Source: Authors' own

By way of general information, an analysis should also be made of which composers are most present in Spanish symphony orchestras (Table 6). It can be seen that just ten composers account for one third of all the programming, a figure which rises to 50% if we consider the first 20. The most performed composers are Beethoven (6%), Mozart (5%) and Brahms (4%), reaching 15% of all composers scheduled in the sample. There are no Spanish composers amongst the first 20. Falla is twenty-first in the list and Turina thirty-first. It is interesting to draw a comparison between the ten most often performed composers and the critics' initial list of the best known composers. In this regard, we see that only six of the latter appear in the programming favoured by Spanish orchestras. Berlioz, Bruckner, Mahler and Schubert give way to Tchaikovsky, Ravel, Shostakovich and Sibelius in the ranking of composers whose works are most often performed in Spain. Only Malher appears later in eleventh position.

TABLE 6. Results by composers				
No.	**Composer**	**Scheduled work**	**%**	**% accumulated**
1	Beethoven	165	5.88%	5.88%
2	Mozart	144	5.13%	11.00%
3	Brahms	117	4.17%	15.17%
4	Tchaikovsky	87	3.10%	18.27%
5	Ravel	82	2.92%	21.19%
6	Dvorak	76	2.71%	23.90%
7	Shostakovich	73	2.60%	26.50%
8	Sibelius	72	2.56%	29.06%
9	Mendelssohn	71	2.53%	31.59%
10	Haydn	69	2.46%	34.05%
11	Mahler	63	2.24%	36.29%
12	Schubert	59	2.10%	38.39%

13	Schumann	59	2.10%	40.49%
14	R. Strauss	57	2.03%	42.52%
15	Stravinsky	55	1.96%	44.48%
16	Prokofiev	54	1.92%	46.40%
17	Bach	47	1.67%	48.08%
18	Rachmaninov	42	1.50%	49.57%
19	Wagner	40	1.42%	51.00%
20	Saint-Saens	38	1.35%	52.35%

Source: Authors' own

Focusing on the results to emerge from each of the indices calculated, Graph 1 shows the range of Spanish orchestras in terms of the level of contemporaneity, prominent amongst which are the Euskadi Symphony Orchestra, the Castilla y León Symphony Orchestra and the Symphony Orchestra of Galicia. These are orchestras in which composers deemed to be contemporary represent a large majority, since they account for around 60% of their programmes. Occupying the middle of the ranking are mainly the orchestras of Madrid, Seville and the three islands, with mean contemporaneity percentages. The lowest indices are seen in the orchestras in the region of Andalusia (Granada, Cordoba and Malaga) together with the symphony orchestra in Navarra, the Extremadura orchestra and the Madrid Symphony Orchestra, which fail to reach 30% of the programmed performances in some instances. A kind of north/south polarisation seems to be evident, with higher contemporaneity indices apparent in orchestras in the northern half of the country, which might be related with other external variables which we will seek to analyse.

GRAPH 1. Mean Index of Contemporaneity by Symphony Orchestra
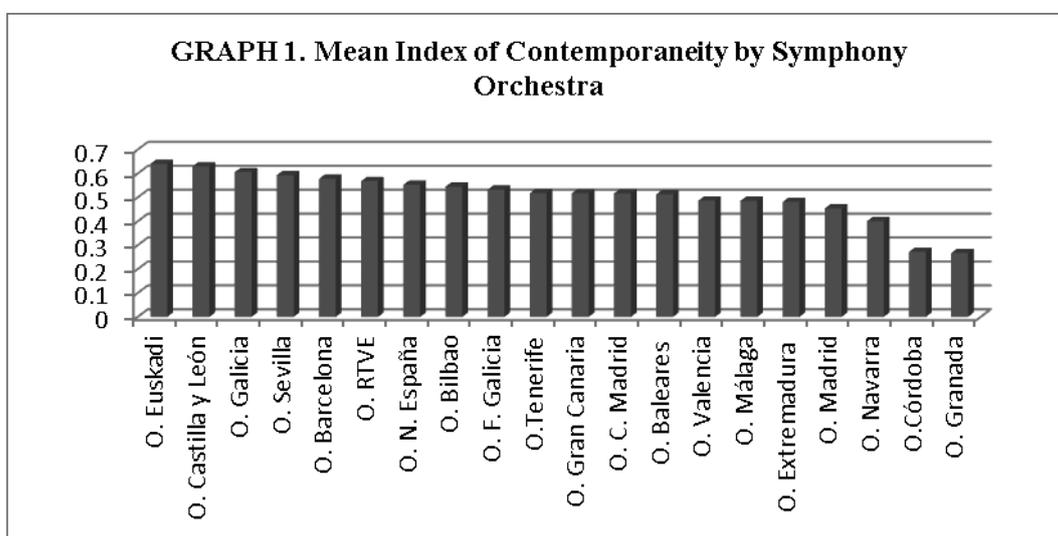
Source: Authors' own

In the case of the list of best known composers, the results in many of the cases are contrary to those stated above, pointing to a certain complementarity between the two indicators. As can be seen in Graph 2, orchestras in which the group of the most prestigious composers accounts for a higher percentage of the programme are those which display a lower index of contemporaneity and vice-versa. In light of these results,

we might speculate that, rather than seeking to provide an enterprising and more complex programme in technical terms, some orchestras choose to offer performances which include the most prestigious composers and which involve less risk, whilst others go for a more ground-breaking and daring programme.

GRAPH 2. Index of most well-known composers. Average by symphony orchestra

GRAPH 3. Index of Conventionality. Average by symphony orchestra
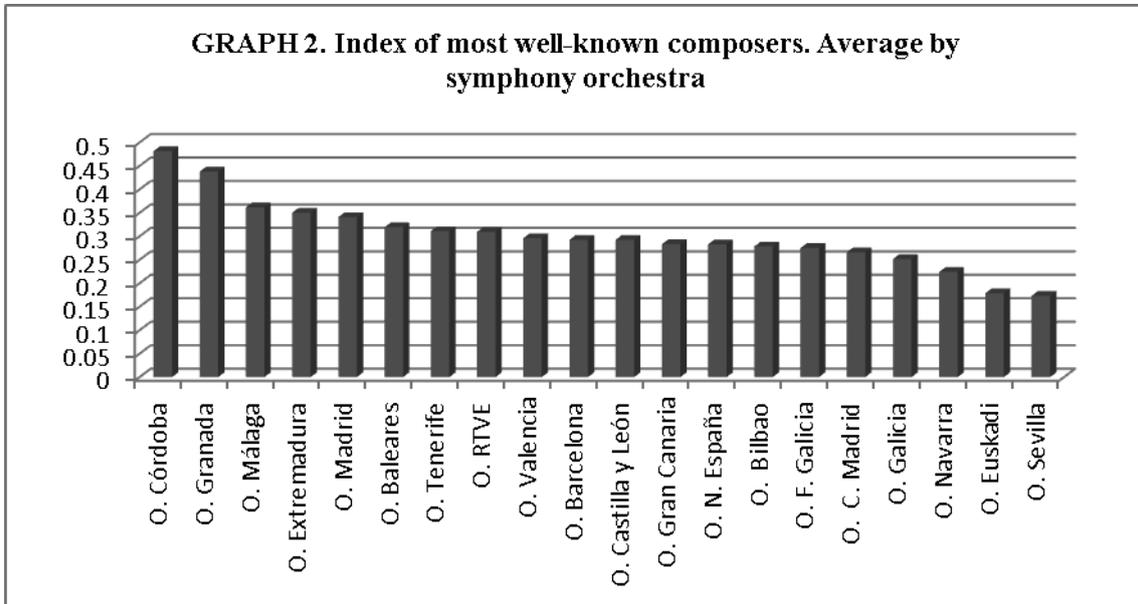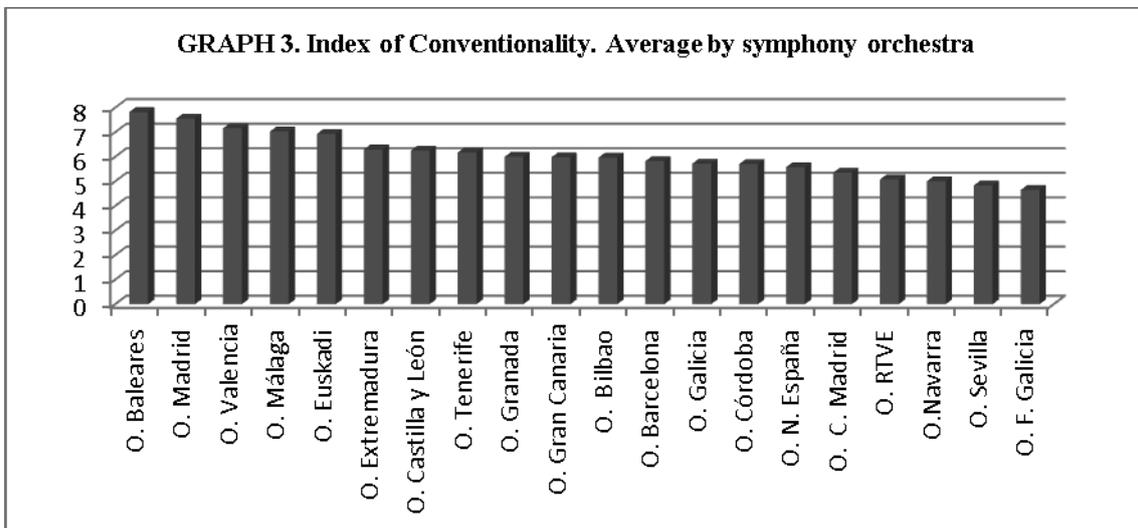
The final indicator calculated is conventionality, which is based on the degree of originality in an orchestra's programming compared to the rest, for any type of composer, whether contemporary or more or less well known. The mean results of this index are shown in Graph 3. The orchestras with the most conventional repertoire, and theoretically the least original and perhaps least daring, are the Balearic Islands Orchestra, the Madrid Symphony Orchestra, the Valencia Regional Orchestra and the Malaga Philharmonic Orchestra, all of whom display indicators above 6, which is the

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mean value for the sample. As regards the orchestras which assume the greatest risk in terms of diversity and originality of composers, we find the Galicia Symphony Orchestra, the Royal Symphonic Orchestra of Seville and the Navarra Symphony Orchestra, all of which are below 5.

Overall, it can be said that this indicator complements the previous one since many of the orchestras offering more conventional repertoires perform the works of composers who are in the list of the top ten best known whereas the orchestras showing most originality in their repertoire tend to include less well-known composers. There are just a few exceptions worth highlighting such as the Euskadi orchestra, which is conventional in its programmes but which displays a high degree of contemporaneity, and the orchestras of Cordoba and Granada, which are not so conventional in their repertoires but which are based on the list of most well-known composers.

Summing up, the results to emerge confirm that the three partial indicators are complementary with regard to their outcomes, since each measures one aspect of what we define as quality in their symphonic orchestra programming. Using a single index and extracting isolated conclusions might lead to biased results which consider only one of the many features that make up the idea of symphonic orchestra quality which we are formulating. It would prove interesting to find a method to combine these so as to obtain a composite indicator of the quality of the symphonic repertoire, thereby allowing us to draw more robust conclusions.

As a complement to this descriptive study, we felt it timely to apply a method that would enable us to classify orchestras following similar programming strategies. This is why we considered a cluster analysis for the 20 symphony orchestras in each of the three seasons and based on the three partial indicators of quality. The squared Euclidean distance method was used, and the clustering criterion is based on differences, in other words, the clusters have been formed in relation with the greatest distances between units.

TABLE 7. Results of the Cluster Analysis by Symphony Orchestra and Season		
Cluster 1	**Cluster 2**	**Cluster 3**
S. Granada 1	O. F. Galicia 1	O. Barcelona 1
S. Granada 2	O. F. Galicia 2	O. Barcelona 3
S. Granada 3	O. F. Galicia 3	O. Madrid 1
O. Málaga 3	O. C. Madrid 2	O. Madrid 2
S. Córdoba 1	O. C. Madrid 3	O. Madrid 3
S. Córdoba 2	S. Córdoba 3	O. Navarra 1
O. Extremadura 1	O. RTVE 1	O. Málaga 1
O. Valencia 3	O. RTVE 2	O. Málaga 2
O. Illes Balears 1	O. RTVE 3	O. C. Madrid 1
	O. N. España 2	O. Extremadura 2
	O. N. España 3	O. Extremadura 3
	O. Sevilla 1	O. N. España 1
	O. Sevilla 2	O. Castilla y León 2
	O. Sevilla 3	O. Castilla y León 3
	O. Castilla y León 1	O. Euskadi 1
	O. Galicia 1	O. Euskadi 2
	O. Galicia 3	O. Euskadi 3
	O. Bilbao 3	O. Valencia 1
	O. Gran Canaria 1	O. Valencia 2
	O. Barcelona 2	O. Galicia 2
	O. Navarra 2	O. Illes Balears 2
	O. Navarra 3	O. Illes Balears 3

		O. Bilbao 1
		O. Bilbao 2
		O. Tenerife 1
		O. Tenerife 2
		O. Tenerife 3
		O. Gran Canaria 2
		O. Gran Canaria 3

Source: Authors' own
Legend: 1 = season 2014/2015; 2 = season 2015/2016; 3 = season 2016/2017.

Three interpretable clusters were finally obtained. As can be seen from Table 7, group size is uneven. In the first, there are nine orchestras, in the second 22, whereas in the third, the largest, contains 29 symphony orchestras. The features of the repertoire of the orchestras that make up each group reveal three clearly distinguishable strategies. The first group or cluster contains orchestras whose programming mainly involves the best-known authors. In other words, they go for prestige and fairly safe bets as a means of achieving quality in their repertoire. These are mostly orchestras located in the south-east of Spain, prominent amongst which are those in Andalusia. The second group is made up of orchestras which assume a very high risk, opting for repertoires which are mainly contemporary, offering very few programmes that involve better known composers. Many of these orchestras are located in the capital, Madrid, and regions in the north of the country although there are exceptions such as the Seville Orchestra. This would suggest a nucleus of fairly unconventional programmes and a tendency towards the contemporary around Madrid, something which we will seek to confirm in subsequent regression analysis. Finally, the third cluster of the sample is more disperse in nature. It contains orchestras offering a contemporary programming, over a quite a similar range to group 2, although slightly higher. Nevertheless, these orchestras assume a much lower risk than the previously mentioned group. Given the number of observations in this cluster, it can be said that it is the most common trend displayed amongst Spanish symphony orchestras.

4.2. Synthetic index of quality and analysis of determinant factors

Having calculated the partial indicators, we group them using a synthetic indicator which allows us to draw conclusions concerning the quality of the symphony orchestras' programming in an aggregate manner.

Prior to constructing this synthetic indicator using DEA we need to make a correction in one of the variables that form part of it. The index of conventionality must be normalised in order to ensure that its range varies between 0 and 1. In addition, an inverse has been taken to identify it with the meaning of originality and risk (rather than conventionality) so that it keeps the same sense as the remainder of the partial indicators.

Having made these preliminary changes, we then describe the method used to extract the synthetic indicator. It should be pointed out that a panel of data was used for the analysis. In other words, each orchestra is deemed to be an independent unit in each of the years taken into consideration, as a result of which we have a total of 60 observations. Each of the three partial indicators (index of contemporaneity, index of best-known composers and index of risk) is introduced as outputs, allocating a single vector of inputs with reference value one, such that the value of the resulting indicator corresponds to the best possible combination of outputs, which is the result of the optimisation process by using DEA (Pérez et al. 2014).

Finally, resolving the linear problem set out in formula [2] and considering the principal restriction based on the fact that the weight allocated to each partial index l must be between 10% and 50% [3], so that they all contribute to constructing the synthetic indicator, without the weight of any of them proving excessive, the results shown in Graph 4 were obtained.

GRAPH 4. Quality Synthetic Index. Average by symphony orchestra
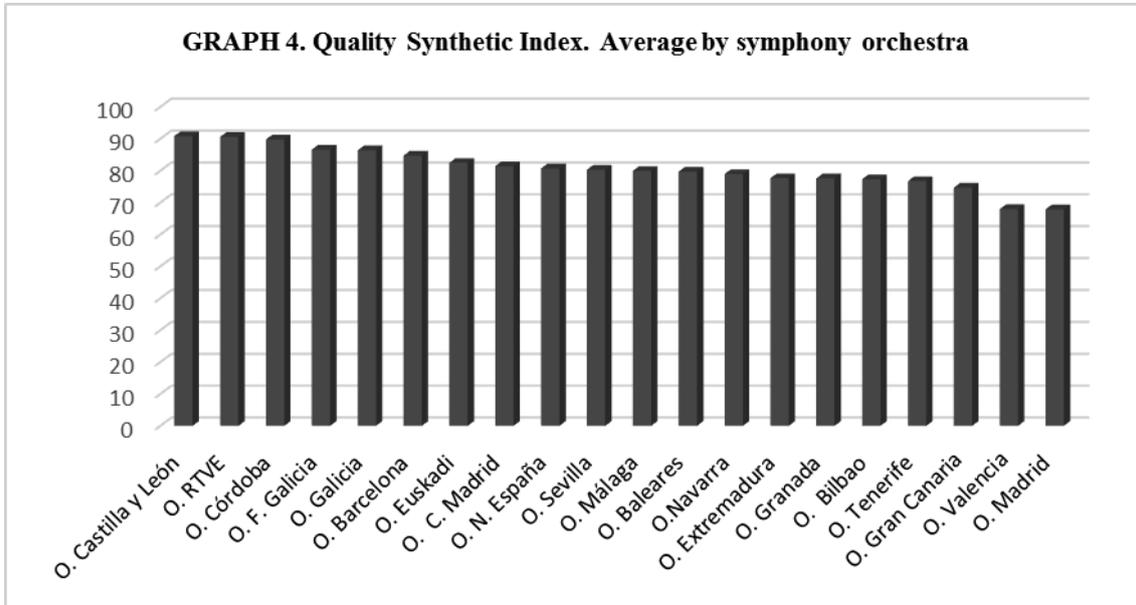
Source: Authors' own

It should first be mentioned that the mean aggregate quality of the sample of orchestras is 80.6%, which indicates a margin of less than 20% for improving the results as regards quality. Of the 60 observations, only six reach the maximum quality level (Malaga Philharmonic 16/17; Cordoba Symphonic in 14/15 and 16/17; the RTVE Orchestra 14/15; Seville Orchestra 15/16 and the Valencia Orchestra 14/15), which emerge as the reference units with regard to programme quality. If we assess the data by seasons, the two first, 2014/2015 and 2015/2016, reach a very similar percentage of 79.6% and 79.5%, respectively, whilst it is the most recent season which shows the highest index of quality, 82.6%.[2]

In an effort to minimise anomalous behaviours amongst orchestras during a given season, we decided to assess the mean results of the three seasons considered. The orchestra displaying the highest mean index of quality is the Castilla y León Symphony Orchestra. By looking at the results of the partial indicators, we see that their programme is devoted especially to contemporary performances, whilst in the other indicators it lies in intermediate positions. Its programme appears to be particularly balanced between the three quality features considered previously which, given the restrictions applied to the model, is reflected in a high aggregate quality. The second orchestra in programme quality is the RTVE Orchestra, with a programme high on the risk and contemporaneity indices, and with best-known composers in intermediate positions. This same pattern is followed by the Galicia Philharmonic Orchestra, which has the highest partial indicator of risk of the orchestras considered and is located in

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[2] The specific results to emerge from the research are not provided at this point. They are available from the authors upon request.

intermediate positions in the remaining partial indicators. One notable case is that of the Cordoba Orchestra whose programme strategy is clearly oriented towards the most prestigious composers, with a low index of contemporaneity and a medium/low index of risk, but with a highly specialised programme based around the most renowned composers and which, given the flexibility of the model, reaches a high index of quality. This latter data support the option of restricting weights within a "controlled freedom" so as to avoid over-weighting any of the simple indicators. It is also interesting to point out that when relating the results of the cluster analysis with those obtained in the index of quality, we see that the symphony orchestras with the highest synthetic programme quality are located, apart from one or two exceptions, in cluster number 2 which was the one displaying the greatest quality and innovation, thus endowing the results with robustness.

Having constructed the synthetic indicator of quality, we conducted a causal analysis of possible external drivers which might determine the level of quality obtained by each orchestra. We set out from the idea that all the orchestras that make up the sample seek to maximise quality in their repertoire as the main objective when producing goods of this nature. Nevertheless, the decisions which lead to said maximisation being achieved might be restricted by a whole host of contextual variables that could propitiate or otherwise said optimum being accomplished.

For this stage of the study, regression analysis between the quality indicator and different external variables was considered, once again using a data panel in which each orchestra is deemed an independent unit in each season. In line with the bulk of the studies on evaluation of repertoires, we apply the ordinary least squares model (OLS), specifying a Box-Cox transformation such as the one posited by Tamburri et al. (2015) and Pompe et al. (2011). As a dependent variable, we introduce the result of the synthetic indicator of quality, and as independent variables a whole range of aspects inherent to management as well as the contextual variables detailed in Table 3. The resulting models have been compared using the usual verification tests. No problems of heteroscedasticity or absence of normality were evident. In addition, possible problems related to the correlations matrix were checked for, as well as other tests common to this approach. The empirical specification of the model was as follows:

Index of Quality$_i$ = f (Capacity$_i$, Years in existence$_i$, Guest performers$_i$, No. of concerts$_i$, Ticket price$_i$, Cultural consumption$_i$, Human capital$_i$, Population density$_i$, Madrid$_i$, Mean age$_i$, Income per inhabitant$_i$,)

Although the principal objective is to observe the variables which shape the quality of the repertoire using the synthetic indicator, we also apply the same equation for each one of the three partial indicators (contemporaneity, best-know composers and risk indexes) to describe each of the strategies implemented by the various orchestras. This is why Table 7 presents the results of a total of eight regressions, two corresponding to each of the indices. In the so-called "Basic Model", all of the variables analysed are introduced whereas in the "Refined Model", we refine the model so as to reduce it to the variables which prove significant.

First, we analyse the results obtained for the synthetic indicator of quality. It should be pointed out that of the eleven explanatory variables, five are not significant: *Guest performers, Human capital, Population density, Mean age* and *Income per inhabitant.* The remaining variables are statistically significant below 10% and are taken into account as a result.

Amongst the significant variables, three evidence a negative coefficient. Firstly, as regards the variable *capacity*, in line with the results obtained in studies such as DiMaggio and Stenberg (1985) and O'Hagan and Neligan (2005), institutions with a larger infrastructure and therefore a greater capacity tend to offer a more conventional repertoire that is less innovative and less original compared to those with a smaller capacity. The second variable to display a negative coefficient is *years in existence*, evidencing a certain stagnation by longer-running orchestras in terms of their programming, whereas the younger orchestras tend to commit to a higher quality repertoire which entails greater innovation and risk. This is the only significant variable in the four models. In this case, we see how it is inversely related to quality, contemporaneity and risk, although the relation is direct. Put differently, the longer-established orchestras clearly tend to focus their programme on the more renowned composers who offer a safer bet vis-à-vis drawing audiences. Finally, the negative coefficient of the variable *cultural consumption* points to an inverse relation between those regions with the highest cultural consumption and quality in the symphony music repertoire. In this case, we interpret this coefficient in relation to the level of competition with substitutive goods and activities, since the cultural consumption variable includes spending on entertainment and leisure. In this way, orchestras located in areas where there is a greater number of substitutive activities tend to programme with less quality in order to be more competitive in the cultural market, perhaps with the aim of maximising the number of spectators. This variable is equally significant and with a negative coefficient in the indices of contemporaneity and risk, thus confirming the justification set out earlier.

The significant variables which display a positive coefficient, in other words those which help generate the right context for a quality programme, include the number of concerts (*no. of concerts*). Works such as those of Pompe et al. (2011) report a significant relation between a greater number of concerts and greater ratios of innovation and quality. In our particular case, we see how orchestras that perform over longer seasons and that offer more repeat performances display a higher index of innovation, diversity and technical complexity in the repertoire. This ties in with so-called "cross subsidies", partly as a result of longer seasons (Towse, 2014). Longer seasons allow for greater risk and innovation in terms of quality, since more innovative and riskier programmes when it comes to attracting spectators can be balanced with other less risky programmes that are likely to draw a larger audience. The dichotomous variable *Madrid* proves significant and displays a positive coefficient. As already pointed out in the cluster analysis, orchestras in a nation's capital tend to be of higher than average quality. Authors such as O'Hagan and Neligan (2005) compare the link between quality and being the national capital in the case of London. This is justified given the existence of a larger market, which allows for content specialisation and the possibility of taking greater risks as a result of the potentially larger audience, added to which is their emblematic nature, since they are usually home to national orchestras. Finally, the *ticket price* is the final significant variable of those included in the analysis. There is a link between greater quality and higher costs, which we have not been able to assess in this study but for which there are numerous references. Said studies show that reductions in the available budget lead to a drop in the quality of the repertoire, giving rise to so-called "artistic deficit" (Krebs and Pommerehne, 1995; Pierce, 2000 and Heilbrun, 2001). If we assume that a better quality repertoire proves more costly, these higher costs should, to a greater or lesser extent, impact on the ticket price, hence this variable's positive coefficient. Nevertheless, we see how in the results of the regression analysis of the index of best known composers, ticket prices have an inverse effect,

indicating that orchestras offering repertoires that focus on better known composers charge lower prices.

To finish off, there are other variables that do not prove significant when analysing the synthetic indicator of quality, but which do emerge as significant for some of the partial indicators, and which it is interesting to examine. Firstly, the variable of *human capital*, which, in line with works such as those of DiMaggio and Stenberg (1985) and Neligan (2006), has a positive effect on repertoires that are contemporary and that involve greater risk. An environment with greater human capital is more permeable to this kind of repertoire, without having a substantial effect on demand. In contrast, this variable, exerts the inverse effect for the index of best known composers which, broadly speaking, are more easily accessible programmes for the general public. Finally, we see the variable *mean age*, which is only significant in the model of best known composers, with a positive coefficient. Attention was already drawn to this by Tamburri et al. (2015); an older population is less likely to experiment with innovative repertoires, and will probably tend towards a more traditional repertoire.

By way of a general conclusion, it should be pointed out that we have observed that the coefficients of the index of quality display a pattern that is clearly contrary to those obtained in the index of best known composers, which leads to the possibility that there might be an inverse relation between quality and the index of best known composers which we have not been able to identify given the specification of the model.

TABLE 8. Regression results (MCO)

Variables	Synthetic Indicator of Quality		Index of Contemporaneity		Index of Best Known Composers		Index of Risk	
	Basic Model	**Refined Model**	**Basic Model**	**Refined Model**	**Basic Model**	**Refined Model**	**Basic Model**	**Refined Model**
Capacity	-0.268 (0.217)	-0.346*** (0.196)	0.035 (0.036)	0.049*** (0.025)	-3.519 (2.278)		-0.009 (0.050)	
Years in existence	-0.012* (0.004)	-0.009* (0.003)	-0.001 (0.001)**	-0.001* (0.000)	0.005*** (0.003)	0.004*** 0.002	-0.001 (0.001)	-0.001*** (0.001)
Guest performers	-0.29 (0.201)	-	-0.02 (0.033)		0.142 (0.128)		-0.139* (0.047)	-0.134* (0.042)
No. of concerts	0.012*** (0.007)	0.010*** (0.005)	0.001 (0.001)	0.002*** (0.001)	-0.002 (0.005)		0.005* (0.002)	0.004* (0.001)
Ticket price	0.0428** (0.02)	0.044** (0.017)	0.001 (0.003)		-0.011 (0.012)	-0.014*** 0.007	-0.000 (0.004)	
Cultural consumption	-1.54E-7 (1.035E-7)	-1.721E-7** (7.113E-8)	-3.283E-8 (1.699E-8)***	-2.026E-8** (8.750E-9)	2.341E-8 (6.578E-8)		3.009E-8 (2.398E-8)	-2.152E-8*** (1.244E-8)
Human capital	1.571 (6.013)	-	1.105 (0.987)	0.471** (0.215)	-7.762** (3.821)	-3.728** 1.398	0.657 (1.392)	0.615*** (0.313)
Population density	-0.001 (0.001)	-	0.001 (0.001)		0.001 (0.001)	0.001* 0.000	-0.000 (0.000)	
Madrid	0.739 (0.554)	0.753** (0.298)	-0.073 (0.091)		0.336 (0.352)		0.050 (0.128)	
Mean age	-0.055 (0.087)	-	-0.002 (0.014)		0.127** (0.055)	0.093** 0.039	-0.012 (0.020)	
Inhabitants' income	0.655 (1.466)	-	-0.185 (0.241)		0.944 (0.932)		0.006 (0.34)	
C	2.098 (3.585)	0.532*** (0.318)	0.220 (0.588)	0.059 (0.068)	-3.518 (2.278)	-1.94 1.487	1.371*** (0.831)	0.835* (0.096)
No. of observations	60	60	60	60	60	60	60	60
R^2	0.30	0.24	0.35	0.32	0.20	0.16	0.28	0.26

N. B.: *Statistical significance at 1%; ** Statistical significance at 5%; *** Statistical significance at 10%.

Source: Authors' own

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4. Conclusions:

An objective method for assessing quality in a symphony orchestra's repertoire may be put to practical use in various ways. Firstly, it provides a palpable measure of the success of one of the main goals pursued by a symphony orchestra, namely as a means of gauging the performance of their internal management. In the sphere of cultural policy, quality is a notion which may contribute towards maintaining and justifying public support for such institutions.

Despite the different perspectives from which quality in the performing and music arts has been approached, all of the methods have only served to underscore the complexity involved in finding an indicator which embraces the notion comprehensively and that also proves comparable. We base our approach on the reference literature and posit a synthetic measure in which we address three aspects or facets which may be interpreted as reflecting quality, and which also prove complementary: technical quality and novelty, incorporated through the index of contemporaneity; prestige, reflected in the presence of a greater number of well-known composers, and finally artistic innovation and originality through the index of conventionality in its inverse version, in other words, the index of risk. In order to group the different strategies adopted by Spanish symphony orchestras seeking achieve quality, cluster analysis identifies three clearly differing behaviours: orchestras which mainly schedule the best known composers, assuming a medium/low risk, orchestras offering a mainly contemporary repertoire and with a medium level of risk, this covering a larger number of orchestras; and finally another group whose programme entails a high degree of innovation and risk, mainly by scheduling contemporary composers, a behaviour which we have subsequently seen provides the highest quality in aggregate terms.

These three partial indicators have been brought together to form a synthetic indicator which provides us with an overall image of the quality of Spanish symphony orchestras' repertoire. Broadly speaking, the results from sample of Spanish symphony orchestras point to a satisfactory level of quality. The lack of any similar studies in comparable contexts makes it difficult to relativise our findings. Nevertheless, the average quality of the synthetic indicator is above 80%. Given the definition of the model, and having included balanced restrictions in the weightings, the index of contemporaneity and the index of risk are felt to make the greatest contribution to achieving maximum quality in the sample.

The results obtained indicate that although quality can be considered one of the main goals to be achieved, maximising it is not always within managers' reach. In this case, the artistic directors of symphony orchestras cannot compile their repertoires oblivious to the environment in which they are located, since another of their objectives is to secure the highest possible number of spectators. Given all of this, we have sought to explore which external drivers impact on the programming strategy. We apply a regression analysis between the index of aggregate quality and external variables related to the determinants inherent in the management of orchestras as well as certain socio-economic aspects of the surrounding area. One prominent result is the effect of variables which contribute to securing higher quality, such as a longer season, ticket price or being located in the country's capital. The years the orchestra has been in existence, a larger capacity concert hall and greater cultural consumption in the reference region have a negative impact on the quality of the symphony orchestras. Another of the main

conclusions to emerge from the work concerns the possible inverse relation between scheduling the most renowned composers and quality in aggregate terms.

Finally, this study paves the way for a series of future lines of research in the Spanish context such as the possibility of expanding the sample and time period as well as incorporating variables associated with available budget, common to this kind of study and which we have been unable to include given the lack of related data.

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