Time Allocation to Leisure Activities in Spain:

Empirical Evidence on Individual Involvement in Sports and Cultural Activities

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Oviedo, 2014

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(awarded the "Mención hacia la Excelencia" distinction in 2011. MEE2011-0173)

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Oviedo, 2014

Resumen

El objetivo principal de esta tesis es analizar la participación individual en dos actividades de ocio: deporte y cultura. La investigación se compone de tres ensayos, en los que se han empleado diferentes definiciones acerca de la participación, tanto activa como pasiva. Por otro lado, se han aplicado diferentes técnicas econométricas adecuadas a las especificidades de la base de datos, ya que las tasas de no participantes en estas actividades son relativamente elevadas.

La tesis se enmarca dentro de dos líneas de investigación: la economía de la cultura y la economía del deporte. En ambos casos, se trata de disciplinas relativamente recientes, y que en general, han tenido una evolución separada. A pesar de ello, algunos autores reconocen que las actividades culturales y deportivas presentan características comunes: así, el deporte y la cultura contribuyen al bienestar individual, pueden también favorecer el desarrollo personal, así como dar lugar a externalidades positivas en la sociedad. Por ello, los gobiernos de los países desarrollados suelen intentar potenciar la práctica de estas actividades de ocio entre la población.

El análisis empírico emplea la Encuesta de Empleo del Tiempo realizada por el INE en 2002-03 como base de datos. En la tesis se han utilizado distintas informaciones proporcionadas por la Encuesta acerca de las prácticas de ocio: 1) se han considerado las actividades realizadas por el individuo a lo largo de un día concreto, así como 2) el número de veces que los individuos han participado en actividades culturales y deportivas en las cuatro semanas previas a la realización de la encuesta.

El primer estudio incluido en la tesis analiza la participación e intensidad de participación en deporte y cultura de los individuos a lo largo de un día concreto. A partir de la especificación de un modelo estructural de asignación del tiempo, se derivan las

demandas relativas de tiempo (en horas) dedicado durante ese día a la práctica y/o la asistencia a actividades culturales, y tiempo (en horas) dedicado a la práctica y/o asistencia a actividades deportivas. El sistema de ecuaciones relativas de demanda se estima empleando la especificación SURE (Seemingly Unrelated Regression System).

El segundo estudio realiza un análisis de frecuencia de participación individual en las actividades deportivas y culturales. El número de veces que el individuo ha asistido a eventos culturales o practicado deporte en las últimas cuatro semanas conforman las variables dependientes del modelo. El análisis empírico compara diferentes técnicas econométricas, así como diferentes especificaciones del conjunto de factores explicativos. De este análisis comparativo se concluye que la especificación más conveniente para estos datos es el modelo binomial negativo inflado en ceros (ZINB). En este capítulo se ha realizado también una descomposición de los efectos marginales individuales, diferenciando el efecto de las variables explicativas sobre la probabilidad de ser un participante potencial y sobre la frecuencia esperada de participación (condicionada a la participación). Finalmente, se ha aplicado la descomposición Blinder-Oaxaca para analizar las diferencias por género en la participación deportiva y cultural.

Finalmente, el último capítulo analiza la participación individual en actividades específicas durante un período de cuatro semanas para realizar un análisis comparativo de los determinantes de los distintos tipos de actividades. En concreto, se analizan la frecuencia de participación de las siguientes actividades físicas y deportivas: caminar, deportes individuales/deportes en grupo, deportes que se practican al aire libre/ deportes que se realizan en recintos cerrados y finalmente deportes que requieren infraestructuras/deportes que no requieren infraestructuras. En cuanto a las actividades culturales, se desglosa la participación en: cine, teatro y conciertos, y visitas culturales. Dadas las características de las variables dependientes, la especificación econométrica

elegida para estudiar la frecuencia de participación es también el modelo ZINB. También se ha llevado a cabo una descomposición de los efectos marginales individuales.

Los resultados obtenidos en los distintos ensayos muestran diferencias en el efecto de las variables independientes sobre la participación y la frecuencia de realización de las diferentes actividades consideradas, así como diferencias de género.

Abstract

The main goal of this dissertation is to analyze individual participation in two leisure activities: Sports and culture. The research consists of three essays, in which we have used different definitions of leisure involvement, both active and passive participation. Moreover, we have applied different econometric techniques to account the special features of the database, as rates of non-participants in these activities are relatively high.

The thesis is framed within two research lines: cultural economics and sports economics. Both of them are relatively new disciplines, and in general, they have had a separate evolution. However, some scholars state that cultural and sports activities have common features: They contribute to individual well-being and may also encourage personal development. In addition, they lead to positive externalities on society. Thereby, governments of developed countries often attempt to enhance the practice of these leisure activities among the population.

In the empirical analysis we have used the Time Use Survey (TUS) conducted by the INE in 2002-03. This database offers two sources of information on individual sports and cultural activities: 1) Time spent on them during a given day, and 2) number of times individuals have participated in cultural and sports activities in the previous four weeks. In this dissertation we have used both types of data.

The first study included in the thesis analyzes the participation and intensity of participation in sports and culture of individuals over a given day. We specify a structural model of time allocation, assuming a CES utility function and we yield the relative demands of time (in hours) allocated to the practice and/or attendance at cultural activities during the day, and time (in hours) allocated to sports practice and/or attendance at sports events.

The system of relative demand equations is estimated using SURE specification (Seemingly Unrelated Regression System).

In the second study, we perform an analysis of the frequency of individual's participation in sports and cultural activities, being the dependent variables the number of times the individual has attended cultural events or take part in sports activities in the past four weeks. In the empirical analysis, we compare different econometric techniques as a well as different specification regarding the set of covariates. In this comparative analysis we conclude that the zero inflated negative binomial model (ZINB) is the most appropriate specification. This essay also provides a decomposition of the individual marginal effects. This decomposition differentiates the effect of covariates on the probability of being a potential participant, and on the expected frequency (conditional on participation). Finally, we apply the Blinder-Oaxaca decomposition to analyze gender differences in sports and cultural participation.

Finally, the last essay focuses on individual participation in specific activities during the previous four weeks. Thus, we make a comparative analysis of the determinants of different types of activities. Specifically, the frequency of participation of the following physical and sports activities are analyzed: Walking, individual/group sports, indoor/outdoor sports and, finally, sports that require infrastructure/sports that do not require infrastructures. Regarding cultural activities, going to cinema, theater and concerts, and cultural visits to museums and historic-artistic heritage are considered. Given the characteristics of the dependent variables, we estimate the ZINB model to study the frequency of participation in each activity. We have also carried out a decomposition of individual marginal effects.

The results of the different researches in this dissertation show differences in the effects of the covariates on the participation and frequency decisions of individuals, as well as differences between males and females and among activities.

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INTRODUCTION

"But unfortunately human nature improves slowly, and in nothing more slowly than in the hard work of learning to use leisure well. In every age, in every nation, and in every rank of society, those who have known how to work well have been far more numerous than those who have known how to use leisure well".

(Marshall, 1907, Principles of Economics, p. 719-720)

In "Economic Possibilities for Our Grandchildren", Keynes (1931) postulated that, by 2030, people in developed societies would work around fifteen hours a week, so that individuals would face the problem of what to do in their leisure time. Nowadays, a healthy work-family life balance has become increasingly important to people trying to cope with the pressures of contemporary societies (Gooding, 2008). This is particularly important in Spain, which has one of the lowest fertility rates among the countries members of the Organization for Economic Cooperation and Development (OECD, 2011). That is the reason why this organization recommends Spain to strengthen its policies for reconciling work and family life.

Time is a scarce resource in societies and time allocation therefore becomes a crucial decision for individuals. In early relevant studies, Robbins (1930) and Hicks (1963) already recognized that consumers maximized their utility from a combination of goods and leisure and an extensive economic literature on time allocation has been developed to date. However, this literature has mainly focused on working time, and leisure was usually regarded as a residual, i.e., time not allocated to work.

Becker's household production theory (Becker, 1965) is usually considered the starting point in the study of the allocation of individuals' leisure time in economics. This approach postulates that households combine time and market goods to produce commodities that increase their utility.

In this dissertation, we focus on two leisure activities: sports and cultural activities. A common feature of both activities is that they tend to be highly time consuming (Løyland and Ringstad, 2009; Ringstad and Løyland, 2011) and they usually require the consumption of goods or services. Moreover, some of them need prior investment in skills.

In addition, participation in sports and cultural activities may generate positive externalities. On the one hand, sports practice helps to combat against individual obesity and other diseases, thereby reducing health care costs to society (Downward and Rasciute, 2010). Moreover, participation in sports may have a positive influence on educational achievement (Pfeifer and Cornelisen, 2010), promote social inclusion and reduce crime (Nichols, 2007; Coalter, 2008; Downward et al. 2009). On the other hand, cultural activities can also generate external benefits such as a legacy to future generations, national identity and prestige, benefits to the local economy, and encouraging artistic innovation (Heilbrun and Gray, 2001).

Another feature common to sports and cultural activities is their social dimension. These goods not only provide individual satisfaction through consumption, but in some cases they also enable individuals to enhance their social relationships and interactions.[1]

Spanish participation in artistic and cultural activities and participation in sports is below the European Union (EU) average (Veal et al. 2011). Therefore, although social policies have been implemented to increase the participation of individuals in these leisure

[1] See also Andreasen and Belk (1980, 1981); McCarthy et al. (2001); Heinemann (2005); Downward and Riordan (2007); Swanson et al. (2008); and Nicholson et al. (2011).

activities, a detailed analysis of the determinants of individual participation can help to design more effective policies.

The relevance of these activities explains the development of two branches of the economics literature: Sports Economics and Cultural Economics. However, both areas of research have generally evolved separately and there are very few papers that jointly examine sports and cultural activities.

The main goal of this thesis is to identify the covariates that explain individual participation in cultural and sports activities, assuming that people seek to maximize their utility level given their economic and time restrictions. The thesis is composed of three studies in which we will consider different definitions of sports and cultural leisure participation and different econometric techniques.

Several forms of participation may be distinguished in order to analyze both cultural and sports demand. McCarthy and Jinnet (2001), focusing on cultural activities, mention three types of participation:

1) A "hands-on" way (e.g., by painting a picture),

2) Through attendance (e.g., by going to a ballet or the theater.),

3) Through the media (e.g., by listening to an opera on the radio).

The same classification can be applied to sports: individuals can practice sports, attend sporting events and watch sports on the TV or the internet.

In our first study, we focus on the time spent by individuals on cultural and sports activities during a day, defined in an aggregate way by summing practice and event attendance. To our knowledge, this is the first study that specifies and estimates a structural model of time allocation applied to the analysis of sports and culture.

Regarding the econometric models applied in this chapter, the choice is mainly conditioned by the characteristics of the dependent variables and the issue of non-participation. In the first study, we use a Seemingly Unrelated Regression Equations (SURE) specification to jointly estimate time devoted to both activities, correcting non-participation by the Heckman method. The SURE methodology allows us to check whether there are unobserved factors that simultaneously affect time allocated to both activities.

In the second study we analyze the number of times the individuals practiced sports or attended cultural events in the previous four weeks. In this study we aggregate the practice of all kind of sports and the attendance at any cultural activity.

In this study we compare two different specifications that have been applied in the literature: count data and double-hurdle models. To the best of our knowledge, this is the first time that both methodologies have been compared, at least in the sports and cultural economics literature. Count data models are appropriate when the dependent variable can only take positive and integer values. After estimating different count data specifications, we conclude that the best one for our data is the Zero-Inflated Negative Binomial (ZINB) model. Then, we compare it with the double-hurdle model. Both the ZINB and the double-hurdle specifications assume that non-participation may arise either because the individual has no interest in these activities or he is interested in them but did not participate during the analyzed period.

In the third study, we perform a disaggregated analysis, distinguishing different types of sports or physical activities (walking, indoor/outdoor sports, individual/group sports, sports that require/do not require facilities) and cultural events (cinema, performing arts and cultural visits). The model chosen, as in the second study, is the ZINB specification.

One of the features of our explained variables is that there is a significant percentage of the sample that does not participate in the activities during the analyzed period. The presence of non-participants leads to statistical problems and the need to correct the excess of zeros in the data. This is a key issue, as there is no consensus in previous work on the appropriate methodology to be used.

Previous studies in the literature about individuals' leisure behavior have documented extensive gender differences in the quantity and quality of free time (see e.g. Bittman and Wajcman, 2000; Mattingly and Bianchi, 2003; Sayer, 2005; and Mattingly and Sayer 2006). Hence, whenever possible, we model individuals' behavior by running separate estimates for males and females. The only exception is the third study because of small sample size problems.

In addition to gender, socio-demographic variables are also important for explaining individual leisure decisions. We have therefore included household and personal characteristics in our empirical analysis, as well as economic variables (non-labor income and hourly labor earnings). It is worth noting that most previous studies include total income as an explanatory variable. Our economic variables will allow us to separate the effect of income from other family members from own hourly earnings on the individual's participation in the leisure activities. Furthermore, as these activities are usually time-consuming, we consider it important to include a measure of the opportunity cost of time.

Since we consider the same set of covariates when studying sports and cultural participation, our research will allow us to determine whether participants in these activities are characterized by the same or different factors, thereby providing the authorities with useful information for the design of appropriate policies to remove barriers to participation in both activities.

The three studies included in this dissertation use the same data base: the Spanish Time-Use Survey (TUS) 2002-2003, conducted by the Spanish Statistical Office (*Instituto Nacional de Estadística, INE*).[2] This survey gathers information about the daily activities of individuals in a sample of approximately 24,000 households. It is the first national survey on time use in Spain and it collects information about Spaniards' participation in cultural and sports recreational activities through two means: the activity diary and the individual questionnaire.

On the one hand, the activity diary constitutes the most characteristic instrument of the survey. It collects information on the activities carried out by the individual during 24 consecutive hours, divided into 10 minute intervals. The activities are coded according to a harmonized list of activities from Eurostat, which compromises 10 large groups: personal care, work, studies, household and family, volunteer work and meetings, social life and recreation, sports and open air activities, hobbies and games, means of communication, and non-specified travel and use of time. This information will be used to define the explained variables of our first study.

The individual questionnaire, on the other hand, includes questions about the participation in as well as the frequency of cultural activity attendance and sports practice during the four weeks preceding the survey.[3] This information will be used to construct the dependent variables in our second and third studies.

The rest of the dissertation is structured as follows. In Chapter 1, we review the literature on participation in the cultural economics literature, the sports economics literature, and the few papers where participation in sports and culture has been jointly considered. In Chapter 2 we specify a structural model assuming that individuals allocate

[2] Recently, the *INE* has released a new Time Use Survey 2009-2010 but this last wave does not contain information on frequency of participation in sports and culture in the previous four weeks.
[3] See http://www.ine.es/metodologia/t25/t2530447.htm for more information about the Survey.

their time to work, sports, culture and other leisure activities with the aim of maximizing a Constant Elasticity of Substitution (CES) utility function. This model leads to a system of leisure demand equations. In Chapter 3, we analyze the frequency of participation of individuals in sports practice and cultural attendance during the previous month. Various econometric methodologies are compared, taking into account that a significant proportion of the sample has not participated during the period. Then we compute and comment on the marginal effects of the main covariates. Chapter 4 examines the frequency of participation in specific sports and cultural activities. The estimates will allow us to compare the effect of personal and family characteristics, earnings, and non-labor income on each type of activity. Finally, the General Conclusions and Agenda section gathers the main conclusions of the analyses of participation in sports and cultural activities from the previous chapters, as well as suggestions for public policies and an agenda with possible extensions for future research.

CHAPTER 1
INDIVIDUAL PARTICIPATION IN SPORTS AND CULTURAL ACTIVITIES: DATA AND LITERATURE REVIEW

1.1 Introduction

Cultural and sports economics are two emerging fields and, with few exceptions, both have evolved separately in spite of the similarities between sports and cultural goods and the methodological and policy connections between them.[4]

In this chapter we present some descriptive data on individual sports and cultural participation and review the main contributions of the sports and cultural economics literatures to the analysis of individual participation and the frequency of participation.

The rest of this chapter is organized as follows. In Section 1.2 we will provide some data on the practice of cultural and sports activities. In Sections 1.3 and 1.4 we will review the cultural economics and sports economics literatures, focusing on the studies about recreational participation. Finally, in Section 1.5 we will discuss the papers that jointly analyse sports and cultural activities.

1.2 Descriptive Analysis

Statistical reports demonstrate the importance of the cultural sector in the EU economy. These industries, including cinema and the audiovisual media, publishing, the

[4] Seaman (2003) states that the sports and cultural economics literatures could enrich each other.

craft industry and music are an important source of jobs: approximately seven million Europeans work in the field of culture. Cultural creative industries are an increasingly important source of growth in the EU. They account for 3.3% of total EU GDP and 3% of employment (Boix et al. 2013; Lazzeretti et al. 2013).

The results of the Satellite Account on Culture in Spain (Ministerio de Educación, Cultura y Deporte, 2013) reveal that cultural activities as well as intellectual property activities also have a very significant impact on the Spanish economy. The contribution of the cultural sector to Spanish GDP was 2.8% in 2009, rising to 3.6% when the activities linked to intellectual property are included.

Sports is also recognized as an important sector of economic activity. Although the overall sports market is not the largest sector of the leisure industry, the economic significance of sports has grown and the contribution of sports to GDP has been increasing in most countries in its economic weight to GDP (Gratton and Taylor, 2000; Andreff, 2008). Sports, broadly defined, generated a value-added of 407 billion euro in the EU in 2004, accounting for 3.7% of EU GDP (European Commission, 2007). Furthermore, sports provided employment for 15 million people or 5.4% of the labor force in the European Union (Dimitrov et al. 2006). Unfortunately, there are no reliable macroeconomic data about the economic contributions of the sports sector in Spain.[5]

The interest of the European public authorities in culture and sports participation is manifested in the various Eurobarometer surveys that have focused on these issues. Cultural participation has been analyzed on four occasions (European Commission 2002, 2004, 2007 and 2013), and the same applies to sports participation (European Commission 2003, 2004 and 2009). Furthermore, European citizens are shown to be interested in these

[5] There are several studies by region in Spain. Among others, Bosch et al. (2012) estimated that sports represents 1.1% of Gross Value Added in the Catalan economy. On the other hand, these scholars estimated that a total of 70,123 people were employed in the sports sector in 2006 in Catalonia.

activities because the Special Eurobarometer carried out in 2011 (European Parliament, 2011) revealed that sports and culture are the main areas of individuals' voluntary work in Europe.

According the Special Eurobarometer 278 (European Commission, 2007), 54% of individuals visit historical monuments while 51% go to the cinema at least once a year. Moreover, 37% attend concerts and 32% attend the theatre. In the case of Spain, 46% of Spaniards participated in cultural activities over the previous year[6] and 35% of individuals attended cultural events. Notwithstanding, these figures are far lower than those of northern countries (participation in live culture reached 90% in Sweden and in Denmark and Sweden some 57% of individuals attended cultural events during the previous year).[7]

The Special Eurobarometer 278 shows evidence of gender differences in cultural activities. Thus, women are more likely than men to have read a book (74% *versus* 67% of men), been to the theatre (34% *versus* 29% of men) and visited a public library (37% *versus* 32% of men) over the previous year (European Commission, 2007).

With regard to sports, the Special Eurobarometer 213 (European Commission, 2004) confirms that approximately 60% of European citizens participate actively in sports activities on a regular basis. More recently, the Special Eurobarometer 334 (European Commission, 2009) shows that a majority of European citizens play sports or carry out some other form of physical exercise at least once a week. Sports practice in Europe is both geographically and socially stratified (Hartmann-Tews, 2006; Scheerder and Van Tuyckom, 2007). In general, sports participation in European countries declines when going from north to south and from west to east. Citizens of the Nordic countries are the

[6] Respondents were asked about their involvement on an amateur basis in a range of artistic activities, whether that be on an individual basis, as part of a group or in classes (e.g. played a musical instrument, done some photography, made a film, written a text or a poem,…).

[7] Participation in live performances varies substantially across European countries: The Scandinavian countries, the Netherlands, United Kingdom, Luxembourg and Estonia have the highest attendance rates (Falk and Falk, 2011).

most active in the EU whereas the figures for the Mediterranean countries are below the EU average.

Descriptive analysis also reveals gender inequalities in sports participation. The Special Eurobarometer 334 (European Commission, 2009) shows that 43% of men said that they practice some sports at least once a week compared to only 37% of women. Most European citizens exercise for the sake of their health but women seem to attach more significance to this aspect than men. However, the number of women participating in sport has increased continuously over recent decades (Breuer and Wicker, 2009; Scheerder and Vos, 2011). Therefore, the gender gap is expected to gradually be reduced (Klostermann and Nagel, 2012).

The Time-Use surveys carried out in several European countries show that there are differences among countries, including gender differences, though these tend to be smaller in countries with higher income levels. Moreover, the participation in artistic activities, attendance at events and visits to cultural centers, as well as the practice of sports, vary more substantially among countries than overall leisure participation. Specifically, the participation indices regarding these activities are four times higher in the most active countries than in the less active.

The figures for Spain on performing arts attendance reached their maximum in 2008, and have decreased thereafter (Sociedad General de Autores-SGAE-, 2012). In relation to gender, the Survey on Cultural Habits and Practices 2010-2011 (Ministerio de Cultura, 2011) showed that attendance at cultural events is generally higher among women than men. Thus, whilst 21% of women attended theater performances, the rate was 17% for males. In addition, 7.8% of women attended the previous year *versus* 7.6% of males in the case of classical music concerts. Moreover, 22.3% of females went to libraries as opposed to 18.6% of males. Finally, the female figures were also higher for visits to

exhibitions and art galleries. Exceptions are visits to museums, monuments or archaeological sites and attendance at contemporary music concerts and cinema, where the rates are higher for males than females. Likewise, when analyzing active leisure, women paint or draw more than males. They also practice theater or dance more than males. Exceptions are playing musical instruments and taking photographs or making videos.

As we mentioned above, the number of people who play sports in Spain is considerably lower than that in other European countries. However, economic development has lead to important changes in Spain: sociological studies carried out in the country reveal that only 22% of individuals took part in sports in 1975, whereas nowadays this percentage has doubled (García-Ferrando and Llopis-Goig, 2011; Moscoso, 2011). According to the Spanish Statistical Office (2008), swimming is the most practiced sport (33%), followed by football (31.7%), cycling (19.1%) and fitness training (14%). Regarding walking, the Time Uses Surveys indicate that Spain ranks first in Europe.[8]

The southern countries in the EU, such as Spain and Italy, have the highest differences in sports practice between men and women, with the figures being above ten percent (Scheerder et al. 2011). In particular, according to the Time-Use Survey 2009-2010 (Spanish Statistical Office, 2011) Spaniards spend an average of two hours per day on sports activities. However, these activities are more prevalent in the case of men (42%) than women (36%), and the latter also spend less time on them. In addition, there are also gender differences in the case of attendance at sports events: 63% of the population between 25 and 74 never attend sports events. This figure for non-participation rises to 73.7% for women (Spanish Statistical Office, 2008).

[8] Although walking could be considered as a category of sports activity, some authors exclude it in their classification of sports.

1.3 Participation in Cultural Activities

Culture is a contested concept in economics (Klamer, 2004). Cultural goods can be defined as goods that carry cultural (non-economic) values and in which creativity is a central concept (McCain, 2006). Moreover, attendance at cultural activities may also have a social dimension because, in addition to educational and entertainment purposes, they also serve for interaction with other individuals.

Following the seminal work by Baumol and Bowen (1966), the cultural economics field began to expand, embracing several areas such as demand for the arts, the economic functions of artists, the role of the nonprofit sector, the cultural or entertainment industries (the media, movies, the publishing industry, popular music), as well as heritage and museum management, property right questions and the role of new communication technologies such as the internet (Throsby, 2006).

Several authors have conducted literature surveys. Throsby (1994) began his research by analyzing the process of formation of tastes in the demand for art, but the survey also addresses other issues such as the artists' labor market and public policies toward the arts. Blaug (2001) focuses on nine major topics in cultural economics: taste and taste formation, demand and supply studies, the media industries, the art market, the economic history of the arts, the labor market for artists, Baumol's cost disease, non-profit arts organizations, and public subsidies to the arts. Finally, Seaman (2005) reviews the arts demand literature and concludes that there are still significant issues that have yet to be dealt with, such as modeling the cultivation of taste, separating the effects of income and education, and clearing up the debate regarding socioeconomic *versus* life–style determinants of arts audiences.

The theoretical literature on participation in the arts is much less extensive than the empirical research. Cowen (1998) distinguishes three broad approaches to cultural economics: mainstream neoclassicism, loose neoclassicism (emphasizing unorthodox features of the cultural sector), and nonmainstream and institutionalist research (descriptive and empirical research without focusing on theoretical connections).

Focusing on the neoclassical approach, the standard theory analyzes cultural demand as a leisure demand where tastes and constraints affect individual's behavior and the preferences are determined.

However, a branch of the literature considers arts to be a cultivated taste, so that preferences can change by experience (McCain, 1995; Brito and Barros, 2005; Castiglione, 2011; and). Particularly, and according to Lévy-Garboua and Montmarquette (2002), there are two processes for the cultivation of taste: the models of rational addiction (Stigler and Becker, 1977; Becker and Murphy, 1988), and learning by consuming models (Lévy-Garboua and Montmarquette, 1996).[9] Seaman (2005, 2006) goes further and also considers a third process of preference formation called "habit formation" in which past consumption affects current and future consumption.[10]

Empirically, most of the literature has focused on the analysis of passive participation, i.e. attendance at cultural events. The branch of performing arts most studied has been the theater (Ateca-Amestoy, 2008; Swanson et al. 2008; O' Hagan and Zieba, 2010; Castiglione, 2011; and Zieba 2011). Other areas that have also been analyzed are music (Kurabayshi and Ito, 1992; Prieto-Rodríguez and Fernández-Blanco, 2000; Favaro and Frateschi, 2007) and, outside the performing arts, cinema (Fernández-Blanco and Baños-Pino, 1997; Dewenter and Westermann, 2005; Collins, 2009), museum attendance

[9] There is empirical evidence for both rational addiction and learning by consuming theories. Smith (1998) concluded that culture or art is at the very least habit forming rather than addictive. In turn, results on the demand for cinema by Cameron (1999) mildly support the rational addiction model.
[10] See also Pollak (1970) and Houthakker and Taylor (1970).

(DiMaggio, 1996; Frey and Meier, 2006; Brida et al. 2012), and reading habits (Løyland and Ringstad, 2008; Fernández-Blanco and Prieto-Rodríguez, 2009).

Initially, the empirical studies conducted in cultural economics were merely descriptive, showing which social groups participate more than others (see e.g., Book and Globerman, 1975; DiMaggio et al. 1978; and Throsby and Withers, 1979). These descriptive studies often reveal that individuals who are more educated, have higher incomes, and who live in urban areas make up the bulk the arts audience (Seaman, 2005).

Over recent decades there has been an increasing availability of surveys and data about participation in various arts and cultural activities. The information is usually extracted from two sources: audience studies which are specific to certain art forms and institutions, and participation studies that analyze the behavior of the whole population with respect to various art forms (Heilbrun and Gray, 2001).

Regarding audience studies, the most popular dependent variable definitions are attendance,normalized by some version of the population or a non-normalized measure of attendance or tickets sold per time period (Seaman, 2005). In these analyses the behaviour of aggregate attendance is studied and income and own-price elasticities are usually computed (Barten, 1992). But while there is econometric evidence in several studies that the demand for the performing arts is own-price inelastic, other studies find opposite results (Seaman, 2006). Regarding income, the findings are also ambiguous.

Different methodologies have been applied in these studies. Basic linear ordinary least square (OLS) - especially the double-log form - has been the most common primary estimation technique (e.g. Withers, 1980; Gapinski, 1984; Felton, 1989; Bonato et al. 1990; Throsby, 1990; Abbé-Decarroux, 1994; and Felton, 1994). Over time, more empirical applications and more sophisticated models have been published, using more variables:

step-wise OLS (Greckel and Felton 1987); two-stage least squares (2SLS) (Moore, 1966; Lange and Lukestich, 1984; Lukestich and Lange, 1995; Jenkins and Austen-Smith, 1987); non-parametric linear regression (Schimmelpfennig, 1997); Clawson-Knetsch distance modeling (Forrest et al. 2000); and conditional maximum likelihood estimation (Corning and Levy, 2002). [11]

However, most empirical studies estimate individual participation or frequency of participation in various cultural activities rather than demand functions since they do not have information about prices and/or income (Gray 2003; Borgonovi 2004). Globerman and Book (1977) and Lévy-Garboua and Montmarquette (1996) are examples of studies that use individual data on audiences. Globerman and Book (1977) estimated Engels curves for many cultural events applying step-wise OLS. Lévy-Garboua and Montmarquette (1996) developed a model of theatre demand with learning by consuming and applied Heckman and tobit methodologies.

Previous micro level studies generally apply discrete-choice models and can be divided into two subgroups: those that focus on the decision to participate and those that investigate both the participation decision and the frequency.

The participation equations in the form of probit/logit regression models consider participation as a dichotomous variable and quantify the effect of the explanatory variables on the probability of being an attendee over a determined period of time (Gray 2003). Moreover, the intensity of participation has sometimes been modeled through ordered probit/logit models (Borgonovi, 2004; Lewis and Seaman, 2004; Masters et al. 2011). However, Fernandez-Blanco et al. (2009) estimate a finite mixture model for cinema in Spain, distinguishing between groups with high average participation and low average participation. Castiglione (2011), along with other model specifications, also estimated a

[11] In addition, Pommerehne and Kirchgassner (1987) specify an almost ideal demand system to estimate shares of expenditure for various cultural goods.

finite mixture model of theater attendance in Italy. In addition, Ateca-Amestoy (2008, 2010) uses count data models, in particular zero-inflated negative binomial models, to estimate cultural attendance in the USA and in Spain. Furthermore, Ateca-Amestoy and Prieto-Rodríguez (2013) discuss the forecasting accuracy of zero-inflated negative binomial models - using bootstrapping techniques - to address the participation in the arts. Finally, Brida et al. (2012, 2013) applied other count data specifications (zero-truncated Poisson and zero-inflated Poisson models) to visits to museums.

Attendance at live performances is typically an infrequent event. This is an important issue as the presence of many zeros in survey data can lead to econometric problems and a key decision will be the choice of an appropriate estimation approach.[12] Moreover, the reasons for non-participation may be due to different causes: infrequency, abstention, and the scenario of the so-called corner solution in economics. Therefore, the different model specifications are based on different assumptions. Tobit and Heckman sample selection model have been the models traditionally applied in the leisure attendance literature when the dependent variable is continuous.[13] According to Jones (1989, 2000), the Tobit implicitly assumes that all the zeros in the database correspond to corner solutions. In this case, even though the individual is interested in participation, he does not take part because the costs of engaging in the activity are too high. On the other hand, Heckman models assume that non-participation does not correspond to either a corner solution or an abstention situation. Jones (2000) argues that Heckman models should be applied when non-participation is observed in the sample time period in the survey because the individual takes part in the activities infrequently.

[12] Lévy-Garboua and Montmarquette (2002) noted that the estimation of individual demand equations requires large samples in order to obtain a sufficient number of participants and to correct the potential selectivity bias.

[13] Ringstad and Løyland (2006) estimate a Tobit model to study the demand for books whereas Lévy-Garboua and Montmarquette (1996) and Urrutiaguer (2002) apply the Heckman sample selection model to estimate aggregate theatre demand.

However, there is an important alternative model: the double-hurdle model. The double-hurdle model has the advantage that it allows the factors that affect participation and frequency of participation to differ. Brida et al. (2013) apply double-hurdle models to explain visitors' expenditure in museums. Finally, when the dependent variable is a count variable, zero-inflated count data (zero-inflated Poisson model, zero-inflated negative binomial model, etc.) have been applied as we previously noted.

Usually, a set of socio-demographic variables such as age, level of education, and other individual skills are considered as covariates to explain individual participation in the arts. In addition, there are also studies that include variables related to the supply side, based on Lancaster assumption that an individual's utility depends on the characteristics or attributes of the goods consumed (Lancaster, 1966).[14]

Empirical analyses consistently report that gender is an essential determinant of cultural choice (Silva and Le Roux, 2011). Recent studies on cultural tastes and individual participation usually find that overall participation in the arts is higher for females than males (Bihagen and Katz-Gerro, 2000; DiMaggio, 1982, 2004; Tepper, 2000).[15] Moreover, some scholars (see e.g., Christin, 2012) search for explanations of the gender gap, and show that the gender gap in highbrow culture may be due to differences in early socialization, i.e. whereas girls are usually driven to cultural and artistic activities, boys tend to be socialized in sports.

However, some scholars note that social class factors determine higher or lower levels of engagement in cultural activities more so than gender (e.g. Silva and Le Roux, 2011). Other factors, such as adolescent exposure to the arts, age, race, partner's background, educational achievement, current income, early childhood and social relations

[14] Werck and Heynels (2007), O'Hagan and Zieba (2010) and Grisolía and Willis (2011) include output characteristics as a proxy of quality.
[15] This is also true for literature, television programmes, films and genres of visual art (Bennett et al. 2008).

are also important covariates of arts events attendance (Upright, 2004; Seaman, 2006; Ateca-Amestoy, 2008).

The role of age in performing arts attendance is comple (Seaman, 2006) and the relationship between age and arts attendance varies according the type of art performance (Favaro and Frateschi, 2007). Traditional socio-economic variables such as income, educational and occupational status were highly correlated with participation (O'Hagan, 1996; Kracman, 1996; Kraaykamp, 2003; Borgonovi, 2004; Nagel et al. 2010).

Withers (1980) and Ekelund and Ritenour (1999) emphasized the time-intensiveness of the live performing arts in the framework of time allocation models and therefore separate pure income and leisure price effects and include the hourly wage to measure the cost of time. They found that any positive income effect on arts demand will be partially offset by the time intensive nature of performing arts as well as the opportunity cost of time.

Regarding education, although some studies find that education is the most important covariate, there is also empirical evidence to the contrary (Seaman, 2005). Furthermore, multicollinearity problems may arise in regression models when education and income are included, and the issue of how to measure education is highly problematic (McCaughey, 1989). It is possible that the income variable partly captures the effects of educational and professional characteristics of the population (Diniz and Machado, 2011; Laamanen, 2013).[16]

Although there is not an extensive body of research, some studies indicate that there is a link between childhood exposure and adult engagement in culture. These studies argue that early exposure is important in developing skills and knowledge to access culture

[16] Besides own education, other family members' educational level may also be relevant. Frateschi and Lazzaro (2008) addressed the impact of spousal educational attainment on both individual and spouses' arts attendance. They found that spousal educational attainment affects joint attendance at performing arts. However, individuals display more individualistic attitudes when visiting museums.

(see e.g. Orend and Keegan, 1996; Gray, 1998; and Zakaras and Lowell, 2008). Furthermore, Andreasen and Belk (1980) concluded that socialization variables are stronger predictors than socioeconomic variables.

Finally, some authors have analyzed the relationship among different types of cultural participation. Baumol and Bowen (1966) concluded that audience characteristics are similar across the various performing arts. Despite the similarities in different performing arts audiences, and the evidence that some of them tend to have strong audience overlaps, some researchers find that fans of different types of arts are characterized by having a different social status and lifestyles (see López-Sintas and García-Álvarez 2002; López-Sintas and Katz-Gerro, 2005).

Among the studies linking different types of cultural activities, Gapinski (1986) concludes that the different live arts (theater, dance, opera and symphony concerts) have their own peculiar characteristics and are substitutes for each other. Other authors consider the relationship between high culture and popular art forms. In particular, Ringstad and Løyland (2011) find that performing arts and cinema are substitutes for each other as well as for other cultural/media goods.

In Spain, Prieto-Rodríguez et al. (2005) analyze the possible relationships among different types of consumption goods estimating an Almost Ideal Demand System (AIDS). They find that going to the cinema, to the theatre or to other shows is complementary to the purchase of books, newspapers and magazines. They also find substitutability between the former activities and the acquisition of music records and movies. In addition, Fernández-Blanco and Baños-Pino (1997), using cointegration analysis, found that the increase of television programming leads to a drop in cinema attendance in Spain. Finally, Prieto-Rodríguez and Fernández-Blanco (2000) analyze the relationship between popular

and classical music applying a bivariate probit model and conclude that the high and low arts behave as complements.

In conclusion, despite the increasingly sophisticated analysis, the econometric results achieved in the studies analyzed above are mixed (Seaman, 2005). Even though many previous researchers have found that the main determinants of different types of cultural participation are both income and education, there is no real consensus about key determinants of arts demand.

The review of the literature above refers to passive participation in cultural activities, and we have mainly focused on individual attendance at performing arts events. Few studies have analyzed amateur live arts participation. Hutchison and Feist (1991) and Donnat (1996) examine unpaid arts labor in the United Kingdom and France. Brooks (2002) estimates active arts participation through a logit procedure with the goal of comparing the behavior of professionals and amateur artists. The author finds that active arts participation is influenced by race, region of residence, age, attendance at arts events, political ideology, gender, income, and education.

1.4 Sports Participation

The interest of economists in sports goes back to the 1950s. The seminal paper by Rottenberg (1956) is the pioneer in sports economics. In the beginning of sports economics, it is worth highlighting the contributions by Neale (1964), Jones (1969), Sloane (1971), El-Hodiri and Quirk (1971), and Noll (1974). From these studies, the development of sports economics has exploded in recent years, analyzing different issues such as: the economic significance of sports markets; the economic impact of sporting events and sports facilities; economic design, finance and efficiency; competitive balance and

attendance; labor market for talents, pay and performances; game theory applied to sports; international dimensions and dysfunctions in sports (Andreff, 2011).

Individuals' sports participation can be disaggregated into two types: sports practice and attendance at sports events. Moreover, sports practice may be due to professional or recreational reasons. In this section we review the theoretical approaches and the empirical studies on active and passive sports participation, and summarize the main results.

Downward et al. (2009) carried out a comprehensive overview of the sports field examining mass participation, professional sports, and sports events. Other recent surveys about active participation in sports are those by Breuer et al. (2010) and Downward et al. (2011).[17]

Active participation in sports has become one of the most common forms of individual leisure activity (Van Tuyckom and Scheerder, 2008). There is no unique definition of sports practice because the boundaries that distinguish sports from other activities are often arbitrary and this makes international comparisons difficult.[18] According to the definition adopted in 1992 by the Council of Europe's Sports Charter, participation in sports is defined by two main criteria: it must involve physical activity; and it must be practiced for recreational purposes and/or as a competitive activity.

Downward (2007) classifies the theories about sports practice into two main types: neoclassical and heterodox approaches. Regarding the neoclassical theory, early studies about the practice of sports have applied the basic economic consumer demand theory to examine sports participation. In these researches, active sports participation is considered as a commodity whose demand depends mainly on the price, the income of the consumers,

[17] Breuer et al. (2010) present an overview of the determinants of both physical activity participation and sport expenditure. In addition, these authors mainly focus on age effects.

[18] The definition of sports activities may vary from country to country and not all national sports participation surveys consider the same list of activities, e.g. gardening is included in some participation surveys as a sports activity (Gratton and Taylor, 2000).

and the prices of related goods and services that may behave as complements or substitutes (Gratton and Taylor, 2000).

Other studies emphasize that consumers also need time to enjoy leisure commodities and analyze sports participation based on the household production approach (Becker, 1965). The first innovative application of the household production connected with the demand for sports is that by Grossman (1972). In his model, the demand for health has direct implications for the demand for active sport. Subsequently, Cawley (2004) developed the so-called SLOTH framework to analyze active participation decisions in physical activity. [19] Cawley assumes that individuals maximize their utility, which depends on the time allocated to sleeping, leisure, paid work, transportation, and home production, among other factors. Humphreys and Ruseski (2007, 2011) extended the SLOTH framework to discuss about the determinants of participation in physical activity and sports.[20]

However, the neoclassical approach has often been criticized by the supporters of the heterodox approach. Scitovsky (1976) does not agree with the assumption of neo-classical theory of a given set of preferences to analyze the behavior of a rational consumer who exactly knows what she wants. Scitovsky believes that a psychological approach is necessary to investigate how preferences are formed and hence to understand individual demand. Following this approach some studies have focused on habits and learning by doing to explain individuals' demand for sports (e.g. Adams et al. 1966; Stempel, 2005). Moreover, Spenner and Crooker (2004) also take account the formation of habits to explain attendance at sports.

[19] *S* represents time spent sleeping, *L* time at leisure, *O* time devoted to occupation (paid work*), T* time in transportation, and *H* time spent in home production (unpaid work).

[20] Becker's model has been used as a theoretical basis in many studies on active sports participation (e.g. Downward and Rasciute, 2010; Hallmann et al. 2011; Kokolakakis et al. 2012; Ruseski et al. 2011; Wicker et al. 2012; and Wicker and Hallmann, 2013). Other theoretical contributions by Becker, such as the theory of human capital (Becker, 1962) and the theory of social interactions (Becker, 1974) have also been applied in the sports economic literature to examine mass sports participation (e.g. Humphreys and Munich, 2008; and Downward and Riordan, 2007).

Within the heterodox approach, other studies of sports participation are based on Bourdieu's sociological theories (1978, 1984, and 1991). Bourdieu introduced the concept of cultural capital so that the tastes of individuals could be interpreted as an accumulation of knowledge. Individuals adopt strategies to acquire the cultural capital necessary to ensure a position in the social hierarchy. According to Bourdieu the dominant classes in societies engage in some highly exclusive sports activities, attempting to differentiate themselves from lower classes.[21]

Empirically, various techniques have been used to estimate the individual decision to participate in sports activities. Since the early studies (Adams et al. 1966 and Cicchetti et al. 1969) the modeling of sports participation decisions has increased in complexity over time.

Most authors have used discrete-choice models to analyze the participation decision. Stratton et al. (2005), Downward (2007), Hovemann and Wicker (2009), Van Tuyckom et al. (2010), and Van Tuyckom and Scheerder (2010) applied logistic regression whereas Farrell and Shields (2002) used a random-effects probit model.

Regarding the frequency of sports participation, most studies have applied Heckman sample selection models to deal with selection bias. This is the case of Humphreys and Ruseski (2006, 2007) and Downward and Riordan (2007).[22] In Spain, García et al. (2011) applied the Seemingly Unrelated Regression method to estimate a structural model of individuals' time allocation to sports practice and they also use the Heckman procedure to correct selectivity bias.

[21] Following the principles of exclusion in Bourdieu's theory, many scholars have shown that some sports are highly class exclusive (White and McTeer, 1990; Lamont, 1992; Taks et al. 1994, 1995; Defrance, 1995; Laberge, 1995; Holt, 1998; White and Wilson, 1999; Thrane, 2001; Wilson, 2002; Curtis et al. 2003; and Scheerder et al. 2002).

[22] These authors particularly focus on analyzing the impact of social capital on the decision to participate in sports and the frequency of participation. They also found that there is evidence that previous participation in sports, that is, personal consumption capital, encourages present participation in sports.

The Heckman approach assumes that there are two different decisions made by individuals: whether or not to participate in sports activities and, conditional on the participation decision, how much time to spend or how many times. Buraimo et al. (2010) and Humphreys and Ruseski (2011) applied a more general specification, namely the double-hurdle model. The main characteristic of this model is that it considers two types of non-participation: some individuals never participate because of their preferences, whereas others may participate or not.

With regard to other empirical specifications found in the literature, Lera-López and Rapún-Gárate (2005) used ordered probit models; Ebert and Smith (2010) applied a copula approach to estimate the relationship between individuals' participation in sports activities and the duration of time spent on them; Ruseski et al. (2011) used tobit models, and Downward et al. (2011) apply the zero-inflated ordered probit model.

Turning to the main findings about the determinants of sports practice, in general studies examining participation and frequency conclude that the decision to participate in sports and the frequency of this participation are driven by different factors. Moreover, males tend to participate more than females (see e.g. Taks and Scheerder, 2006; Downward, 2007; and Lera-López and Rapún-Gárate, 2007) and there are also differences in the type of sport practiced (Farrell and Shields, 2002; Humphreys and Ruseski, 2007; Breuer et al. 2011). Furthermore, García et al. (2011) run separate estimations for males and females and find evidence of relevant differences between men and women with regard to the time allocation decision as well as the participation decision in sports activities.

Gender differences can be attributed to biological factors, and also cultural and social influences reflecting differences in family responsibilities as well as differences regarding behavior, social expectations and work (Gratton and Taylor, 2000; Wilson, 2002;

Humphreys and Ruseski, 2006, 2007; Lera-López and Rapún-Gárate, 2007; Downward, 2007, Downward et al. 2009).

Moreover, other studies, such as Farrell and Shields (2002) and Downward and Riordan (2007) or Wicker et al. (2009), highlight that household variables such as being married and the presence of children have a negative influence on the participation rates of particular sports. In addition to the presence of children, Ruseski et al. (2011) found that time constraints in the form of time spent caring for children and relatives reduce both the likelihood that individuals participate and the time spent taking part in sports. However, the presence of children in the household has mixed effects depending on the type of decision about sports under consideration, i.e., participation or time spent (Humphreys et al. 2012).

The negative association between age and participation in physical activity has been repeatedly documented (Farrell and Shields, 2002; Downward and Riordan, 2007; Humphreys et al. 2012).[23]

Some scholars analyze the effect of "lifestyle" factors on mass sports participation. While covariates such as self-reported better health tend to raise participation, other factors such as smoking have the opposite effect (Farrell and Shields, 2002; Downward, 2007; and Lechner, 2009). Surprisingly, when drinking habits were analyzed a positive effect on sports participation was found (Farrell and Shields, 2002; Downward, 2007; and Downward and Riordan, 2007). Moreover, Stratton et al. (2005) found that weekly contact with family and friends lowers the individual participation in sports.

In addition to the socio-demographic factors discussed above, the literature also analyzes some economic determinants of sport activity. Humphreys and Ruseski (2011) showed that household income and the opportunity cost of time are important

[23] Instead, Breuer and Wicker (2008) obtained opposite results using longitudinal data from Germany.

determinants of physical activity. According to Downward and Riordan (2007), this phenomenon could be explained by an income-leisure trade-off model: A higher income is associated with more working hours and consequently less leisure time. In addition, these authors also showed that employed persons are slightly less likely to participate in sport than the unemployed (see also Farrell and Shields, 2002), but other researchers have found the opposite effect (e.g. Humphreys and Ruseski, 2007). Furthermore, a positive relationship between income and sport participation has been found in a number of cross-sectional studies since people with higher income can better afford the specialized equipment, fees, and other costs associated with some types of sport and physical activity (Humphreys et al. 2012).

Some studies have also taken into account macro-level variables such as the availability of sport facilities and/or sports programs. This is the case of Kligerman et al. (2007), Mowen et al. (2007), Haug et al. (2008), Limstrand and Rehrer (2008), Wicker et al. (2012), and Wicker and Hallmann (2013). Moreover, Humphreys et al. (2012) perform an international comparative analysis and attempt to measure the effect of country-level economic, demographic and institutional factors on the individual's participation decision.

So far we have analyzed studies examining mass active sports participation. We focus now on the analysis of passive sports participation (attendance at sporting events or watching sports events through the media). Since Noll (1974), many studies have applied economics to sports attendance. We can again distinguish between aggregate studies, in which the participation behavior of the population is analyzed to estimate demand functions, and studies that use individual microdata.

Regarding the first type of studies, García and Rodríguez (2009) conducted a survey of the literature examining the models, the data used and the different definitions of attendance. They conclude that attendance not only depends on the variables usually

analyzed in economics to examine demand (income and price), but that the spectators will also be influenced by the characteristics of the match such as the quality of the teams and the uncertainty of the outcome.[24]

Regarding studies which analyze the determinants of individuals' attendance at sporting events, Lera-López et al. (2012) use a Spanish database to examine two separate decisions: the consumption choice and how much money the individuals spend at sports events, differentiating between professional and amateur sporting events. By using ordered probit and Heckman sample selection models, their results show that attendance at professional and amateur events are driven by different factors. Attendance at professional sports events is positively associated with regional income, individual socio-economic characteristics, fan motivation and sports supply, whereas attendance at amateur sporting events is mainly associated with the motivation of possible social interactions, the presence of children at home, active sports participation and indicators of use of the Internet at regional level. Moreover, some scholars have emphasized that a positive relationship exists between individuals' economic and social status and the attendance at sports events (White and Wilson, 1999; Thrane, 2001). Furthermore, some authors use the concept of proletarian sports (Wilson, 2002). Thus, Mehus (2005), for example, examines this concept analyzing individuals' attendance at basketball, football, and ski-jumping events. The author applies logit models to conclude that those individuals with higher education attended less sports events than those with lower education.

Although the analyses of active and passive sports participation have generally been separate, some authors study the relationships between both activities. The literature about the connections among the demands for different types of sports participation focuses mainly on the relationship between active sports participation and passive participation in a

[24] García and Rodríguez (2002) performed an empirical analysis on Spanish football.

broad sense (sports viewer ratings on television, the reading of sports publication, etc.). However, little attention has been paid in the literature to the particular relationship between mass sports participation and attendance at sports events (exceptions include the studies of Zhang et al. 1997; Thrane, 2001; Lera-López and Rapún-Garate, 2011; and Lera-López and Suárez, 2012).

Dawson and Downward (2011) discuss the relationship among three ways of individual sports participation, namely the practice of sports and sport watched either live or via the media. They conclude that attending live sports events is complementary to active participation in sports. However, the practice of sports decreases when individuals expand the number of hours watching television.

For the Spanish case Lera-López and Rapún-Gárate (2011) do not find a relationship between the frequency of sports participation and the frequency of sports attendance. However, Lera-López and Suárez (2012), using data from the Spanish region of Navarra, find a positive correlation between active sports participation and attendance after controlling for individual socio-demographic variables.

1.5 Joint Analysis of Sports and Cultural Participation

According to the economic time allocation theory, sports and cultural activities may be analyzed as part of a complete demand system derived from the individual's decision on how to distribute their resources to consumption and time allocated to sports and cultural activities (Downward and Rasciute, 2010). However, the literature that addresses the relationship between sports and cultural activities is relatively scarce.

Some authors have performed descriptive analysis to examine participation in different leisure activities. Thus, Belk et al. (1980) find considerable overlap among the arts

audience and other leisure activities such as sports. These scholars examine two American surveys and conclude that the greater the frequency of attendance at one art form, the greater the attendance at the other entertainment events analyzed (i.e. sports, motion pictures, rock concerts and other arts).

Kate (1992), examining an American survey, finds a negative relationship between sports fandom and reading. However this author also notes that sports fans combine their interest in sports with higher rates of participation in a broad range of social and cultural activities. Furthermore, this author highlights that sports fans are more likely than non-fans to have interest in music activities.

Kopczynski and Hager (2003), using U.S. data, state that the usual attendees of the performing arts are more than twice as likely to attend professional sports events, and almost three times to attend amateur sports events than other individuals.

With regard to the studies that jointly analyze sports and cultural participation applying econometric techniques, Fernández-Blanco and Prieto-Rodríquez (2001) estimate a three-equation system to determine the probability of attending live sports, listening to music, and attending cinema using a Spanish survey "Structure, Conscience and Class Biography Survey" (*INE*, CoMa, IM, 1991). They conclude that live sports do not seriously compete in time allocation against the consumption of music or cinema. However, they do find substantial differences in the estimated effects of gender and education on live sports attendance and music and cinema consumption, with males along with less educated individuals having much higher attendance at sports.

Montgomery and Robinson (2006) employ U.S. data to estimate both levels of attendance and the proportion of attendance devoted to different leisure activities (ten types of sports, arts, and non-art events) and conclude that the relationships between

sports and arts events attendance are ambiguous. Firstly, they estimate a system of equations where the dependent variable is the natural log of the number of times the event is attended. According to their results, there are complementarities between events of different types. Furthermore, there is also evidence that highly socially active individuals who attend sporting events are more likely to also attend arts events. Secondly, they also estimate the percentage of time devoted to each activity and, contrary to their previous results, they find clear patterns of substitution between sports and arts.

Løyland and Ringstad (2009) discussed the demand for the sports good (expressed as an aggregate including both participation in sports activities and attendance at sports events). These authors estimated a system of demands applying the SURE (Seemingly Unrelated Regression System) methodology. Specifically, they analysed the following demand system: the demand for sports; the demand for newspapers, weeklies, and books; the demand for cinema; the demand for live performing arts; and the demand for audio-visual media. Their results indicate that most related leisure goods are substitutes for sports.

Finally, Montgomery and Robinson (2010) explore the attendance of married and single individuals at professional sports, high arts, and popular events using U.S. data by apply Tobit models. Although single males (females) attend more (less) sports than arts events, after marriage they find that men attend more arts events and women attend fewer arts events. They also find that both males and females attend more sports events after marriage. Therefore, while married females trade-off arts for sports events, married males do not appear to be trading off sports for arts events.

To sum up, the empirical results obtained in the literature carrying out a joint analysis of sports and cultural participation generally show that both activities are not exclusive.

CHAPTER 2
THE ALLOCATION OF TIME TO SPORTS AND CULTURAL ACTIVITIES

2.1 Introduction

As stated in the previous chapter, while a burgeoning literature exists in both cultural and sport economics, these subjects have generally been studied in isolation. The aim of this research is to analyze the individual's decision to allocate time to sports and cultural activities using neoclassical consumption theory.

For the arts, Becker's time allocation model has been used as a framework for theoretical models of demand (Seaman, 2005). Moreover, cultural goods are special goods in the sense that they have a special feature that would imply an exception to diminishing marginal utility (Marshall, 1907).

In the context of the household production model, the consumption of cultural goods grows over time, not because of a change in tastes but to a change in the shadow price due to the accumulation of human capital that the individual acquires over time (Throsby, 1994). Specifically, two approaches were developed to explain this situation: rational addiction models (Stigler and Becker, 1977; Becker and Murphy, 1988) and learning-by-consuming models (Lévy-Garboua and Montmarquette, 1996). Based on this, by purchasing cultural goods individuals obtain an "appreciation for cultural goods", and this appreciation is an argument of their utility function. Although household models must take into account the optimal allocation of all resources, namely time and income, many

empirical studies on cultural participation have not included time-related variables in their estimated models (Ateca-Amestoy, 2010).[25]

In Spain, Ateca-Amestoy (2010) discusses cultural participation using the Spanish Time Use Survey 2002-2003. The author applies both logit and count data models to examine individual time allocation for cultural activities during a surveyed day and in the previous four weeks respectively.

In the sports economic literature, most of the published studies are exclusively empirical. Focusing on papers which have a theoretical framework, Cawley (2004) extends Becker's time use model (1965) to physical activity. Later, Humphreys and Ruseski (2006) combine the main aspects of Cawley's approach with a recreation demand model (McConnell, 1992). Subsequent works by the same authors also follow the neoclassical approach to examine sports participation and time spent on physical activity (Humphreys and Ruseski, 2009, 2010).[26]

Downward (2007) explores the choice to participate in sports and states that the results suggest "more support for the predictions of heterodox theories for sport demand than the neoclassical theories" (p.650). Moreover, Becker (1974) has broadened the initial model of time allocation. According to this scholar, individuals, in addition to accumulating income, can invest in social characteristics which enable them to increase their wealth. Thus, Downward and Riordan (2007) noted that an individual's social characteristics have impacts on sports participation. Finally, Becker (1996) discusses human capital (education) to explain that this factor influences the productivity of time. As human capital increases, individuals could achieve higher incomes and then become more involved in sports in

[25] Note, however, that Withers (1980) uses the concept of "full income", imputing leisure time as part of this "full income" (Becker, 1965).

[26] Breuer and Wicker (2008) and Wicker et al. (2009) also use Becker's theoretical model.

monetary terms. Hallmann et al. (2011) recently argued that there is a significant positive influence of human capital on sports participation.

The possibility of substitution between various activities has been addressed in Kesenne (1981, 1983), Kesenne and Butzen (1987), and Downward and Rasciute (2010).

In Spain, the literature on sports and/or cultural participation from an economic perspective is scarce and, as far as we are aware, there are no articles which jointly study these leisure activities based on a structural model. However, it is worth mentioning the paper by Fernández-Blanco and Prieto-Rodríguez (2001) in which they jointly estimate the probability of attending cinema, live sports and listening to music. Their results indicate that sports do not compete with the consumption of music or cinema. Moreover, García et al. (2011) develop a model of the allocation of time to sports and leisure, assuming a Constant Elasticity of Substitution (CES) utility function.

The research presented here specifies and estimates a model of the allocation of time to sports, culture, and other leisure activities. The study develops and estimates a neoclassical model based on Humphreys and Ruseski (2006), Downward and Riordan (2007) and, especially, García et al. (2011). However, the current study expands upon the previous literature because these earlier papers focused on the time allocated to sports. In particular, we extend the García et al. (2011) model by adding another use of leisure time: time devoted to cultural activities. Thus, we specify a model that defines three uses of time apart from working-time, namely sports, cultural, and other leisure activities. This model leads to a system of three demand equations for time not allocated to work, which are estimated using the Seemingly Unrelated Regression method (SURE).

The dataset used in this research is the Spanish Time Use Survey 2002-2003 conducted by the Spanish Statistical Office (*Instituto Nacional de Estadística, INE* 2004). The sample is composed of working-age people and we run separate estimates by gender.

The outline of this research is as follows: Section 2 presents an economic model that allows the joint analysis of the individual's allocation of time to different leisure activities. Section 3 discusses the main features of the database and the estimation method. In Section 4 we present and comment on the empirical results. Finally, section 5 provides a concluding summary.

2.2 Model of Participation in Leisure Activities

In this section we specify a structural model of time allocation and derive the system of time demand equations to be estimated. The model developed in this study is an extension of the research previously conducted by García et al. (2011) which estimated a system of two typical Marshallian demand functions of time devoted to sports and other leisure practices. Furthermore, in this study three possible time allocation possibilities are examined besides working time: sports, cultural activities, and other leisure time.

Following García et al. (2011) we assume a simplified CES (constant elasticity substitution) as the utility function. The CES utility function is commonly used to model the static labor supply choice.[27] We choose this function for its flexibility (it does not impose a linear relationship between wages and time spent on various leisure activities) and ease of estimation. However, it is important to note that this functional form presents the

[27] See, for example, Zabalza (1983) and Kesenne (1983). In particular, Kesenne (1983) assumes CES utility functions to analyze substitution in consumption for leisure and non-leisure activities within the Becker framework of the allocation of time. The Stone-Geary function has also been used in consumption studies, but its performance has been disappointing when leisure is incorporated into the set of commodities (Zabalza, 1983). Moreover, in the field of sports economics, Downward and Rasciute (2010) use a Cobb-Douglas utility function, which is more restrictive than the CES because it implies that the elasticity of substitution is equal to one.

disadvantage that it does not allow inferior goods to be included in the model.[28] However, this is not a serious problem for our research because sports and cultural activities can be considered normal goods.

We assume that individual preferences are a function of consumption and time that people devote to sports, culture, and other leisure activities. According to the neoclassical model, the objective of each individual is to maximize the level of utility subject to a budget constraint.

$$Max_{c,l_0,l_1 l_2}\, U(c, l_0, l_1, l_2) \quad = [c^{-\gamma} + \alpha {l_0}^{-\gamma} + \beta {l_1}^{-\gamma} + \delta {l_2}^{-\gamma}]^{-1/\gamma}$$

$$s.t.$$

$$c = w(T - l_0 - l_1 - l_2) + y \tag{2.1}$$

where U denotes utility, c is consumption, l_0 is leisure time (not devoted to sports or cultural activities), l_1 is time spent on sports activities, l_2 is time spent on cultural activities, w is hourly earnings, y is non–labor income, and T is the time endowment (24 hours a day). Finally, α, β, δ and γ are parameters of the utility function that must meet the following conditions:

$$\gamma > -1$$

$$\alpha, \beta, \delta > 0$$

Additionally, we allow both observable and unobservable factors to enter the preferences through the parameters α, β and δ according to:

$$\alpha = e^{(z_0\varphi_0 - \mu_0)} \tag{2.2}$$

$$\beta = e^{(z_1\varphi_1 - \mu_1)} \tag{2.3}$$

[28] See Stern (1986) for details on the specification of different functional forms for the utility function.

$$\delta = e^{(z_2\varphi_2 - \mu_2)} \tag{2.4}$$

where z_0, z_1, and z_2 are vectors of explanatory variables that may influence an individual's wellbeing, and μ_0, μ_1, and μ_2 are random variables that capture unobservable factors that affect the individual valuation of leisure activities.

From the first order conditions for interior solutions, we obtain the following system of relative demands:

$$log\frac{c}{l_0} = \frac{1}{1+\gamma} logw - \frac{z_0\varphi_0}{1+\gamma} + \frac{\mu_0}{1+\gamma} \tag{2.5}$$

$$log\frac{c}{l_1} = \frac{1}{1+\gamma} logw - \frac{z_1\varphi_1}{1+\gamma} + \frac{\mu_1}{1+\gamma} \tag{2.6}$$

$$log\frac{c}{l_2} = \frac{1}{1+\gamma} logw - \frac{z_2\varphi_2}{1+\gamma} + \frac{\mu_2}{1+\gamma} \tag{2.7}$$

Estimating equations (2.5) – (2.7) will allow us to gain better understanding of the determinants of individuals' time allocation decisions. Regarding the relationship between sports and cultural activities, because the opportunity cost is the same in both cases (the amount of income that is not received by substituting work for all leisure activities), the complementarity or substitutability between these different types of leisure can only be analyzed through the correlation between the residuals of the last two equations (μ_1 and μ_2). It should be noted that although this is consistent with our theoretical approach, it also

reveals a limitation of the model since prices are not included. The costs of participation will probably be different in cultural activities and sports, as prices differ between them.[29]

2.3 Data and Estimation Procedure

The data used to estimate the model specified in the previous section are provided by *La Encuesta de Empleo del Tiempo* (The Spanish Time Use Survey) conducted by the Spanish Statistical Office (*INE*) in 2002-2003.[30] Data collection instruments included individual diaries and questionnaires pertaining to individuals and households.[31]

Individuals' daily activity is recorded by a diary that all household members aged over 10 complete on a given day. The daily activity diary collects 24 consecutive hours (from 6:00 am until 6:00 the next day) of data in 10 minute intervals. At each interval, the respondent records the main activity he is engaged in as well as any secondary activity that is performed at the same time.

These activities are coded according to a list of harmonized activities from Eurostat. The 177 main activities are classified into ten groups: personal care; work; education; home and family; volunteer work and meetings; social life and entertainment; sports and outdoor activities; hobbies and games; media; and travel to activities and unspecified time uses.

[29] The model developed by Humphreys and Ruseski (2006) contains a full budget constraint that includes time and monetary cost of participation in sport.
[30] Although there was a more recent wave conducted in 2009-2010, it was not available when this research was carried out.
[31] Researchers seem to agree that the diary is the best option because the measure of time allocation is more accurate than others. However, there are also disadvantages with diary information, as it is sometimes so general that it may mislead when examining multi-tasking (Juster and Stafford, 1991), there may be biases due to lack of response (Friedberg and Webb, 2006) or inaccurate estimates of time use during a week or a month (Mulligan et al., 2005).

Therefore, we can now determine the four dependent variables on the left-hand side of relative demand equations (2.5) – (2.7):

- *Time spent on sports activities*: This variable is defined as the amount of time (measured in hours per day) assigned to both physical activity and all types of sports such as walking, playing football,[32] going to the gym, dancing, fishing, and swimming. It also includes time spent attending sporting events. It is therefore an aggregate variable that measures both active and passive participation in sport activities. There are three reasons for this aggregation. First, a homogeneous definition of sports and culture is necessary. Second, following Dawson and Downward (2011) we consider that both demands generally manifest "a latent variable of sport consumption" (p. 38) (the same reasoning is applied to cultural activities). Third, aggregation provides us with a larger sample size.

- *Time spent on cultural participation:* This variable is defined in a similar way to the sports variable. It is the amount of time (measured in hours per day) allocated to artistic activities such as painting, sculpture, ceramics, graphic arts, pottery, making movies, singing alone or in a group, dancing, playing musical instruments, and writing novels or poetry. We also consider the time spent as a spectator at cultural events. Therefore, time spent on cultural participation is also an aggregate variable that includes active and passive participation in cultural activities.

- *Time spent on other leisure activities:* This variable is defined as the amount of time (measured in hours per day) assigned to leisure activities other than those captured by the previous two variables. The leisure variable acts as a time residual that captures time that is not devoted to work, sports or cultural activities. It is important to note that variables such as time watching television or reading books are subsumed into the leisure residual and are not considered as part of the previous two groups.

[32] In addition to football, the survey considered in this category other collective ball games, e.g., basketball, hockey, etc.

- *Consumption:* This variable represents the daily net family income. It is computed using information about monthly family income from all sources. Because income is reported in ranges, we assign the interval midpoint to each household.

In this research, we only focus on the behavior of the working-age population aged between 18 and 65. In addition, to correctly measure individual earnings we only take into account the survey information regarding each individual's primary occupation. Individuals with a secondary occupation are dropped from the sample. We also eliminate from the sample all individuals who worked more than 112 hours per week and those observations for which no information is available on the variables under study.

Our main goal is to estimate the relative demand system of equations (2.5) – (2.7). This system of relative demand equations is only applicable to the subsample of people who participate in both cultural and sports activities during the day interviewed.[33] Since this subsample is not randomly selected from the population, we must control for possible selection biases. Thus, our estimation procedure consists of two stages.

First, participation in sports and cultural activities is estimated using a bivariate probit model. The dependent variables in this bivariate probit model are discrete variables that take the value one when individuals participate in the activities during the selected day, and zero otherwise. From the bivariate probit coefficients, we compute a transformation of the predicted individual probabilities in order to correct the selection biases in the demand equations to be estimated in the second stage (see, e.g., Ham, 1982; Baffoe-Bonnie, 2009).

Second, the linear equation system (2.5) – (2.7) is estimated assuming that the random components μ_0, μ_1, and μ_2, are distributed as a trivariate normal distribution with zero means and constant variances. Additionally, our theoretical model imposes one

[33] Time spent on other leisure activities must also be positive, and all the individuals meet this condition.

constraint, which is that the coefficient on the logarithm of wages must be the same in all three equations. Thus, we estimate the system using the Seemingly Unrelated Regression (SURE) method, which allows correlation between the random terms and also allows cross-equation restrictions on the parameters. Previous studies have shown that this econometric technique can offer more efficient estimators when the equations are linked via their error terms (Cameron and Trivedi, 2005; Greene, 2008). Finally, this equation system is estimated using the subsample of people who participate in sports and cultural activities, so we include the selection rule estimates computed from the previous stage to correct the sample selection problem.[34]

In the empirical analysis, separate equations were estimated for men and women because previous findings in the literature on the allocation of time suggest that there are important behavioral differences depending on gender. Table 2.1 provides the definition and summary statistics of the variables used in the empirical analysis for the subsample of individual who participated in both activities.

[34] We can observe a zero value of time allocated to sports or culture either because the person did not participate in that activity the day the information was collected (infrequency of consumption) or because he never participates in these activities. The sample selection model does not take into account these possibilities (Buraimo et al. 2010; and Humphreys et al. 2010). However, the double-hurdle model distinguishes both mechanisms that may generate zeros: one represents the participation or not in consumption, and the other represents corner solutions.

Table 2.1a Summary Statistics of the Explanatory Variables (Males)

Variable	Definition	Mean	Standard Deviation
Age	Age of respondent	38.8195	14.3404
Married	1 if respondent is married, 0 otherwise	0.4806	0.5004
NChild12	Number of children in household aged 12 years or younger	0.2444	0.5936
Nlabinc	Non–labor individual income: calculated as income from other household members.	1242.778	1055.208
Educ1*	1 if respondent completed primary education, 0 otherwise.	0.26944	0.4443
Educ2*	1 if respondent completed secondary education, 0 otherwise.	0.3611	0.4810
Educ3*	1 if respondent completed university degree, 0 otherwise.	0.275	0.4472
	*The reference category is uneducated individuals		
Weekend	1 if day is Saturday or Sunday, 0 otherwise.	0.6228	0.4900
Ill	1 if respondent is ill, unfit or has a disability, 0 otherwise.	0.1639	0.3707
Quart1	1 if month is January, February or March; 0 otherwise	0.2806	0.4499
Quart2	1 if month is April, May or June; 0 otherwise	0.2362	0.4253
Quart3	1 if month is July, August or September; 0 otherwise	0.2362	0.4253
Urb2*	1 if respondent lives in a township with more than 100,000 inhabitants, 0 otherwise	0.0916	0.2890
Urb3*	1 if respondent lives in a township with less than 100,000 inhabitants, 0 otherwise.	0.4195	0.4942
	*The reference category is the provincial capitals.		
Adult3	1 if respondent lives in a household with more than 2 adults, 0 otherwise.	0.4556	0.4988
Region	Dummies for Andalucía, Aragón, Asturias, Baleares, Canarias, Cantabria,Castilla-León, Castilla - La Mancha, Cataluña, Comunidad Valenciana,Extremadura, Galicia, Murcia, Navarra, País Vasco and La Rioja.		
Log W	Logarithm of hourly predicted earnings, computed from a wage equation through Heckman's two–stage method.	1.7013	0.3225
N=360			

Table 2.1b Summary Statistics of the Explanatory Variables (Females)

Variable	Definition	Mean	Standard Deviation
Age	Age of respondent	38.94087	13.67401
Married	1 if respondent is married, 0 otherwise	0.4910026	0.500562
NChild12	Number of children in household aged 12 years or younger	0.2750643	0.641294
Nlabinc	Non–labor individual income: calculated as income from other household members.	1616.645	1210.175
Educ1*	1 if respondent completed primary education, 0 otherwise.	0.2827763	0.4509286
Educ2*	1 if respondent completed secondary education, 0 otherwise.	0.3316195	0.4714014
Educ3*	1 if respondent completed university degree, 0 otherwise. *The reference category is uneducated individuals	0.2493573	0.4331982
Weekend	1 if day is Saturday or Sunday, 0 otherwise.	0.5886889	0.4927051
Ill	1 if respondent is ill, unfit or has a disability, 0 otherwise.	0.1465296	0.3540917
Quart1	1 if month is January, February or March; 0 otherwise	0.2673522	0.4431476
Quart2	1 if month is April, May or June; 0 otherwise	0.2287918	0.4205958
Quart3	1 if month is July, August or September; 0 otherwise	0.2287918	0.4205958
Urb2*	1 if respondent lives in a township with more than 100,000 inhabitants, 0 otherwise	0.0694087	0.2544752
Urb3*	1 if respondent lives in a township with less than 100,000 inhabitants, 0 otherwise. *The reference category is the provincial capitals.	0.4627249	0.4992508
Adult3	1 if respondent lives in a household with more than 2 adults, 0 otherwise.	0.4318766	0.4959754
Region	Dummies for Andalucía, Aragón, Asturias, Baleares, Canarias, Cantabria, Castilla-León, Castilla - La Mancha, Cataluña, Comunidad Valenciana, Extremadura, Galicia, Murcia, Navarra, País Vasco and La Rioja.		
Log W	Logarithm of hourly predicted earnings, computed from a wage equation through Heckman's two–stage method.		
N=389			

The independent variables included in the bivariate probit models to explain the probability of participation in cultural and sports activities are: age, age squared, health, marital status, number of children younger than 12, number of adults in the home, dummies to control for the term and day of the week when the information is collected, degree of urbanization, non-labor income, region, and educational level.

Regarding the relative demands for leisure time, the explanatory variables included are: age, age squared, marital status, the number of children younger than 12, number of adults in the home, a dummy to control for weekends, predicted hourly earnings, and two terms to correct sample selection biases.

In the system of relative demand equations we include predicted hourly earnings because wages are computed as a ratio of labor earnings and working hours, and this may lead to endogeneity problems. Additionally, there is no information about the earnings of non–working individuals.[35]

For identification reasons, we assume that some variables only influence the decision to participate but not the intensity.[36] In particular, in the SURE estimates we drop health status, term, degree of urbanization, and non-labour income because we think these variables may affect the probability of participating but not the amount of time devoted to the activity. Moreover, educational level and region are assumed to have an indirect influence on the leisure demands, via their effect on individual earnings. [37]

[35] Predicted earnings are computed from a wage equation estimated using the subsample of workers and applying Heckman's two–stage method (Heckman, 1979). The estimation process is not detailed in this study.

[36] According to Maddala (1983), Amemiya (1985) and Johnston and DiNardo (1997), at least one of the explanatory variables in the first equation has to be excluded at the second step for identification. However, as Downward and Riordan (2007) point out, finding variables that are excluded from the frequency equation but not the probability of participation equation is difficult and arbitrary in many cases.

[37] Downward and Riordan (2007) identify the equations by allowing alternative functional forms in the error terms.

2.4 Results

In this section, we discuss the results of the bivariate probit estimates for the probability of participation in cultural and sports activities and the system of demand equations (2.5) – (2.7).

The coefficients estimated in the bivariate probit model that explains the probability of participating in sports and cultural activities are presented in Table 2.2 Although in probit analysis the coefficients have no direct interpretation, the signs indicate the direction of the relationship.It is worth noting that the correlation coefficient is positive and significant for both males and females. This means that individual sports participation and cultural participation are not independent. Instead, there is a relationship of complementarity between the two leisure activities.

Table 2.2 Bivariate probit: Cultural and Sports Participation of Males and Females

Explanatory Variables	Males				Females			
	Cultural Activities		Sports		Cultural Activities		Sports	
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	-0.0382	-3.59	-0.0525	-7.75	-0.0027	-0.27	-0.02798	-4.57
Agesq	0.0421	3.31	0.0750	9.41	0.0011	0.09	0.0408	5.62
Married	-0.1627	-2.94	-0.0518	-1.49	-0.2028	-4.41	0.0943	3.25
Child12	-0.0486	-1.38	-0.0565	-2.70	-0.1196	-3.78	-0.0363	-2.00
Educ1	0.1752	2.84	0.0428	1.30	0.1891	3.55	0.0784	2.67
Educ2	0.4439	7.08	0.0891	2.47	0.3261	5.57	0.0141	0.41
Educ3	0.5892	8.53	0.2244	5.30	0.4507	7.19	0.1230	3.15
Ill	0.0572	1.07	0.1875	5.86	0.0296	0.60	-0.0093	-0.31
Weekend	0.4363	11.67	0.4858	19.88	0.4473	13.06	0.2292	10.27
Quart1	-0.1050	-2.03	-0.0329	-1.00	-0.0929	-2.00	0.0228	0.76
Quart2	-0.0589	-1.13	0.0528	1.59	-0.1199	-2.53	0.1127	3.77
Quart3	-0.0527	-0.98	0.0861	2.52	-0.1289	-2.60	0.1528	4.94
Urb2	-0.0165	-0.22	0.0315	0.67	-0.0498	-0.73	0.0459	1.09
Urb3	-0.0419	-1.01	-0.0785	-2.99	-0.0840	-2.23	-0.0175	-0.73
Adult3	-0.0920	-2.18	-0.0308	-1.16	-0.1011	-2.65	-0.0241	-1.01
Andalu	-0.0780	-1.07	0.0808	1.77	-0.0205	-0.31	-0.0113	-0.27
Aragon	0.0561	0.47	0.0263	0.33	-0.0354	-0.30	0.1126	1.56
Asturi	-0.0218	-0.18	0.2131	2.84	0.1562	1.50	0.0594	0.87
Balear	-0.0546	-0.36	-0.0602	-0.66	0.1043	0.80	0.0054	0.06
Canari	0.1131	1.07	0.1359	1.98	0.1649	1.74	-0.0246	-0.40
Cantab	-0.1487	-1.20	0.1351	1.81	-0.0065	-0.06	0.2621	3.75
Castle	0.0408	0.41	0.2825	4.40	-0.0216	-0.22	0.4017	6.81
Castma	0.0209	0.18	0.0410	0.57	0.0073	0.07	0.0724	1.11
Catalu	0.0719	0.96	0.0076	0.16	0.1177	1.68	0.0089	0.20
Valenc	0.1937	2.12	0.0714	1.16	0.3525	4.35	0.0127	0.23
Extrem	0.1049	0.82	0.3171	3.83	0.2184	1.97	0.3310	4.60
Galici	0.0162	0.19	0.1452	2.66	0.0129	0.16	0.0919	1.87
Murcia	-0.2330	-1.70	-0.0461	-0.60	-0.1904	-1.42	0.1693	2.40
Navarra	0.0387	0.37	0.2455	3.65	0.1961	2.04	0.3317	5.21
Pvasco	0.0331	0.25	0.3557	4.20	0.1886	1.62	0.4222	5.49
Rioja	-0.0499	-0.36	0.2178	2.55	-0.1068	-0.74	0.2244	2.74
Nlabinc	0.0001	0.67	0.0001	1.26	0.0001	2.87	0.0001	4.61
	N=12467				**N=**14801			
	Ll=-10579.205				**Ll**=-12748.442			
	Rho=0.023656				**Rho=**0.0505695			

In Table 2.2, the estimated coefficients suggest that males and females display the same behavior in relation to cultural activities and sports according to age. Age displays a U-shaped relationship to participation in cultural activities and sports (although this relationship is not significant for females' participation in cultural activities). For males, the minimum probability of participation in cultural activities is reached at the age of 45. This variable shows a negative effect, which is similar to the findings of most previous studies (Downward, 2007; Gratton and Tice, 1991; and Humphreys and Ruseski, 2006). Further, the influence of age on sports participation agrees with the results of García et al. (2011). In our case, the probability of participation in sports activities decreases up to 35 and 34 years-old for males and females respectively.

With regard to the other explanatory variables, the probability of sports participation for males increases when a chronic illness is present. This result is surprising but may not be unreasonable because our dependent variable includes both active and passive sports. Thus, the disease may promote passive participation as a spectator of sports.

Being married negatively affects participation in cultural activities. However, for sports activities, this variable is only significant for females, and it has a positive sign. Because sports activities are more frequently practiced by males, married women attend sporting events or participate in certain sports activities with their husbands (Montgomery and Robinson, 2008*)*.

In addition to marital status, household composition also affects participation. Family responsibilities reduce the time available for leisure activity. Like sports, cultural participation is time consuming, and the presence of children under 12 in the household has an adverse effect on both types of participation, especially in the case of females (the

variable is not significant for males for cultural activities). In addition, the presence of adults in the household also reduces participation in cultural activities.

Education level shows a positive effect on both types of leisure activities. Moreover, if we compare the marginal effects of the explanatory variables, the coefficients suggest that this effect is higher for cultural activities. As we would expect *a priori*, we have evidence of the importance of the acquisition of skills, which allows increased appreciation and enjoyment of cultural activities (Baumol and Bowen, 1966; and Gray, 2003).

The results show that non–labor income has a significant and positive effect on female's probability of sports participation. Regarding the effect of the time of year, we find that that sports participation intensifies during the spring and summer seasons, and cultural participation decreases during these terms, when significant. One possible explanation for this trend is that sports activities are held outdoors, so the weather becomes a significant factor, whereas cultural activities are often carried out in enclosed places. Moreover, the practice of these activities is concentrated during weekends, when individuals have more leisure time and lower opportunity costs of participation.

In terms of the geographic variables, it might be expected that the likelihood of sports and cultural participation would be higher in urban areas, especially in larger cities where there is greater supply of such activities. The results confirm in some cases (the sign is right but variables are not always significant,) that participation in sports and cultural activities is promoted by the presence of major sports and cultural facilities in big cities.

Having analyzed the results of the first stage, we now turn to the relative demand equations. We have estimated three equations: the ratios of consumption to time allocated to sports, cultural activities, and other leisure activities respectively. However, we only

show the results two of them, namely the relative demands for culture and sports. These are the ones we are interested according to the goal of our research.

As previously mentioned, the system of relative demands has been estimated using the SURE method - which allows for the possibility that the random terms be correlated - and for the subsample of people who have positive values for participation in both cultural activities and sports. Therefore, we have included two terms to solve possible sample selection problems.

In Table 2.3, we show the results for two out of the three equations estimated. The results of the relative demand for other leisure activities are not displayed because the focus of this research is to analyze sports and cultural activities.

Table 2.3 Relative Demands for Sports and Cultural Activities of Males and Females

	Males				Females			
Explanatory	**Sports**		**Cultural Activities**		**Sports**		**Cultural Activities**	
Variables	**Log C / L_1**		**Log C / L_2**		**Log C / L_1**		**Log C / L_2**	
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*T*
Log W	0.9826	6.23	0.9826	6.23	0.8819	7.85	0.8819	7.85
Age	-0.0554	-1.85	-0.0175	-0.64	-0.0230	-0.85	-0.0521	-1.98
Agesq	0.0412	1.14	0.0041	0.12	0.0125	0.38	0.0386	1.21
Married	0.4852	3.02	0.3646	2.53	0.3372	2.44	0.4754	3.54
Nchild12	0.0732	0.71	0.1137	1.22	0.0757	0.84	0.1563	1.78
Adult3	0.4625	4.35	0.2270	2.38	0.6025	6.01	0.6117	6.27
Weekend	-0.1213	-0.81	-0.1781	-1.32	0.0265	0.23	-0.1922	-1.75
Lambda2	0.0369	0.17	0.1566	0.79	0.2039	1.25	0.4879	3.07
Lambda3	3.2971	2.06	3.2501	2.22	1.5682	1.79	2.3614	2.77
R^2	0.1662		0.1778		0.1924		0.2334	
N	360				389			
Ll	-1114.527				-1207.204			

A Breusch-Pagan test is used to examine the correlation of errors across equations. The null hypothesis of diagonal errors is rejected because there is a positive correlation between the residuals of the three demand equations (see Appendix 1). Therefore, time spent on sports, culture, and other leisure activities is not independent. This may be because both cultural activities and sports share the common character of being social activities. Thus, the individual presumably achieves his desire to interact with other individuals through participation in one activity or the other.

The results show that the influence of some variables on the participation decision is different from their effect on the time allocation decision. Therefore, participation and participation frequency are different decisions (Humphreys and Ruseski, 2006).

To analyze the effect of these variables properly, we must recall that the signs are interpreted in the opposite direction in the estimates because C/L_1 and C/L_2 are the dependent variables.

Thus, the relative demands for cultural activities and sports decline in relation to hourly earnings because when hourly earnings grow, the opportunity costs of all types of leisure activity increase.[38]

Additionally, we have computed a Wald test for the null hypothesis that the earnings coefficients are the same in all equations, and we accept this hypothesis. Thus, the results are consistent with our theoretical model and we conclude that the SURE method is more appropriate than ordinary least square estimation because it allows us to incorporate cross–equation restrictions.

A positive effect of age is identified. The relative demands of both males and females continue to increase with age, although for females, age is only significant for cultural activities, and for males it is only significant for sports. There is no consensus in the literature about the effect of this variable: Some previous studies also find positive effects for age, whereas other studies find the opposite effect.

The presence of children at home reduces females' probability of participation in cultural and sports activities and reduces the relative demand for culture. Thus, for females, children discourage both participation and the frequency of participation in cultural activities. Following Gray (2003), although having children at home implies "childcare expenses and implicit costs in the form of parental concern" (p. 358), mothers might like to share cultural activities with their children. However, the results suggest the opposite effect. In previous studies on the frequency of participation in sports, the presence of

[38] Downward and Riordan (2007) find the same effect.

children reduces sports participation, especially for females (Gratton and Tice, 1991; Humphreys and Ruseski, 2006). However in García et al. (2011) this factor positively affects the relative demand for sports of both men and women. This may suggest that parents practice such activities to ensure that their children develop a taste for sports.

The presence of adults in the household also reduces the intensity of participation in cultural and sports activities, probably because it increases the costs of family entertainment. Marriage undermines the relative demands of males and females for sports and cultural activities. Finally, it is logical that participation in these cultural activities intensifies during the weekends for females.

The significance of the terms correcting for selection bias (the lambdas) confirm that the time allocation decision is dependent on the decision to participate for both activities.

2.5 Conclusions

In this study, we specified and estimated a structural neoclassical model to analyze individual behavior concerning sports and cultural activities, and we disaggregated the choices of males and females. The dataset came from the Spanish Time Use Survey elaborated by the *INE* for the period of 2002 to 2003.

To estimate the relative demands for the different types of leisure, we applied the SURE methodology. These demand equations (2.5) – (2.7) are estimated only for the subsample of individuals who allocate time to both sports and culture during the day selected. As this sample selection may bias the results, we control for possible selection

biases by including two correction terms in the demand equations. These terms are computed from the bivariate probit estimates calculated in the first stage.

A comparison with previous literature is not straightforward because there is no homogeneous definition of cultural and sports activities. However, most of our results concerning participation in cultural activities, especially with respect to the effects of education, age, marital status, and number of children, are similar to those found in previous research. Our results also reinforce the findings in the empirical literature on sports participation: being younger, educated, and having no children at home increase sports participation.

As both sports and culture are time-intensive, family responsibilities negatively affect both participation and the frequency that individuals engaged in such activities, particularly for females and especially in the case of cultural activities. Our results suggest that there continues to be a gender gap in leisure: women are at a substantial disadvantage because even today the care of children is distributed unevenly.

Therefore, the government could promote greater job flexibility and policies favoring work-family balance to enhance sports and culture activities on weekdays. This opportunity cost is higher when wages increase, and the shadow prices for cultural and sports activities increase with an increase in predicted earnings per hour. Moreover, we assume that many of these activities require travel time, so the government should encourage a greater supply and build new infrastructure to reduce the existing gap between rural and urban areas in our model.

Household composition also affects leisure time enjoyed by the individual in other ways. Previous studies have shown that married people have less leisure time compared to the unmarried. Our results support these findings, showing a negative effect on sports and

culture demands. However, marriage increases the probability of married women participating in sports.

Moreover, the practice of these activities is not free because there are also monetary barriers. These barriers are greater the larger the family size because sports and culture are social activities often shared with other household members.

The government should also try to eliminate these barriers by subsidizing and increasing grants to low-income families. Cultural participation is different from general leisure recreation because specific training and skills are often necessary to appreciate cultural goods, so that educational barriers are especially important in the case of culture, as shown by the calculated marginal effects.

In sum, we have found differences in time allocation for sports and cultural activities between males and females and presented evidence on the existence of a gender gap in free time. This result validates our decision to conduct separate estimates by sex and allows us to identify actions that could be taken by public authorities.

In addition, the incorporation of a new demand equation that measured time allocated to culture allowed us to compare different individual leisure practices. Previous models focused only on sports and did not allow for such comparisons.

Finally, it is worth noting that there is a positive correlation between sports and cultural activities, both in terms of the probability of participation and the amount of time allocated to these activities. This suggests that a relationship of complementarity exists between both activities.

Appendix1

Table 2.4 Correlation matrix of residuals (Males)

	Log C / L_0	**Log C / L_1**	**Log C / L_2**
Log C / L_0	1		
Log C / L_1	0.5088	1	
Log C / L_2	0.5507	0.4056	1

Table 2.5 Correlation matrix of residuals (Females)

	Log C / L_0	**Log C / L_1**	**Log C / L_2**
Log C / L_0	1		
Log C / L_1	0.5957	1	
Log C / L_2	0.5952	0.4531	1

CHAPTER 3
PARTICIPATION IN SPORTS AND CULTURAL ACTIVITIES: A COMPARISON OF ECONOMETRIC METHODOLOGIES.

3.1 Introduction

The empirical literature on individual decisions related to sports and cultural activities generally uses frequency data in a given time interval. In the previous chapter, we analyzed the daily time individuals allocate to cultural and sports activities, both active and passive, using information from the activity diary of the Spanish Time Use Survey 2002-2003. In this chapter we focus our attention on a different type of information provided by the same database, namely the frequency of participation, defined as the number of times the individuals played sports or attended cultural events in the previous four weeks.[39]

A distinguishing feature of data on frequency of participation in sports and culture is that there is a high proportion of people who do not participate during the analyzed period, and this may be due to infrequency of participation, deliberate abstentions, or corner solutions.

In the economics literature on sports and cultural participation, there are many studies that use frequency data applying different econometric techniques (e.g. ordinary least squares, ordered probit or logit, multinomial logit, count data models, double-hurdle models, tobit and Heckman specification).

[39] The survey does not include questions about active cultural participation, thus we cannot define culture and sports in the same way as in previous chapter.

In this chapter, we analyze two phases of the individual's making decision procedure: participation and frequency decisions. In addition, we compare two types of econometric models that have been previously used in the literature - count data models and double-hurdle models - to check which of them is best suited to our data. In the sports and cultural economics literature, count data specifications have been previously applied in several studies,[40] whereas double-hurdle models have only been applied to the analysis of sports participation by Buraimo et al. (2010) and Humphreys and Ruseski (2011).[41] Moreover, Buraimo et al. (2010) make a comparative analysis of the Heckman and the double-hurdle model, whereas Humphreys (2010) estimates the tobit model and the double-hurdle model but, as far as we aware, no one has yet compared count data and double-hurdle models.

As in the previous chapter, we run separate estimates by gender and by type of leisure activity (sports practice and attendance at cultural events). Our preliminary estimates show that the Zero-inflated Negative Binomial (ZINB) model is the preferred among count data models. Then, this specification is compared to the double-hurdle model with independent errors. Both the ZINB and double-hurdle specifications assume that non-participation may be explained by two reasons: the individual may not be willing to participate under any circumstances, or he is a potential consumer but he has not participated during the time period considered. The main difference between both specifications is that the ZINB model takes into account that the dependent variable can only take integer values whereas double-hurdle models assume that the dependent variable is continuous.

[40] See, for example, Ateca-Amestoy (2008, 2010), Devesa et al. (2009), Fernández-Blanco and Prieto-Rodríguez (2009), Dawson and Downward (2011), Brida et al. (2012), Palma et al. (2013), Wen and Cheng (2013), and Montoro-Pons et al. (2013).

[41] In cultural economics, this specification has only been used by Brida et al. (2013) to study expenditures on visits to museums.

After choosing the econometric specification, we focus on the choice of the explanatory variables. Specifically, the previous literature indicates that education and income-related variables may be important determinants of leisure decisions. However, the inclusion of both variables may be problematic because of multicollinearity. We run three different specifications depending on the covariates included: wage but not education, education but not wage, both wage and education. The analysis of the estimates will allow us to determine the most suitable vector of covariates for each case.

Having determined the specification method and the covariates to be included, we provide a detailed analysis of the final results by computing the marginal effects of the main independent variables for each individual in the sample. This facilitates the interpretation of results, since count data models are not linear and the coefficients' values do not show the marginal effects. Finally, we apply the Oaxaca-Blinder decomposition for non-linear models to check the relevance of gender differences in characteristics and behaviour.

To the best of our knowledge, this is the first time that individual marginal effects are computed from count data models and that the Oaxaca-Blinder decomposition is used for the analysis of individual sports practice and cultural attendance.

The rest of the study proceeds as follows. In Section 2 we define and carry out a descriptive analysis of the dependent variables. Section 3 analyses and compares the econometric methodologies applied in this chapter. In Section 4 we discuss the estimation results and Section 5 summarises the main contributions of our study.

3.2 Descriptive Analysis

The Spanish Time Use Survey (TUS) conducted by the Spanish Statistical Office (*INE*) in 2002-2003, includes several questions about participation and frequency of participation in cultural and sports activities during the previous four weeks, providing a list of activities in each category. Thus, the two dependent variables in this chapter are defined as follows:

- *Nculture*: This variable denotes the number of times the individual attended cultural events during the previous four weeks. The cultural events considered are: attendance at theatre, ballet and classical dance, cinema, concerts, as well as visits to museums and monuments. Some other activities were excluded because either individuals' participation was negligible or they could not be included in a strict definition of culture - -the survey question refers to cultural and other leisure activities.[42]

- *Nsports*: This variable is the number of times the individual practiced sports or physical activity during the previous four weeks. In this case, the complete list of activities suggested in the survey is taken into account in this research: walking, running, cycling, skiing, tennis, skating, climbing, gymnastics, aerobics, yoga, swimming, boxing, and so forth.

Our empirical analysis focuses on the working-age population between 18 and 65 years old, assuming that they behave differently from other social groups such as younger or retired people. Moreover, as wage is included as a covariate in our model, it is reasonable to restrict our analysis to the population in this age interval.

In addition, other filters are introduced in the sample. In particular, following the survey criterion of setting a maximum limit of 90 times for each specific activity, the same

[42] The TUS includes other activities in this category such as going to amusement and entertainment parks, shopping, sightseeing, going to the beach, visiting fairs and exhibitions (except art exhibitions), attending circus and magic shows, and going to bullfights, as well as tourism and travel in general. These activities are not considered in our research.

limit is set in our dependent variables. Hence, we drop from our sample those observations with a frequency of participation over 90 and assume that those values might be coding errors.[43]

Table 3.1 shows the distribution of the sample based on whether or not the individuals participated in the cultural or sports activities considered. Looking at the information, 31.45% of females did not participate in sports during the previous four weeks *versus* 31.42% of males. These percentages are higher when cultural activities are analysed: 57.18% of females and 56.82% of males did not to take part in cultural events during the same period.

Table 3.1 Number of Participants and Non-Participants in Sports and Cultural Activities

Activity	Gender	Non-Participants	Participants	Total Obs.
Sports	*Female*	4608	10047	14655
	Male	3872	8453	12325
Culture	*Female*	8379	6276	14655
	Male	7003	5322	12325

Therefore, our database displays a large number of zeros in the dependent variables and this characteristic may lead to statistical problems that should be corrected empirically. This aspect will be crucial when selecting the appropriate model to analyse the behaviour of the individual regarding sports and cultural activities. However, the data do not show relevant differences in participation by gender.

With regard to the frequency of participation, Figures 3.1 show the distribution of our dependent variables by gender. In all cases, the distribution is skewed to the left.

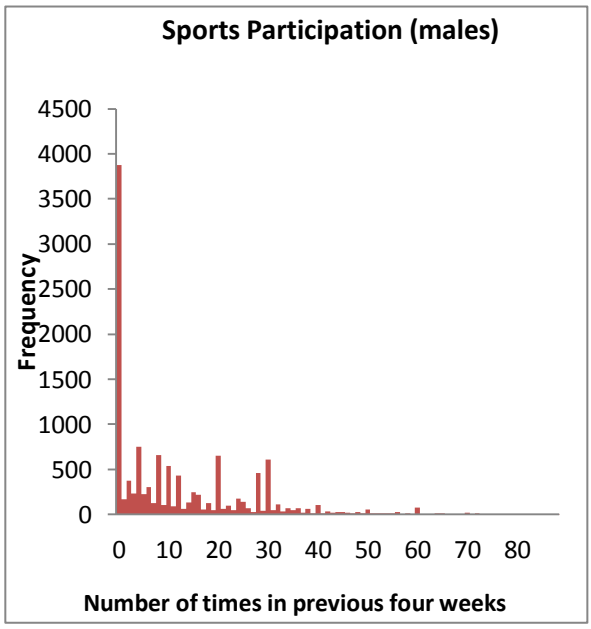
[43] The results do no change significantly as a result of this selection.

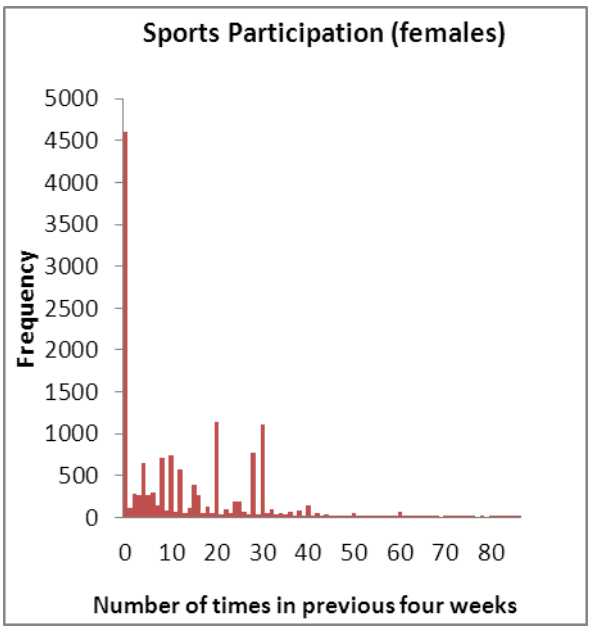
Therefore, our samples are concentrated in small values, especially in cultural activities where about 95% of the population - males and females - attended cultural events less than ten times in the last 4 weeks. For sports, those percentages are lower: 55.7% of females and 59.8% of males in the sample practiced sports less than ten times during the four weeks immediately preceding the survey.

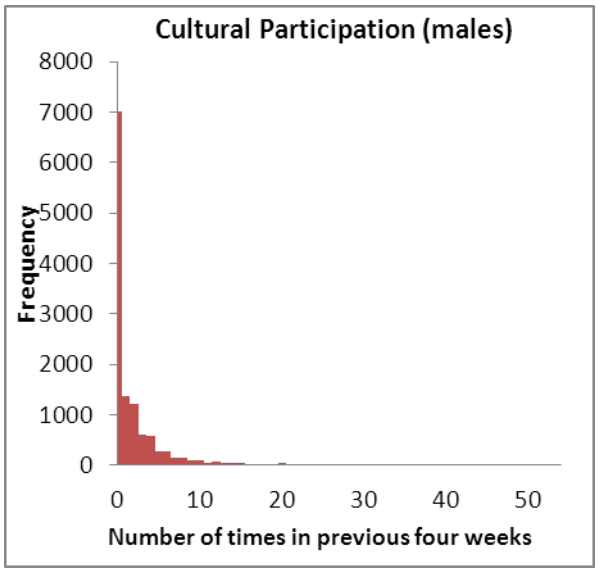
In addition, the graphs show that the number of individuals who attended cultural events decreases continuously as frequency increases. However, in the case of sports practice, the sample is concentrated in certain values.

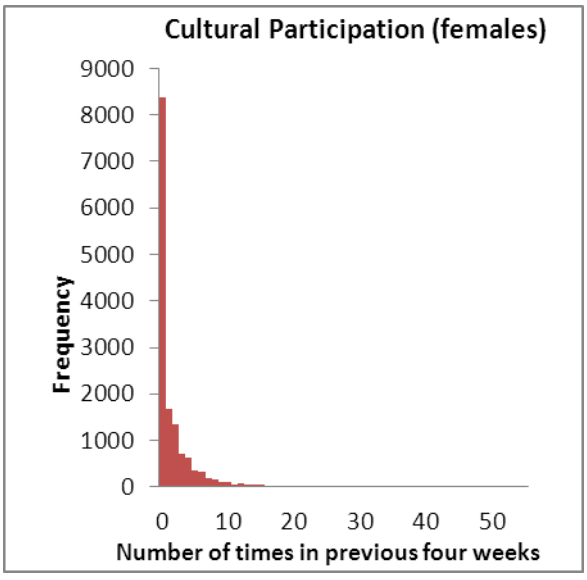
Finally, another characteristic of our dependent variables is that there are some individuals with high frequencies in sports and cultural activities.

Figure 3.1 Participation in Sports and Cultural Activities (by Gender)









3.3 Econometric Specification: Count Data and Double-Hurdle Models

In this section, we first discuss and compare different count data specifications to explain sports practice and attendance at cultural events. After having decided which is the most appropriate for our data, we then compare this with the double-hurdle model.

3.3.1 Count Data Specifications

The dependent variables in our research record the number of times that a particular event takes place in a time interval. As they can only take non-negative integer values, they can be regarded as count data. Hence, the linear regression model may lead to biased estimates. Count data models are nonlinear discrete-choice models that take into account this characteristic of the variable and are estimated by maximum likelihood.

In the count data literature, various distributions have been proposed for the dependent variable.[44] The Poisson model, which assumes a Poisson distribution, is the simplest. However, this model usually underestimates the actual frequency of zeros in the data and it does not fit over-dispersion of the dependent variable because it assumes equality of the conditional mean and the variance (equidispersion).

A more general model is the Negative Binomial Model (NBM). Indeed, the Poisson model is a special case of the NBM. The NBM model adds a parameter to the Poisson model that overcomes the problem of over-dispersion. The Poisson model and NBM are standard models for count data. Although NBM solves over-dispersion, is not the right model when the dependent variable has an overabundance of zeros. Unlike the previous

[44] See Cameron and Trivedi (2013) for a comprehensive analysis of count data models.

models, the Zero-Inflated Regression Models are able to incorporate over-dispersion and excess zeros, two problems that typically occur in count data variables (Lambert, 1992).

There are two types of zero-inflated regression models: the Zero-Inflated Poisson model (ZIP) and the Zero-Inflated Binomial Negative model (ZINB). Both of them assume the existence of two types of subpopulations in the data, usually denominated the Always Zero group and Not Always Zero group. The difference between these models lies in the specification of the probability of each count.

According to the zero-inflated models, there are two subgroups in the sample:

- *Always Zero group*: It is composed of all those individuals who never take part in the activity in question. In this case, the results would be zero with a probability one. In other words, the individuals in this group do not even contemplate the possibility of participating under any circumstances.

- *Not Always Zero group*: This group includes all those individuals who may or not participate, depending on the restrictions they face. Therefore, people in this group have a positive probability of having a positive outcome. In this case, a zero value would reveal a corner solution.

It is worth noting that our survey does not differentiate between both types of non-participation.

Preliminary estimates have been made on the various count data models discussed above. Regarding the covariates included, following the time allocation literature we assume that an individual's decisions depend on personal and family characteristics because they determine preferences. Moreover, non-labour income and wage are included to reflect the budget constraint. Finally, other variables are considered to control for the supply of sports and cultural activities. Consequently, the explanatory variables included in our analysis are

age (and age squared), health (only for the sports analysis), marital status, number of children younger than 12, a dummy about the number of adults in the home, non-labour income, logarithm of hourly earnings, labour status (a dummy variables equal to one if the individual is working), as well as dummies to control for the term and degree of urbanisation. Appendix 3.1 displays this set of covariates and the descriptive statistics of the variables.

It is worth noting that hourly-earnings are not available for non-working people in the sample. To address this issue, we estimate a wage equation applying Heckman's two-stage selection model (Heckman, 1979) to take into account the sample selection bias. From the estimated coefficients of the wage equation, predicted earnings are computed for non-workers – conditioned on their labour status - whereas for workers we use their observed wages.[45]

With the selected sample, we estimated the four count data specifications discussed above: the Poisson (PM), Negative Binomial (NBM), Zero-Inflated Poisson (ZIP) and Zero-Inflated Negative Binomial (ZINB) models, and we apply the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) to compare them.

The AIC is computed as:

$$AIC = -2Ll + 2k \tag{3.1}$$

where L is the maximized log likelihood value and k is the number of parameters in the model. The model with the smallest information criteria will be the preferred. The Bayesian Information Criteria (BIC) is:

$$BIC = -2Ll + (LN)k \tag{3.2}$$

[45] See García (1991) for a discussion about alternative methodologies to predict wages.

where *N* is the number of observations.

Tables 3.2 and 3.3 show the logarithm of the likelihood function, the values of the AIC and BIC statistics, and the sample sizes for sports and culture respectively.

Table 3.2 Sports Participation

	Males				Females			
	PM	**NBM**	**ZIP**	**ZINB**	**PM**	**NBM**	**ZIP**	**ZINB**
N	12325	12325	12325	12325	14655	14655	14655	14655
Ll	-114435.77	-41357.36	-69088.04	-39574.25	-133372.92	-50183.34	-73752.78	-47210.78
AIC	228907.5	82752.73	138248.1	79222.507	266781.8	100404.7	147577.6	94495.56
BIC	229041.1	82893.70	138515.2	79497.024	266918.5	1 00548.9	147850.9	94776.48

Note: PM denotes Poisson Regression model. NBM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model

Table 3.3 Cultural Participation

	Males				Females			
	PM	**NBM**	**ZIP**	**ZINB**	**PM**	**NBM**	**ZIP**	**ZINB**
N	12325	12325	12325	12325	14655	14655	14655	14655
Ll	-22084.22	-16740.31	-17891.37	-16100.63	-25622.01	-19682.70	-21020.36	-19040.51
AIC	44202.447	33516.631	35850.734	32271.268	51278.02	39401.412	42108.727	38151.013
BIC	44328.576	33650.18	36102.993	32530.946	51407.093	39538.077	42366.873	38416.751

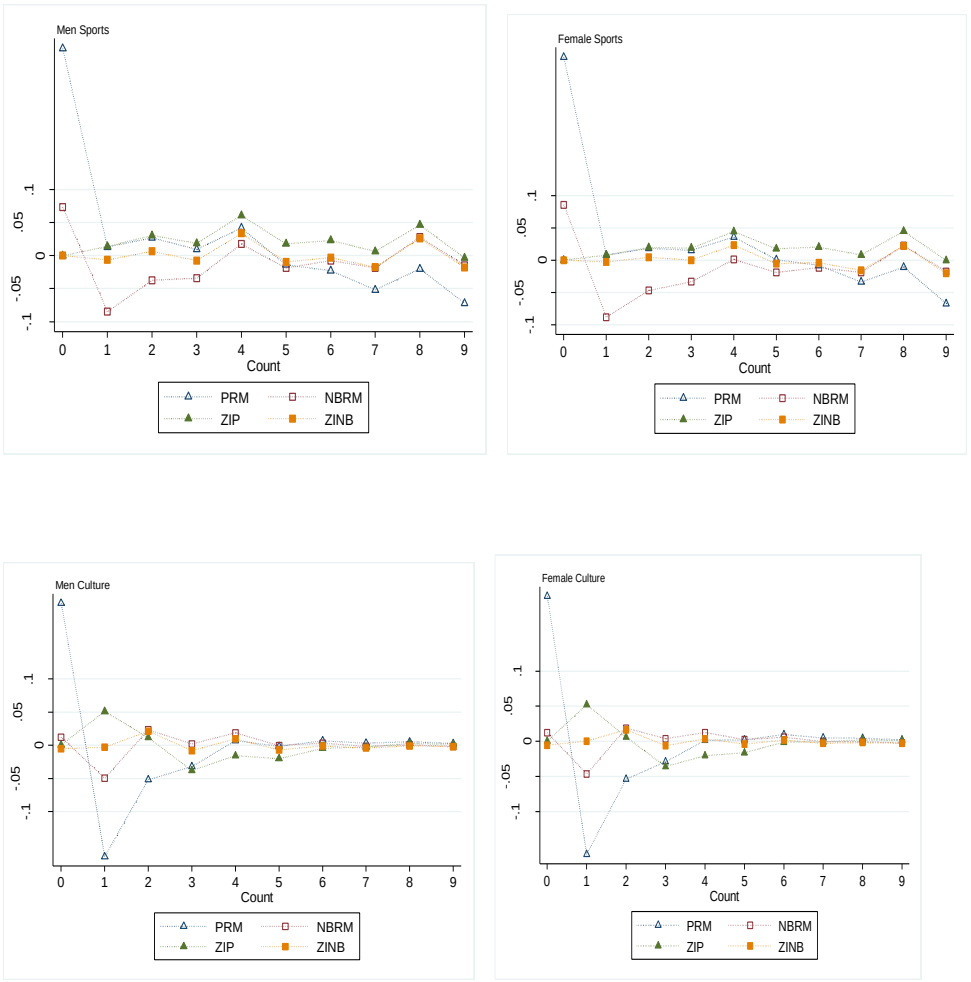
Note: PM denotes Poisson Regression model. NBM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model

Both the AIC and the BIC display the lowest values for the ZINB model, so the test results support the choice of a model that takes into account the high proportion of non-participants in the sample. [46]

In addition to the previous tests, the following figures also confirm the selection of ZINB models among count data specifications for our study. Figure 3.2 displays the residuals of the models, showing the difference between the observed probability and the average predicted probability for any value of the dependent variables in our estimates.

[46] In addition to AIC and BIC, various tests have been performed allowing us to conclude that the Zero-inflated specification was the most appropriate for our data. In particular, the simple Poisson model and Negative Binomial Model (NBM) are compared through a likelihood ratio test since they are nested models. The result shows that NBM is more appropriate than Poisson. Moreover, Vuong's test is applied to determine whether the zero-inflated models (ZIP and ZINB) are more suitable than the Poisson model and NBM. The final outcome shows that inflated models are preferred.

Figure 3.2 Difference between observed probabilities and average predicted probabilities by gender



Note: PM denotes Poisson model. NBM denotes Negative Binomial Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

Small residuals are indicative of well-fitting models. Positive deviations reveal under-predictions whereas negative values indicate over-predictions. The plots confirm that

the ZINB model is the specification where the divergence between the observed and the mean predicted probabilities are smaller.

3.3.2 ZINB Model *versus* Double-Hurdle Model

As well as the Zero-inflated Count data models, the double-hurdle specification also assumes that there may be two reasons for observing a zero in the dependent variable: deliberated abstentions and corner solutions.

Although our dependent variables only take zero or positive integer values, so that the ZINB count data model might seem more appropriate *a priori*, they take high values for some individuals and therefore could also be considered as continuous, in which case the double-hurdle specification can be applied. [47]

On that basis, we consider that it is interesting to compare both methodologies with our database. Although both models have been previously applied in the sports and cultural literature on participation as discussed in Section 3.1, as far as we are aware they have never been compared.

In the reminder of this section we detail the econometric specification of the ZINB model, following Long and Freese (2006), and the double-hurdle model.

Starting with the ZINB model, the probability that an individual belongs to the Always Zero group is assumed to follow a logit specification:

[47] See Wooldridge (2009).

$$\psi_i = p(A_i = 1|z_i) = \frac{exp(z_i\gamma)}{1+exp(z_i\gamma)} \quad (3.3)$$

In equation (3.3) A_i is a binary variable, that is equal to one if the individual belongs to the group, and zero otherwise, and z_i is the vector of explanatory variables. Z_i are called variables of inflation, since they inflate the number of zeros in the observations.

The probability of each count in the Not Always Zero group – i.e. for the individuals with positive levels of participation or zero participation due to corner solutions - is computed by a Negative Binomial Regression:

$$p(Y = y_i|x_i) = \frac{\Gamma(y_i + \alpha^{-1})}{y_i!\,\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu_i}\right)^{\alpha^{-1}}\left(\frac{\mu_i}{\alpha^{-1} + \mu_i}\right)^{y_i} \quad (3.4)$$

where y_i is a discrete variable that reflects the number of times the individuals have practiced sports or attended cultural events over the four weeks preceding the survey, Γ is the gamma function, α is a parameter to be estimated, and μ_i is the expected number of counts for the Non-Always Zero group and is equal to:

$$\mu_i = exp(x_i\beta) \quad (3.5)$$

In the previous equation, β is a vector of coefficients, and x_i is a vector of explanatory variables. The factors that determine the probability of belonging to the Always Zero group (z_i) are not necessarily the same as those that affect the probability of each count (x_i), but exclusion restrictions are not required for identification. In fact, many

previous studies often use the same set of explanatory variables in equations (3.3) and (3.4). Initially, we use the same variables in the both parts of the model.

According to the above assumptions, the probability of observing a zero in the sample is specified as follows:

$$p(y_i = 0|x_i, z_i) = \psi_i * 1 + (1 - \psi_i) * p(y_i = 0|A_i = 0, x_i, z_i) = \tag{3.6}$$

$$= \psi_i + (1 - \psi_i) * \left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu_i}\right)^{\alpha^{-1}}$$

Furthermore, the probability of observing a positive value for *y* is given by equation (3.4). Then, the log-likelihood function is:

$$\begin{aligned} log\, L = & \sum_{\{y_i=0\}} log\left[\psi_i + (1 - \psi_i) * \left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu_i}\right)^{\alpha^{-1}}\right] \\ & + \sum_{\{y_i>0\}} [log(1 - \psi_i) + log\Gamma(y_i + \alpha^{-1}) + log\Gamma(y_i + 1) - log\Gamma(\alpha^{-1}) \\ & + \alpha^{-1}\, log(\alpha^{-1}) + y_i\, log(\mu_i) - (\alpha^{-1} + y_i) log(\alpha^{-1} + \mu_i)] \end{aligned} \tag{3.7}$$

Looking now at the double-hurdle methodology, the models are so called because individuals must overcome two hurdles to observe a positive value in participation. First,

the individual decides whether or not to participate. Second, those who opt for demanding the activity have to choose how often to demand. Thus, the specification of these two-part models consists of two equations:

$$y_{i1}^{*} = A\, z_i + u_i \tag{3.8}$$

$$y_{i2}^{*} = B\, x_i + v_i \tag{3.9}$$

where y_{i1}^{*} is a latent dependent variable that determines whether the individual *i* participates (y_{i1} = 1) or not (y_{i1} = 0) in cultural/sports activities; y_{i2}^{*} is a latent endogenous variable representing how many times the individual has participated in sports/cultural activities in the previous four weeks; z_i is a vector of observed independent covariates that explains the participation decision and x_i is a vector of observed independent factors affecting the frequency decision. Moreover, *A* and *B* are vectors of unobserved parameters to be estimated. Finally, u_i and v_i are unobserved random variables that follow a normal distribution.

Equation 3.8 is the first hurdle representing the participation decision and equation 3.9 is the second hurdle, which specifies the subsequent individual decision about frequency. The corresponding observed dependent variable y_i, representing the engagement in sports/cultural activities, could be positive or zero in the case that an individual might potentially participate $y_{i1}^{*} > 0$, but finally does not participate during the period (y_{i1}^{*}=1, y_{i2}^{*}=0).

$$\begin{cases} y_i = B\, x_i + v_i \;\; if \;\; y_{i1} > 0 \;\; and \;\; y_{i2} > 0 \\ y_i = 0 \qquad\qquad\qquad\qquad otherwise \end{cases} \tag{3.10}$$

We can distinguish between two specifications of the double-hurdle model depending on the assumptions on the random terms: double-hurdle model with independent errors, also called Cragg model because this author was the first one to propose it (Cragg, 1971), and double-hurdle model in which disturbance terms are correlated. In our empirical specification, we have assumed that there is independence among the error terms in the participation and frequency equations in our model.[48]

Thus, the likelihood function for the Cragg model is:

$$L = \prod_1 P(v_i > -A\, z_i)\, P(u_i > -B\, x_i) f(y_i | u_i > -B x_i\,) * \qquad (3.11)$$

$$* \prod_0 (1 - P(v_i > -A\, z_i)\ P(u_i > -B x_i))$$

We use the subscript *0* to denote those individuals whose level of frequency for sports/cultural activities is zero and a subscript *1* for all other individuals whose intensity level for sports/cultural activities is positive. Then, $\prod_0$ is the product operator for observations where $y_{i2} = 0$, and $\prod_1$ is the product operator for observations where $y_{i2} = 1$. Finally, *f* is the probability density function for a standard normal random variable.

Given the assumption of independent errors, the Cragg model can be estimated in two parts: a probit for the probability of participation in the first stage, and a truncated normal regression in the second stage. Nevertheless, we estimate both tiers of the model simultaneously.

[48] We tried to estimate a dependent double-hurdle model but we did not achieve convergence. Nevertheless, Smith (2003) argued that the assumption of non-zero correlation between the two processes may be spurious, and the identification of dependence between errors is likely to be very weak without exclusion restrictions.

Double-hurdle models have a flexible structure and do not require exclusion restrictions to identify the equations. Thereby, the same explanatory variables are included in both the participation and the frequency equations, as we did in the ZINB specification.

Tables 3.4 and 3.5 show the coefficients and t-statistic for both the ZINB and the double-hurdle models. The coefficients are not directly comparable because the ZINB model is a non-linear specification and, in addition, the participation decision is modeled in a different way: that is, the ZINB model specifies the probability of belonging to the Always Zero group whereas the double-hurdle model specifies the probability of being a potential participant. This is the reason why the coefficients in the participation equation are generally of opposite sign.

Table 3.4 Sports Practice: ZINB and Double hurdle (DH) Models

Explanatory Variables	ZINB				DH			
	Males		Females		Males		Females	
	Frequency decision				Frequency decision			
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	-0.02308	-4.27	-0.01309	-3.12	-1.23256	-4.12	-0.43671	-2.90
Age2/100	0.02962	4.73	0.01931	4.01	1.62038	4.60	0.65822	3.75
Married	-0.07005	-2.61	-0.03603	-1.89	-3.97988	-2.69	-1.17491	-1.72
Nchild12	-0.03659	-2.13	-0.00964	-0.78	-2.32114	-2.32	-0.38567	-0.85
Adult3	-0.02448	-1.19	-0.01549	-0.98	-1.33563	-1.20	-0.60505	-1.08
Ill	0.02289	0.96	0.03379	1.82	1.34087	0.99	1.19625	1.74
Educ1	-0.00806	-0.31	0.02981	1.63	0.51643	0.35	1.25710	1.79
Educ2	0.02966	1.02	0.04794	1.99	1.77826	1.10	1.91133	2.19
Educ3	0.05612	1.57	0.10691	3.51	3.17247	1.61	4.20410	3.89
Labour	-0.29145	-12.74	-0.20047	-9.78	-16.14035	-11.82	-7.29854	-10.12
Log (Wage)	0.0805	3.39	0.00654	0.30	4.75178	3.60	0.22477	0.30
Nlaboinc	-0.00001	-0.04	-0.00001	-1.43	0.00001	0.01	-0.00041	-1.49
Quart1	-0.00002	-0.01	0.00389	0.19	-0.05576	-0.04	0.17633	0.25
Quart2	0.01893	0.73	0.02746	1.39	0.95005	0.67	0.94339	1.34
Quart3	0.11106	4.28	0.10467	5.16	6.00930	4.19	3.76810	5.21
Urb2	-0.01496	-0.43	-0.03820	-1.39	-0.63361	-0.33	-1.39572	-1.41
Urb3	-0.05124	-2.62	-0.00811	-0.53	-2.79861	-2.61	-0.37370	-0.70
	P(Always-Zero Group)				**P(y^*_1>0)**			
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	0.08297	6.12	-0.01500	-1.35	-0.04773	-6.29	0.00889	1.35
Age2/100	-0.09570	-6.00	-0.00005	-0.01	0.05518	6.17	0.00014	0.02
Married	0.10703	1.70	0.14347	2.81	-0.06445	-1.79	-0.08534	-2.85
Nchild12	0.15431	4.38	0.21030	6.94	-0.09173	-4.43	-0.12657	-6.93
Adult3	0.29085	5.90	0.22655	5.40	-0.16483	-5.85	-0.13383	-5.42
Ill	0.07592	1.28	0.34335	6.87	-0.04068	-1.19	-0.20587	-6.87
Educ1	-0.22956	-4.12	-0.20457	-4.12	0.13290	4.04	0.12181	4.07
Educ2	-0.52551	-8.10	-0.43772	-7.08	0.30190	8.14	0.26178	7.14
Educ3	-0.90712	-9.98	-0.62532	-7.81	0.50130	10.22	0.36762	7.93
Labour	0.42844	7.32	0.38486	7.99	-0.25775	-7.93	-0.23593	-8.32
Log (Wage)	-0.45350	-9.33	-0.16847	-3.43	0.26523	9.41	0.10070	3.46
Nlaboinc	-0.00015	-5.55	-0.00016	-7.11	0.00008	5.39	0.00009	7.24
Quart1	0.16735	2.80	0.18264	3.51	-0.09600	-2.82	-0.10744	-3.49
Quart2	0.18735	3.10	0.12430	2.35	-0.10531	-3.05	-0.07319	-2.36
Quart3	0.09028	1.44	0.20619	3.81	-0.04556	-1.27	-0.11942	-3.73
Urb2	0.12268	1.50	0.16905	2.43	-0.07149	-1.53	-0.10256	-2.48
Urb3	0.08100	1.74	0.03841	0.96	-0.05007	-1.89	-0.02216	-0.93

Table 3.5 Cultural Event Attendance: ZINB and Double-Hurdle (DH) Models

Explanatory Variables	ZINB				DH			
	Males		Females		Males		Females	
	Frequency Decision				Frequency Decision			
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	0.00300	0.27	-0.00225	-0.19	1.28541	0.90	0.09373	0.06
Age2/100	0.00766	0.55	0.00947	0.65	-0.78458	-0.51	0.93922	0.47
Married	-0.31434	-4.22	-0.33198	-5.69	-16.85052	-1.48	-35.83893	-1.31
Nchild12	-0.22254	-4.98	-0.24129	-6.36	-20.86974	-1.62	-28.59532	-1.30
Adult3	-0.08638	-1.93	-0.07705	-1.99	-5.39556	-1.01	-11.88392	-1.16
Educ1	0.06595	0.90	0.24251	3.41	34.1910	0.39	35.43076	1.24
Educ2	0.27862	3.82	0.39703	5.38	21.51120	1.44	57.56031	1.30
Educ3	0.57647	6.85	0.52126	6.43	50.00067	1.67	67.26864	1.31
Labour	-0.02598	-0.53	-0.15802	-3.38	-7.57483	-1.15	-22.04277	-1.25
Log (Wage)	-0.03960	-0.86	0.11959	2.69	-2.51013	-0.52	17.48542	1.20
Nlaboinc	0.00009	4.62	0.00009	5.00	0.00627	1.57	0.01004	1.31
Quart1	-0.23284	-4.67	-0.08621	-1.92	-20.83909	-1.60	-12.68677	-1.10
Quart2	-0.13066	-2.56	-0.10096	-2.21	-10.17143	-1.29	-12.08784	-1.07
Quart3	-0.01111	-0.19	0.07517	1.39	-12.2300	-0.23	11.53558	1.06
Urb2	-0.08145	-1.15	-0.13689	-2.23	-34.6389	-0.45	-18.60507	-1.10
Urb3	-0.10165	-2.54	-0.08518	-2.30	-8.36155	-1.32	-11.33548	-1.15
	P(Always-Zero Group)				**P(y^*_1>0)**			
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	0.27604	10.19	0.19279	7.88	-0.07873	-10.05	-0.05209	-7.55
Age2/100	-0.23318	-7.81	-0.15720	-5.77	0.06390	6.82	0.03756	4.57
Married	0.29890	2.48	0.42327	4.10	-0.26885	-7.29	-0.31171	-10.21
Nchild12	0.18655	2.52	0.23283	3.57	-0.16130	-7.34	-0.19559	-10.14
Adult3	0.27492	3.16	0.21741	2.86	-0.14098	-4.81	-0.09883	-3.82
Educ1	-0.66078	-6.38	-0.62044	-7.05	0.32810	8.74	0.37217	11.31
Educ2	-1.30426	-11.39	-1.19316	-10.05	0.66933	16.80	0.65719	17.20
Educ3	-2.01124	-11.64	-1.96509	-9.74	0.96728	19.69	0.92530	19.59
Labour	-0.77947	-7.87	-0.24427	-2.58	0.28466	8.59	0.02353	0.80
Log (Wage)	-0.73622	-7.73	-0.51496	-4.58	0.23792	8.15	0.22197	7.35
Nlaboinc	-0.00034	-6.32	-0.00035	-7.23	0.00014	9.77	0.00015	11.58
Quart1	-0.12555	-1.18	-0.08375	-0.89	-0.05180	-1.48	0.00154	0.05
Quart2	0.14481	1.37	-0.04998	-0.52	-0.09993	-2.81	-0.03185	-1.00
Quart3	0.08340	0.76	0.11793	1.22	-0.04252	-1.15	-0.02646	-0.79
Urb2	0.15601	1.05	0.20992	1.58	-0.12268	-2.53	-0.11157	-2.56
Urb3	0.22591	2.67	0.31112	4.14	-0.15088	-5.60	-0.15003	-6.15

In general, the set of significant covariates is the same in both specifications and have the same sign. However, it is worth noting that in the double-hurdle model no variable is significant in the explanation of frequency of attendance at cultural events.

Since count data and double-hurdle models are non-nested, we compare them by using the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The values of these criteria are shown in Tables 4.6 and 4.7 and allow us to conclude that the ZINB model is the one that best fits to our data.

Table 3.6 Sports Participation

	ZINB		DH	
Statistics	**Males**	**Females**	**Males**	**Females**
N	12325	14655	12325	14655
Ll	-39574.25	-47210.78	-39746.69	-47315.67
AIC	79222.507	94495.562	79567.39	94705.35
BIC	79497.024	94776.486	79841.9	94986.27

Table 3.7 Cultural Participation

	ZINB		DH	
Statistics	**Males**	**Females**	**Males**	**Females**
N	12325	14655	12325	14655
Ll	-16100.63	-19040.51	-17012.77	-20109.61
AIC	32271.268	38151.013	34095.55	40289.22
BIC	32530.946	38416.751	34355.23	40554.96

3.4 ZINB Specification: Analysis of Empirical Results

After selecting the econometric specification, we turn now to the analysis of results. In this section, we first discuss the inclusion of two explanatory variables: education and

earnings. Secondly, we present and comment on our final estimate. Finally, we apply the Oaxaca-Blinder decomposition to gain deeper insight into the gender differences in sports and cultural participation decisions.

3.4.1 Discussion of Explanatory Variables: Education *versus* Earnings

In our previous estimates, we incorporated as covariates wages and education, two variables that may cause a multicollinearity problem, given that education is a main determinant of individual productivity and thus of earnings.

Seaman (2005, 2006) discusses this issue in detail, focusing on the economics of highbrow culture. This author notes that although theoretical analysis assumes that education is a key variable in performing arts demand, many empirical models do not confirm this result. It is worth noting that this scholar argues that econometric evidence favoring specific forms of arts training over individual's formal education exists. Furthermore, Seaman (2006) notes that there is some empirical evidence of a weak impact of formal education in demand models (when controlling for other determinants such as income).

Moreover, McCaughey (1989) argues that "the reasons for the positive association of general educational attainment with participation in the arts are not fully understood; and how specifically arts education fits into association is not clear" (p.48).

To clarify the influence of these variables, we performed several estimates of the ZINB specification. In addition to the specification discussed in the previous section, in which we included earnings and the educational level, we also estimate the models for both activities including wages but not education, and education but not wages. The remaining covariates are the same as in the previous section. Tables 3.8 and 3.9 include the

coefficients and t-values of the education dummies and the logarithm of hourly earnings, as well as the Akaike and Bayesian Information Criteria for the three sets of estimates. The results for the rest of variables do not differ substantially among the different specifications (in Appendix 3.2 we include the complete estimates).

The first part of the tables corresponds to the results regarding frequency of participation of the Not Always Zero group. The last part of the tables provides information on the determinants influencing the membership of the Always Zero group, based on a logit model. Given that count data models are non-linear, the interpretation of the coefficients is not straightforward, although their signs indicate whether the relationship is direct or inverse. If the coefficient has a positive sign in the inflated part of the model, the variable has a positive influence on the probability of being a non-participant in the activity. Moreover, if the variable has a positive sign in the frequency part, it means that the variable has a positive effect on the expected number of counts.

Table 3.8 Sports Practice: ZINB Estimates. Education *Versus* Wage

Explanatory Variables	**Males**		**Females**		**Males**		**Females**		**Males**		**Females**	
Frequency decision	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*T*	*Coef.*	*t*
Log (Wage)	0.09937	4.68	0.04041	2.16					0.0805	3.39	0.00654	0.30
Educ1					0.00026	0.01	0.03045	1.67	-0.00806	-0.31	0.02981	1.63
Educ2					0.05082	1.80	0.05010	2.17	0.02966	1.02	0.04794	1.99
Educ3					0.10595	3.29	0.11139	4.20	0.05612	1.57	0.10691	3.51
P(A=1)	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*T*	*Coef.*	*t*
Log (Wage)	-0.64170	-14.01	-0.34407	-7.81					-0.45350	-9.33	-0.16847	-3.43
Educ1					-0.26894	-4.86	-0.21872	-4.43	-0.66078	-6.38	-0.62044	-7.05
Educ2					-0.63550	-10.02	-0.49067	-8.22	-1.30426	-11.39	-1.19316	-10.05
Educ3					-1.17848	-13.71	-0.73969	-10.18	-2.01124	-11.64	-1.96509	-9.74
N		12325		14655		12325		14655		12325		14655
Ll		-39642.05		-47216.83		-39626.41		-47254.84		-39600		-47200
AIC		79346.11		94503.65		79322.81		94571.68		79222.507		94495.56
BIC		79576.11		94769.39		79582.49		94807.05		79497.024		94776.49

Note: other variables considered are: age (and age squared), health, marital status, number of children younger than 12, a dummy about the number of adults, non-labour income, logarithm of hourly earnings, labour status, as well as dummies to control for the term and degree of urbanisation.

Table 3.9 Cultural Attendance: ZINB Estimates. Wage *versus* Education

Explanatory Variables	Males		Females		Males		Females		Males		Females	
Frequency Decision	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*T*	*Coef.*	*t*
Log (wage)	0.12866	3.24	0.23157	5.83					-0.03960	-0.86	0.11959	2.69
Educ1					0.05645	0.78	0.25092	3.55	0.06595	0.90	0.24251	3.41
Educ2					0.25657	3.59	0.42774	5.97	0.27862	3.82	0.39703	5.38
Educ3					0.54278	7.01	0.59458	7.94	0.57647	6.85	0.52126	6.43
P(A=1)	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*T*	*Coef.*	*t*
Log (wage)	-1.25285	-13.74	-1.32587	-11.15					-0.73622	-7.73	-0.51496	-4.58
Educ1					-0.73142	-7.21	-0.66297	-7.62	-0.66078	-6.38	-0.62044	-7.05
Educ2					-1.51776	-13.57	-1.36621	-12.10	-1.30426	-11.39	-1.19316	-10.05
Educ3					-2.49511	-14.96	-2.36187	-12.56	-2.01124	-11.64	-1.96509	-9.74
N	12325		14655		12325		14655		12325		14655	
Ll	-16371.71		-19251.78		-16138.5		-19070.56		-16100.63		-19040.51	
AIC	32801.43		38561.56		32343.01		38207.11		32530.94		38416.751	
BIC	33016.59		38781.75		32587.85		38457.66		32271.26		38151.013	

Note: other variables considered are: age (and age squared), marital status, number of children younger than 12, a dummy about the number of adults, non-labour income, logarithm of hourly earnings, labour status, as well as dummies to control for the term and degree of urbanisation.

As we show in the tables above, the effects of earnings and education are similar when included in isolation: both factors significantly increase the probability of participating and the frequency of participation. Moreover, the significance level and the coefficient values are higher than when both determinants are included simultaneously.

In our final estimates, wage and/or education covariates were dropped in those parts of the model where they were not significant. In this way, we partially overcome the problem of multicollinearity and we keep those variables that seem to be most relevant for explaining individual decisions. The final models are compared to the complete specification - which includes earnings and education - and the former is always preferred.[49] Therefore, in our final estimates the educational variables were not included in the frequency of sports participation for males, and earnings are dropped in the frequency of sports practice for females. Regarding cultural attendance, we removed individual earnings from the male frequency equation and keep both set of covariates in the female model.

Table 3.10 includes our definitive ZINB estimates for the number of times that males and females practiced sports and attended cultural events.

It is worth clarifying that our estimates provide information about the factors that are associated with sports participation and cultural event attendance. However, correlation does not necessarily imply a causal relationship, which cannot be identified because we have cross-sectional data. Furthermore Lechner (2009), by using panel data, studies the effect of individual sports participation on long-term labour market variables, health, and subjective well-being, addressing the problems of the endogeneity of the control variables[50].

[49] As the different specifications of ZINB are nested models, the LR test has also been applied to compare the various models. The results of the LR test also support the choice of our final model.

[50] Bauman et al. (2002) analyze the problems of identifying causal relationships in the sports literature.

Table 3.10 Sports Practice and Cultural Attendance

	Sports				Culture			
Explanatory Variables	**Males**		**Females**		**Males**		**Females**	
Frequency Decision	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	-0.02239	-4.13	-0.01278	-3.14	0.00176	0.16	-0.00225	-0.19
Age2/100	0.02855	4.55	0.01903	4.04	0.00848	0.61	0.00947	0.65
Married	-0.07740	-2.90	-0.03589	-1.89	-0.31610	-4.25	-0.33198	-5.69
Nchild12	-0.03608	-2.11	-0.00941	-0.76	-0.22436	-4.99	-0.24129	-6.36
Adult3	-0.02886	-1.41	-0.01593	-1.02	-0.08275	-1.87	-0.07705	-1.99
Ill	0.01958	0.83	0.03386	1.82				
Educ1			0.03047	1.68	0.06216	0.85	0.24251	3.41
Educ2			0.05013	2.17	0.26867	3.74	0.39703	5.38
Educ3			0.11139	4.20	0.55331	7.11	0.52126	6.43
Labour	-0.28904	-12.70	-0.19707	-11.73	-0.03256	-0.67	-0.15802	-3.38
Log (Wage)	0.09893	4.65					0.11959	2.69
Nlabinc	0.00001	0.33	-0.00001	-1.40	0.00009	4.58	0.00009	5.00
Quart1	-0.00028	-0.01	0.00391	0.19	-0.23351	-4.69	-0.08621	-1.92
Quart2	0.01717	0.66	0.02737	1.39	-0.13142	-2.57	-0.10096	-2.21
Quart3	0.10981	4.23	0.10467	5.16	-0.01117	-0.19	0.07517	1.39
Urb2	-0.02048	-0.59	-0.03849	-1.40	-0.08187	-1.16	-0.13689	-2.23
Urb3	-0.05712	-2.96	-0.00846	-0.56	-0.10087	-2.52	-0.08518	-2.30
P(A=1)	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	0.08307	6.13	-0.01498	-1.35	0.27557	10.15	0.19279	7.88
Age2/100	-0.09585	-6.01	-0.00007	-0.01	-0.23294	-7.79	-0.15720	-5.77
Married	0.10605	1.69	0.14348	2.81	0.29478	2.45	0.42327	4.10
Nchild12	0.15443	4.39	0.21030	6.94	0.18482	2.49	0.23283	3.57
Adult3	0.29052	5.89	0.22652	5.39	0.27750	3.18	0.21741	2.86
Ill	0.07573	1.28	0.34336	6.87				
Educ1	-0.22884	-4.11	-0.20452	-4.12	-0.66462	-6.42	0.62044	-7.05
Educ2	-0.52878	-8.16	-0.43758	-7.08	-1.31517	-11.54	-1.19316	-10.05
Educ3	-0.91515	-10.06	-0.62506	-7.81	-2.03550	-11.99	-1.96509	-9.74
Labour	0.42903	7.33	0.38505	7.99	-0.78357	-7.92	-0.24427	-2.58
Log (Wage)	-0.45164	-9.29	-0.16886	-3.44	-0.70197	-8.22	-0.51496	-4.58
Nlabinc	-0.00015	-5.53	-0.00016	-7.11	-0.00034	-6.31	-0.00035	-7.23
Quart1	0.16747	2.80	0.18263	3.51	-0.12773	-1.20	-0.08375	-0.89
Quart2	0.18724	3.09	0.12428	2.35	0.14314	1.36	-0.04998	-0.52
Quart3	0.09023	1.44	0.20618	3.81	0.08153	0.75	0.11793	1.22
Urb2	0.12198	1.49	0.16903	2.43	0.15557	1.04	0.20992	1.58
Urb3	0.08040	1.73	0.03839	0.96	0.22679	2.67	0.31112	4.14
N	12325		14655		12325		14655	
Ll	-39576.8		-47210.83		-16101.16		-19040.51	
AIC	79221.59		94493.67		32270.31		38151.01	
BIC	79473.85		94767		32522.57		38416.75	

For cultural activities, age only affects participation, whereas for sports it is significant in all cases except for the female probability of participating. Moreover, the effect of this variable is similar in participation and frequency decisions when significant: young and elderly people have a higher probability of participating as well as a higher frequency of participation. This result could be linked to the effects of the life cycle: family responsibilities that arise during middle age might reduce individuals' cultural participation (Gray, 2003; Borgonovi, 2004). Notwithstanding, the previous literature has often assumed that there is an inverse linear relationship between age and the involvement in sports, though, as Breuer and Pawlowski (2011) note, age may pick up the impact of other related variables and thus its effect is sometimes complex to isolate (see also Van Tuyckom et al. 2010 and Pawlowski et al. 2011).[51]

Regarding family structure, we have considered dummy variables capturing the number of adults in the household, the marital status and the number of children less than 12 years. These variables are generally significant and have the expected effect of increasing the likelihood of belonging to the Always Zero group and reducing the frequency of participation in both cultural activities and sports.[52] However, it is striking that no family variable significantly affects female sports practice frequency.

The educational level has a positive effect on participation and frequency decisions when included in the final specifications.

It is worth emphasizing the different effect of the labour situation on the probability of belonging to the Not Always Zero group in sports practice and cultural event attendance. Individuals who work are more likely to never participate in sports, while they

[51] Breuer and Wicker (2009) also discuss opposing results regarding age in sports participation studies. These authors show that different methods of analysis, such as cross-sectional and longitudinal analysis, reveal a different effect of the age covariate.

[52] Notwithstanding, there is also evidence in the literature of conflicting results. Farrell and Shields (2002), for example, found that the number of children increases individuals sports participation in the case of males.

are less likely to be non-participants in cultural activities. This may be because the availability of time is a more important factor for practicing sport activities than for attending cultural events. With regard to frequency decisions, having a job adversely affects sports and cultural activities.

The economic variables included - non-labour income and logarithm of earnings - are generally significant. Higher non-labour income is associated with a lower likelihood of belonging to the Always Zero group and a higher frequency of participation in cultural activities, although this variable is not significant in the frequency of sports practice. Therefore, monetary barriers appear to have more impact on cultural activities than on sports. This result appears to reinforce the positive effect of the occupation covariate on participation in cultural activities. Moreover, the hourly wage (in logs) is always significant (when it is included in the specification), and has a positive effect on both the probability of participation and the frequency.

Some studies have analyzed the relationship of temperature and weather on the allocation of leisure time and outdoor recreation (Zivin and Neidell, 2010; Finger and Lehmann, 2012). In our estimates, sports participation is influenced by the quarter of the year but this variable is not significant for cultural participation. This is a reasonable result since many sports activities are held outdoors and our findings corroborate the results of previous studies (see e.g. Eisenberg and Oeke, 2009). Moreover, the frequency of practicing sports increase from July to September for both males and females. In addition to the impact of climatology, individuals are usually on holiday during the summer months, so that the availability of more spare time may decrease the opportunity cost and encourage sports practice. For cultural events, the frequency falls in the first half of the year. Nevertheless, the participation often depends on the supply of activities.

With regards to the place of residence, this factor is not generally significant for sports whereas it significantly affects participation and frequency of participation in cultural activities: the likelihood of never participating is greater in smaller areas. This is a reasonable result since the presence of cultural facilities conditions the supply. Moreover, the frequency decreases outside provincial capitals. These findings corroborate previous results. Heilbrun and Gray (2001) note that the live performing arts and museums are preeminently urban activities. Furthermore, Bille and Schulze (2006) indicate that most cultural institutions, such as symphony orchestras, ballet companies, and museums tend to be located in large cities only. All of these institutions require a minimum size of market and below this threshold they are not generally viable.

Finally, there is an explanatory factor only included in the estimates of sports, namely the individual's health status. There is an extensive literature that links the effects of personal health to sports and most previous studies find a negative relationship between this covariate and sports participation (e.g., Farrell and Shields, 2002; Stratton et al. 2005; Humphreys and Ruseski, 2006; Downward, 2007). We also find that women with chronic illness are more likely to never engage in sports.

3.4.2 Analysis of Marginal Effects

Up to now we have focused on the positive or negative effect of the explanatory variables on the participation and frequency of participation. In this section, we compute and comment on the marginal effects of the personal and family variables, as well as the elasticities for the economic covariates.[53] In doing so, we will be able to gain a better

[53] Pawlowski and Breuer (2012) provide expenditure elasticities of leisure demand.

understand of the importance of the covariates in explaining individual decisions about sports practice and cultural activities.

The marginal effects show how much the expected number of counts changes in response to a unit change in the explanatory variable. The expected value of counts is equal to the product of the probability that the individual belongs to the Not-Always-Zero group (A=0) and the expected value of counts in this group:[54]

$$E(y|x,z) = p(A=1|z) * 0 + p(A=0|x,z) * E(y|x,z\,A=0) =$$

$$[\mu * (1-\psi)] \tag{3.13}$$

where ψ is explained by (3.3) and μ by (3.5).

Thus, the marginal effect of x_k on the expected number of counts when x_k is a continuous covariate can be expressed as:

$$\frac{\partial E(y|x,z)}{\partial x_k} = \frac{\partial(1-\psi)}{\partial x_k} * \mu + (1-\psi) * \frac{\partial \mu}{\partial x_k} \tag{3.14}$$

As shown in the above equations, if x_k is included in both parts of the model, it influences the expected value of y in two ways: on the one hand, it modifies the probability of belonging to the Not-Always-Zero group, and on the other hand it also affects the expected number of counts, conditioned to belonging to that group (when the variable is included in both parts of the model). [55] Thus, it is also interesting to analyze both of these partial effects, which ca be expressed as:

$$\frac{\partial p(A=0|x_k)}{\partial x_k} = \frac{\partial(1-\psi)}{\partial x_k} = -\gamma_k * \psi * (1-\psi) \tag{3.15}$$

[54] Individual subscripts are omitted for notational convenience.
[55] McDonald and Moffitt (1980) define this decomposition of marginal effects for tobit models.

$$\frac{\partial E(y|x_k, A=0)}{\partial x_k} = \frac{\partial \mu}{\partial x_k} = \beta_k * \exp(x\beta) \quad (3.16)$$

In the case of categorical covariates (d_j), we compute the total marginal effect as the discrete difference between the expected value of the dependent variable when dj is equal to one and zero:

$$E(y|d_j = 1, x_k) - E(y|d_j = 0, x_k) =$$

$$\{[(1-\psi)|d_j = 1]E(y|d_j = 1, A = 0)\}$$

$$-\{[(1-\psi)|d_j = 0]E(y|d_i = 0, A = 0)\} \quad (3.17)$$

The effects of d_j on the probability of being a potential participant in a group (A=0), and on the expected number of counts in the Not-Always-Zero group are equal to:

$$p(A = 0|d_j = 1) - p(A = 0|d_j = 0)$$

$$= [(1-\psi)|d_j = 1] - [(1-\psi)|d_j = 0] \quad (3.18)$$

$$E(y|d_j = 1, A = 0) - E(y|d_j = 0, A = 0)$$

$$= [\exp(x\beta)\,|d_j = 1] - [\exp(x\beta)\,|d_j = 0] \quad (3.19)$$

These effects have been calculated for a set of variables referring to the personal characteristics of individuals. In addition, elasticities were computed for the economic

covariates, i.e., wages and non-labour income. Tables 3.11-3.14 report the average and standard deviation of the total marginal effects (equations 3.13 and 3.17), the average marginal effects on the probability of being a potential participant (equations 3.15 and 3.18) and the average marginal effect on the expected number of counts, conditioned on being a potential participant (equations 3.16 and 3.19). Finally, Table 3.15-3.18 contains information about the average earnings and non-labour income elasticities.

Table 3.11 Marginal Effects (Male Sports Activities)

	Total Marginal Effects		**Marginal Effects on the Probability of Being a Potential Participant**		**Marginal Effect Expected Number of Counts Conditioned on A_i=0**	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	-0.5409765	0.0973095	-0.0159689	0.0037281	-0.3793986	0.0747463
Married	-1.327478*	0.2980508	-0.0208011	0.0048099	-1.357658	0.2568639
Nchild12	-0.961970	0.1679523	-0.0303897	0.0070947	-0.6274158	0.1236089
Adult3	-1.324074	0.2198119	-0.0572243	0.0132829	-0.5016639*	0.0995234
Educ3	1.097016	0.1559886	0.0655881	0.0154989		
Educ2	1.001206	0.1220779	0.0593637	0.0110773		
Educ1	0.840734	0.1018635	0.0494876	0.0072249		
Labour	-5.312577	0.6792353	-0.0820354	0.0190128	-5.282591	0.5374589

Notes: * This variable is not significant

Table 3.12 Marginal Effects (Female Sports Activities)

	Total Marginal Effects		Marginal Effects on the Probability of Being a Potential Participant		Marginal Effect Expected Number of Counts Conditioned on $A_i=0$	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	-0.1024016	0.034154	0.0030908*	0.0004668	-0.1590725	0.0319382
Married	-1.006773	0.1216006	-0.0293689	0.0045269	-0.6657236*	0.0821525
Nchild12	-0.9160973	0.1298327	-0.0433837	0.0065528	-0.173577*	0.0214265
Adult3	-1.061842	0.1423139	-0.046868	0.0070514	-0.2936507*	0.0362607
Educ3	1.545853	0.1915441	0.0348609	0.0059865	1.179568	0.1560597
Educ2	1.124909	0.1369057	0.0473645	0.0068042	0.3635832	0.048103
Educ1	1.165158	0.1423654	0.0447768	0.005082	0.5494516	0.0726938
Labour	-3.870682	0.3387884	-0.0805396	0.0117045	-3.545917	0.2654647

Notes: * This variable is not significant

Table 3.13 Marginal Effects (Male Cultural Activities)

	Total Marginal Effects		Marginal Effects on the Probability of Being a Potential Participant		Marginal Effect Expected Number of Counts Conditioned on $A_i=0$	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	-0.0768208	0.0436127	-0.0423301	0.0198255	0.0038679*	0.0014043
Married	-0.4880687	0.2723794	-0.0468757	0.0210539	-0.6544591	0.2124065
Nchild12	-0.3315507	0.2115943	-0.0288776	0.0135249	-0.4508674	0.1636997
Adult3	-0.1834692	0.0878577	-0.0435199	0.0204454	-0.1664335*	0.0614327
Educ3	0.7912367	0.2168615	0.1168054	0.0580768	0.7093672	0.1976764
Educ2	0.4618761	0.1376215	0.1169693	0.044695	0.4019692	0.1120151
Educ1	0.2458500	0.084387	0.1183303	0.0384901	0.1056035*	0.0294281
Labour	0.2001422	0.1310391	0.1252841	0.0545496	-0.0657865*	0.0236666

Notes: * This variable is not significant

Table 3.14 Marginal Effects (Female Cultural Activities)

	Total Marginal Effects		Marginal Effects on the Probability of Being a Potential Participant		Marginal Effect Expected Number of Counts Conditioned on $A_i=0$	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	-0.0590809	0.0275524	-0.0316893	0.0132560	-0.0039655*	0.0013942
Married	-0.5456951	0.256404	-0.0722225	0.0287344	-0.6603484	0.1934265
Nchild12	-0.358031	0.2117347	-0.0389060	0.0162748	-0.4636029	0.1629942
Adult3	-0.1565935	0.0713256	-0.0364709	0.0152414	-0.1477468	0.0526698
Educ3	0.5005796	0.1533306	0.1302665	0.0581591	0.2861009	0.08047
Educ2	0.4075402	0.116207	0.1112188	0.0363324	0.3096856	0.0871036
Educ1	0.3968448	0.1477369	0.1214004	0.0305010	0.3990844	0.1122483
Labour	-0.1170769	0.1494641	0.0415490	0.0170348	-0.2995623	0.1080309

Notes: * This variable is not significant

Starting with the total marginal effects, the labour situation is the variable that has the greatest impact on expected number of counts for sports practice. Being a worker reduces the expected number of counts by 5 times in the case of males, and almost 4 times in the case of females. Marital status and family composition are the following variables when looking at the values of the total marginal effects on male sports practice, whereas for females, education has a slightly higher effect than the family variables. Regarding cultural activities, education and marital status are the variables that have the highest influence on the expected number of counts.

The analysis of the partial marginal effects of these variables on the probability of participating and the expected frequency conditioned on participating provide a more detailed picture of their influence.

Regarding the probability of being a potential participant, the labour situation and the educational level are the variables that cause the greatest changes in most cases. It is also worth noting that the positive effect of education on the probability of participating is greater for culture than for sports

The labour situation is also the variable with the greatest effect on the expected number of counts of potential sports participants. The average expected frequency of practice in four weeks is reduced by 5 times for men and 3 for women. However, in cultural activities, family variables and education have a higher effect on the expected frequency of attendance than the labour situation. In addition, the frequency of participation in cultural activities is less sensitive to individual and family characteristics than the frequency of sports practice because the marginal effects are generally smaller.

Regarding the influence of the economic variables, the values of the elasticities given in Tables 3.15-3.18 allow us to conclude that, in general, hourly earnings have a

greater effect on individuals decisions about the practice of sports and cultural activities than non-labour income and its effect is higher on the probability of being a potential participant than on the expected number of counts of participants. However, all the wage elasticities are below one. Finally, cultural activities are more sensitive to changes in wage and non-labour income than sports activities, since the values of both elasticities are higher.

Table 3.15 Male Wage and Non-labour Income Elasticities (Sports)

	Total Elasticity		**Elasticity on the Probability of Being a Potential Participant**		**Elasticity on the Expected Number of Counts Conditioned on A_i=0**	
Variable	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**
Wage	0.2344491	0.0519656	0.1355165	0.0519656	0.0989326	0
Nlabinc	0.0428833	0.0365472	0.0393661	0.0339412	0.0035172*	0.0033046

Notes: * This variable is not significant

Table 3.16 Female Wage and Non-labour Income Elasticities (Sports)

	Total Elasticity		**Elasticity on the Probability of Being a Potential Participant**		**Elasticity on the Expected Number of Counts Conditioned on A_i=0**	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Wage	0.0521404	0.0142756	0.0521404	0.0142756		
Nlabinc	0.0489548	0.0294593	0.0646601	0.0380616	-0.0157052*	0.0109589

Notes: * This variable is not significant

Table 3.17 Wage and Non-labour Income Elasticity (Male Culture)

	Total Elasticity		Elasticity on The Probability of Being a Potential Participant		Elasticity on the Expected Number of Counts Conditioned on $A_i=0$	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Wage	0 .301224	0.209104	0.301224	0.209104		
Nlabinc	0.2172463	0.2064855	0.124532	0.1539088	0.0927143	0.0871089

Table 3.18 Female Wage and Non-labour Income Elasticities (Culture)

	Total Elasticity		Elasticity on The Probability of Being a Potential Participant		Elasticity on the Expected Number of Counts Conditioned on $A_i=0$	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Wage	0.3422371	0.1441252	0.2226433	0.1441252	0.1195938	0
Nlabinc	0.3130124	0 .218825	0.1888824	0.1686333	0.1241299	0.086616

3.4.3 An Application of the Oaxaca-Blinder Decomposition to the Analysis of Participation in Sports and Cultural Activities

Empirical research has shown the existence of a gender gap in leisure consumption. According to Bittman (2002), there are three main reasons for "social exclusion" in leisure time: gender, family responsibilities and longer hours of work. Moreover, Mattingly and Bianchi (2003) consider that gender differences exist not only in the amount of leisure time but also in the quality of leisure time.

Most studies find that women participate more in culture than men, whereas the reverse happens in sports participation. The literature highlights three factors that explain high rates of participation for females in cultural activities: early socialization in the arts; the structure of employment and the workplace culture; and marital status and spousal influence (Christin, 2012; Katz-Gerro and Meier, 2013). Moreover, some authors state that sports activities promote skills associated with masculinity such as leadership and competitive behavior (Ridgeway and Smith-Lovin 1999).

Although our descriptive data do not reveal large differences either in the participation rate or the frequency of participation in sports practice and cultural event attendance by gender, we think it is worthwhile to distinguish between the effects of characteristics and behavior in order to gain a better understanding of female and male decisions. Thus, we apply the Oaxaca-Blinder decomposition to our models.[56]

This methodology has been usually applied to the analysis of wage inequalities and was developed to identify the extent to which wage differences were caused by differences in qualifications or by other factors not explained by the model. In leisure economics, Aguiar and Hurst (2007) apply the Oaxaca-Blinder decomposition to analyze differences in

[56] This methodology was first developed by Oaxaca (1973) and Blinder (1973). Bauer et al. (2007) developed the Oaxaca-Blinder decomposition for count data.

the allocation of time in the United States to determine how much of the change in the allocation of time can be explained by characteristics of individuals, and how much is due to differences in individuals' behavior. Moreover, the same authors subsequently applied the Oaxaca-Blinder decomposition to examine differences in leisure time between more and less educated men (Aguiar and Hurst, 2009).

In the fields of sports and cultural economics some papers have also applied the Oaxaca-Blinder decomposition, focusing mainly on the analysis of discrimination in the labor market of artists and sportsmen (see e.g. Shmanske, 2012; and Alper et al. 2006).[57] To the best of our knowledge, this is the first time that this method has been applied to analyze gender differences in the frequency of participation in sports and culture. Our results will allow us to determine to what extent gender differences in participation in these leisure activities arise from differences in observed characteristics or in behavior.

Taking males as the reference group, the difference in the average observed frequency of participation between males (m) and females (f) can be split into two parts:

$$\Delta_m^{NL} = \bar{Y}_m - \bar{Y}_f =$$

$$\left[E_{\beta m}(Y_{im}|X_{im}) - E_{\beta m}(Y_{if}|X_{if})\right] + \left[E_{\beta m}(Y_{if}|X_{if}) - E_{\beta f}(Y_{if}|X_{if})\right] \quad (3.20)$$

In the previous equation the subscript m denotes males and f denotes females. On the left hand side of the equation:

$$\bar{Y}_m = N_m^{-1} \sum_{i=1}^{N_m} Y_{im} \quad (3.21)$$

[57] In sports economics, Bäker et al. (2012) also use this methodology to test whether football derbies are different from other non-derby matches with regards to the number of goals scored by each group, the match result, and the referee evaluations.

$$\bar{y}_f = N_f^{-1} \sum_{i=1}^{N_f} y_{if} \tag{3.22}$$

where N_f and N_m are the number of observations in each sample, y_{im} and y_{if} represent the number of times the individual *i* participates in the leisure activity. X_{im} and x_{if} are the set of covariates, and β_m and β_f are the estimated vector of parameters in the models.

The first term on the right hand side of the equation shows the part of the differential in the average dependent variable that is due to differences in the values of the explanatory variables. The second term shows the part of the differential in outcome that is caused by differences in the coefficients.

Another alternative formulation would be to take females as the reference group (Oaxaca, 1973). In this case, the average difference in the expected number of counts is specified as follows:

$$\Delta_f^{NL} = \bar{y}_m - \bar{y}_f =$$

$$\left[E_{\beta f}(y_{im}|x_{im}) - E_{\beta f}(y_{if}|x_{if})\right] + \left[E_{\beta m}(y_{im}|x_{im}) - E_{\beta f}(y_{im}|x_{im})\right] \tag{3.23}$$

Because we could not find any strong reason to select either alternative, we present both of them in Table 3.19 below. This table also shows the standard errors of the components of the decomposition equation, computed by using bootstrap methods.

The first set of results in the table corresponds to the method that takes males as the reference group, while the bottom of the table contains the results corresponding to females as the reference group. The first row in each case shows the value of the first term

of equations 3.20 and 3.23, i.e. how much of the gender difference in the average frequency is explained by differences in characteristics (in absolute value and as a percentage). The second row gives information about the second term of equations 3.20 and 3.23, i.e. what portion of this difference is caused by differences in behaviour. The last row contains the average observed difference in the sample.

Table 3.19 Oaxaca-Blinder Decomposition (Sports)

	Coef.	*t*	*Percentage*
	Reference group: Males		
Characteristics	-1.02096	-7.54	250.742%
Coef.	0 .61378	2.41	-150.742%
	Reference group: Females		
Characteristics	-0.45701	-2.40	112.2404%
Coef.	0 .04984	0.16	-12.24038%
Δ	-0.40717	-2.09	100%
	Number of observations (males) : 12325		
	Number of observations (females) : 14655		

Note: Bootstrapping (50 replications)

Table 3.20 Oaxaca-Blinder (Culture)

	Coef.	*t*	*Percentage*
	Reference group: Males		
Characteristics	0.09706	4.27	235.527%
Coef.	-0.05585	-1.68	-135.527%
	Reference group: Females		
Characteristics	0.12918	5.73	313.46%
Coef.	-0.08797	-2.73	-213.46%
Δ	0.04121	1.56	100%
	Number of observations (males) : 12325		
	Number of observations (females) : 14655		

Note: Bootstrapping (50 replications)

Taking into account that the general conclusions we obtain are similar regardless of the reference group, to simplify the discussion we will focus on the decomposition which takes males as the reference group (equation 3.20).

Starting with sports, observed gender differences in sport participation are small (-0.407) and sports practice is, on average, slightly more frequent among females.

However, if we applied the same coefficients to both males and females, the gender difference in the average frequency of sports practice explained by their characteristics would be equal to:

$$\left[E_{\beta m}(y_{im}|x_{im}) - E_{\beta m}(y_{if}|x_{if})\right] = \ -1.020967 \qquad (3.24)$$

This value implies that, for the same behavior, the gender differences in characteristics would lead to a greater divergence in sports practice.

However, the second term, which shows the difference in the average frequency of sports practice due to differences in coefficients, has the opposite effect:

$$\left[E_{\beta m}(y_{if}|x_{if}) - E_{\beta f}(y_{if}|x_{if})\right] = \ 0.6137886 \qquad (3.25)$$

Thus, if the characteristics were the same, the average observed frequency would be slightly greater for men than for women. However, as the negative effect of characteristics

is greater than the positive effect of behavior (250.8% *versus* 150.8%), the final difference is negative.

Applying the same decomposition to cultural activities, Table 3.20 above presents the results of the Oaxaca-Blinder decomposition taking as reference groups males and females. We will also comment in detail on the case in which males are the reference group.

The observed average difference in frequency of participation in cultural activities is positive but very small (-0.04), even smaller than for sports in absolute value.

When we decompose this average difference, we find that the differences in characteristics would make men participate more in culture than women:

$$\left[E_{\beta m}(y_{im}|x_{im}) - E_{\beta m}(y_{if}|x_{if})\right] = 0.0970663 \quad (3.26)$$

However, when we focus on the second term, we obtain the opposite effect:

$$\left[E_{\beta m}(y_{if}|x_{if}) - E_{\beta f}(y_{if}|x_{if})\right] = -0.055854 \quad (3.27)$$

Thus, if women behaved as men the observed difference in frequency of participation would become slightly positive.

In addition, differences in characteristics are more important than differences in behavior when analyzing gender participation in cultural activities. Specifically, 235.6% of

the observed difference can be explained by characteristics compared to 135.6% that would be explained by behavior.

Summing up, both in sports and culture, differences in characteristics have the opposite effect to differences in behavior, and their effects are greater in absolute value. Moreover, whereas in sports the differences in behavior would lead to a higher observed frequency for males than for females, the opposite happens in cultural activities.

3.5 Conclusions

The goal of this chapter was to analyze individuals' decisions about participation and the frequency of participation in sports and cultural activities. In particular, we focus on passive cultural activities (visiting museums and monuments, attending theater, cinema, etc.) and on active sports activities, i.e. playing sports.

Given that both activities are characterized by a high proportion of individuals who do not participate in them during the time period covered by the survey - four weeks - we compare two methodologies that consider two reasons for explaining non-participation: some individuals may have no interest at all in these activities, whereas other people are potential participants but they have not demanded them during the period. The two models specified and estimated are the Zero-inflated Negative Binomial count data model and the double-hurdle model with independent errors.

The ZINB specification assumes that the dependent variable only takes integer and non-negative values, whereas the double-hurdle specification assumes that the dependent variable is continuous.

The database used is the Spanish Time Use Survey 2002-2003 and the sample consists of people between 18 and 65 years old. We run separate and independent estimates for culture and sports, as well as by gender. The set of covariates includes personal and family characteristics, labour status, earnings, non-labour income, and dummies for the quarter of the year and place of residence. In all cases, the ZINB model is preferred to the double-hurdle one.

Our results reveal that labour status is an important determinant of sports practice and cultural attendance. Being a worker decreases the probability of playing sports and the frequency. On the contrary, it increases the probability of attending cultural events.

It is worth noting the importance of higher education in the decisions regarding sports and cultural activities, except in the case of the frequency of sports practice for males where the educational level was dropped from the final estimates because it was not significant. Furthermore, for women the value of the marginal effect of higher education on the expected number of counts of participants is even higher for sports than for cultural activities.

Two economic variables have been included in this study: non-labour income and wages. Both variables have a positive effect on individuals' participation decision, with the elasticities being more than double for cultural than for sports participation. Moreover, all wage and non-labour income elasticities take values below one and wage elasticities are generally greater than non-labour income elasticities.

Our model also shows that the marital status and family responsibilities affect both males and females, and the presence of other adults in the household has a negative effect on the probability of being a potential participant in both sports and cultural activities. Participation in both activities tends to be higher among young and old people.

Moreover, the time of year and the place of residence also affect the dependent variables. In particular, in the case of culture, living in small towns reduces both the likelihood and the frequency of participation. This inequity could be a good argument to justify the intervention of public authorities to promote cultural events in less populated areas.

Finally, a binary variable for chronic disease was included in sports estimates, and it is only significant in female participation decisions: women with chronic illness are less likely to practice sports.

In sum, most of the variables have the expected effects and corroborate previous results in the literature.

In addition to analyzing the relevance of the covariates, we have applied the Oaxaca-Blinder decomposition to analyze whether gender differences were based on behavioral differences or differences in their characteristics. We found that most of the differences are due to the different characteristics. However, in our sample the mean frequency of attendance at cultural events and sports practice is very similar between men and women, so that it would make little sense to implement gender differentiated policies.

One of the reasons for obtaining similar observed frequencies of participation by gender is that we have defined sports and culture in an aggregated way, adding up heterogeneous activities. Therefore, in the next chapter we perform a differentiated analysis of the various sports and cultural events.

Appendix 3.1 Descriptive Statistics (Males Subsample)

Variable		Mean	Std. Dev.	Min.	Max.
Dependent Variables					
Nsports	Number of times individuals practiced sports in the last four weeks	12.41598	14.71956	0	89
Ncult	Number of times individuals attended cultural events in the last four weeks	1.234077	2.526935	0	50
Cult	1 if individuals attended cultural events in the last four weeks, 0 otherwise	0.3931846	0.488477	0	1
Sports	1 if individuals practiced sports in the last four weeks, 0 otherwise	0.6858418	0.4641986	0	1
Explanatory Variables					
Age	Age of respondent	41.19757	13.39117	18	65
Agesq	(Age squared of respondent)/(100)	18.76548	11.18386	3.24	42.25
Married	1 if respondent is married, 0 otherwise	0.6269371	0.4836382	0	1
Nchild12	Number of children aged 12 years or younger	0.3643813	0.7108015	0	6
Ill	1 if respondent is ill, unfit or has a disability; 0 otherwise	0.1720892	0.3774733	0	1
Quart1	1 if month is January, February or March; 0 otherwise	0.2803245	0.449176	0	1
Quart2	1 if month is April, May or June, 0 otherwise	0.2589858	0.4380956	0	1
Quart3	1 if month is July, August or September, 0 otherwise	0.2266126	0.4186568	0	1
Urb2*	1 if respondent lives in a township with more than 100,000 inhabitants (and no provincial capital), 0 otherwise	0.0808925	0.272681	0	1
Urb3*	1 if respondent lives in a township with fewer than 100,000 inhabitants (and no provincial capital), 0 otherwise	0.5460446	0.4978956	0	1
*The reference category is the provincial capitals.					
Adult3	1 if respondent lives in a household with more than 2 adults, 0 otherwise.	0.472211	0.4992474	0	1
Educ1*	1 if respondent has primary education, 0 otherwise	0.3458824	0.4756744	0	1
Educ2*	1 if respondent has high school education or vocational training, 0 otherwise	0.284787	0.4513313	0	1
Educ3*	1 if respondent has college education, 0 otherwise	0.1446653	0.3517773	0	1
*The reference category is uneducated individual					
Lwage	Logarithm of observed hourly earnings for workers Logarithm of hourly predicted earnings for non-workers: lwage is computed from a wage equation through Heckman's two-stage method	1.644886	0.5086768	-0.617705	4.866052
Nlabinc	Non-labour individual income, calculated as income from other household members	1065.343	1000.933	0	6000
N = 12325.					

Appendix 3.1 Descriptive Statistics (Females Subsample)

Variable		Mean	Std. Dev.	Min	Max
Dependent Variables					
Nsports	Number of times individuals practiced sports in the last four weeks	12.8234	13.7512	0	88
Ncult	Number of times individuals attended cultural events in the last four weeks	1.197612	2.469739	0	55
Cult	1 if individuals attended cultural events in the last four weeks, 0 otherwise	0.3904469	0.4878672	0	1
Sports	1 if individuals practiced sports in the last four weeks, 0 otherwise	0.6855681	0.4643051	0	1
Explanatory Variables					
Age	Age of respondent	41.60389	13.30683	18	65
Agesq	(Age squared of respondent)/(100)	19.07943	11.16945	3.24	42.25
Married	1 if respondent is married, 0 otherwise	0.6469464	0.4779355	0	1
Nchild12	Number of children aged 12 years or younger	0.3791198	0.7159595	0	6
Ill	1 if respondent is ill, unfit or has a disability, 0 otherwise	0.1733197	0.3785363	0	1
Quart1	1 if month is January, February or March, 0 otherwise	0.2698055	0.4438738	0	1
Quart2	1 if month is April, May or June, 0 otherwise	0.261276	0.439345	0	1
Quart3	1 if month is July, August or September, 0 otherwise	0.225998	0.4182521	0	1
Urb2*	1 if respondent lives in a township with more than 100,000 inhabitants (and no provincial capital), 0 otherwise	0.0833163	0.2763691	0	1
Urb3*	1 if respondent lives in a township with fewer than 100,000 inhabitants (and no provincial capital), 0 otherwise	0.5336745	0.4988818	0	1
*The reference category is the provincial capitals.					
Adult3	1 if respondent lives in a household with more than 2 adults, 0 otherwise.	0.4442852	0.4969031	0	1
Educ1*	1 if respondent has primary education, 0 otherwise	0.3407028	0.4739618	0	1
Educ2*	1 if respondent has high school education or vocational training, 0 otherwise	0.25377	0.4351824	0	1
Educ3*	1 if respondent has college education, 0 otherwise	0.1460935	0.353212	0	1
*The reference category is uneducated individual.					
Lwage	Logarithm of observed hourly earnings for workers. Logarithm of hourly predicted earnings for non-workers: lwage is computed from a wage equation through Heckman's two-stage method	1.208328	0.5405595	-0.4801602	5.75987
Nlabinc	Non-labour individual income, calculated as income from other household members	1421.474	991.8829	0	6000

N= 14655

Appendix 3.2 Sports Practice: ZINB Estimates. Wage *versus* Education

Explanatory Variables	Males		Females		Males		Females	
Frequency Decision	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	-0.02241	-4.13	-0.01348	-3.23	-0.01961	-3.70	-0.01279	-3.14
Age2/100	0.02859	4.56	0.01877	3.92	0.02642	4.28	0.01903	4.04
Married	-0.07712	-2.88	-0.04325	-2.29	-0.06316	-2.38	-0.03591	-1.89
Nchild12	-0.03611	-2.11	-0.01164	-0.95	-0.03585	-2.10	-0.00938	-0.76
Adult3	-0.02915	-1.42	-0.01948	-1.24	-0.03129	-1.54	-0.01589	-1.01
Ill	0.01936	0.82	0.03029	1.63	0.02249	0.95	0.03385	1.82
Educ1					0.00026	0.01	0.03045	1.67
Educ2					0.05082	1.80	0.05010	2.17
Educ3					0.10595	3.29	0.11139	4.20
Labour	-0.28968	-12.74	-0.20547	-10.03	-0.28008	-12.44	-0.19709	-11.73
Log (Wage)	0.09937	4.68	0.04041	2.16				
Nlabinc	0.00001	0.33	-0.00001	-0.99	0.00001	0.34	-0.00001	-1.40
Quart1	-0.00042	-0.02	0.00453	0.23	0.00091	0.04	0.00392	0.20
Quart2	0.01711	0.66	0.02692	1.36	0.02165	0.84	0.02744	1.39
Quart3	0.10969	4.23	0.10316	5.08	0.10985	4.24	0.10468	5.16
Urb2	-0.02021	-0.58	-0.04235	-1.54	-0.01498	-0.43	-0.03847	-1.40
Urb3	-0.05729	-2.97	-0.01427	-0.95	-0.05631	-2.89	-0.00847	-0.56
P(A=1)	**Coef.**	**t**	**Coef.**	**t**	**Coef.**	**t**	**Coef.**	**t**
Age	0.07641	5.57	-0.01271	-1.14	0.06445	4.85	-0.02247	-2.06
Age²/100	-0.08255	-5.15	0.00460	0.35	-0.07830	-4.99	0.00682	0.53
Married	0.16205	2.57	0.18891	3.72	0.07230	1.16	0.14113	2.77
Nchild12	0.15837	4.54	0.22367	7.43	0.15102	4.31	0.20364	6.74
Adult3	0.35446	7.29	0.26393	6.33	0.32713	6.68	0.23557	5.63
Ill	0.11329	1.93	0.36809	7.40	0.08225	1.40	0.34056	6.82
Educ1					-0.26894	-4.86	-0.21872	-4.43
Educ2					-0.63550	-10.02	-0.49067	-8.22
Educ3					-1.17848	-13.71	-0.73969	-10.18
Labour	0.35493	6.18	0.39028	8.27	0.39825	6.84	0.30244	7.23
Log (Wage)	-0.64170	-14.01	-0.34407	-7.81				
Nlabinc	-0.00020	-7.63	-0.00019	-8.43	-0.00017	-6.41	-0.00017	-7.52
Quart1	0.17712	2.98	0.18945	3.65	0.15882	2.67	0.18080	3.47
Quart2	0.19884	3.31	0.13321	2.53	0.17189	2.85	0.12246	2.32
Quart3	0.10291	1.65	0.22260	4.13	0.09601	1.54	0.20475	3.78
Urb2	0.17866	2.22	0.18985	2.73	0.12340	1.52	0.17471	2.51
Urb3	0.15731	3.44	0.07467	1.87	0.11081	2.40	0.04717	1.18
N	12325		14655		12325		14655	
Ll	-39642.05		-47216.83		-39626.41		-47254.84	
AIC	79346.11		94503.65		79322.81		94571.68	
BIC	79576.11		94769.39		79582.49		94807.05	

Appendix 3.2 Cultural Attendance: ZINB Estimates. Wage *versus* Education

Explanatory Variables	Males		Females		Males		Females	
Frequency Decision	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Age	0.02184	1.90	0.00967	0.81	0.00181	0.16	0.00210	0.18
Age2/100	-0.01576	-1.09	-0.00951	-0.65	0.00857	0.62	0.00599	0.41
Married	-0.39001	-5.14	-0.40798	-6.84	-0.32206	-4.31	-0.32918	-5.60
Nchild12	-0.22334	-4.76	-0.26078	-6.69	-0.22482	-4.95	-0.23485	-6.20
Adult3	-0.11284	-2.46	-0.10895	-2.78	-0.08445	-1.90	-0.08434	-2.19
Educ1					0.05645	0.78	0.25092	3.55
Educ2					0.25657	3.59	0.42774	5.97
Educ3					0.54278	7.01	0.59458	7.94
Labour	-0.06684	-1.34	-0.21321	-4.57	-0.03111	-0.64	-0.08833	-2.26
Log (Wage)	0.12866	3.24	0.23157	5.83				
Nlabinc	0.00011	5.79	0.00011	6.06	0.00009	4.72	0.00009	5.32
Quart1	-0.23176	-4.54	-0.09377	-2.09	-0.23657	-4.73	-0.08521	-1.90
Quart2	-0.13816	-2.67	-0.11735	-2.55	-0.13469	-2.63	-0.10209	-2.23
Quart3	-0.01826	-0.31	0.05879	1.08	-0.01686	-0.29	0.07370	1.36
Urb2	-0.13669	-1.93	-0.15851	-2.56	-0.08245	-1.16	-0.14375	-2.35
Urb3	-0.17088	-4.15	-0.11265	-3.02	-0.10118	-2.52	-0.09275	-2.50
P(A=1)								
Age	0.31668	10.80	0.25518	9.49	0.24764	9.34	0.16809	7.23
Age2/100	-0.26439	-8.41	-0.20394	-6.92	-0.20749	-7.06	-0.13427	-5.12
Married	0.36124	3.05	0.46662	4.49	0.22352	1.85	0.41805	4.02
Nchild12	0.18790	2.62	0.25247	3.85	0.18076	2.43	0.21776	3.34
Adult3	0.44549	5.31	0.31138	4.12	0.32209	3.72	0.24181	3.19
Educ1					-0.73142	-7.21	-0.66297	-7.62
Educ2					-1.51776	-13.57	-1.36621	-12.10
Educ3					-2.49511	-14.96	-2.36187	-12.56
Labour	-1.02941	-11.11	-0.25795	-2.77	-0.83764	-8.87	-0.48209	-5.74
Log (Wage)	-1.25285	-13.74	-1.32587	-11.15				
Nlabinc	-0.00048	-8.97	-0.00044	-8.73	-0.00036	-6.68	-0.00037	-7.76
Quart1	-0.07342	-0.71	-0.06176	-0.66	-0.14932	-1.41	-0.08316	-0.88
Quart2	0.17347	1.67	-0.04070	-0.42	0.10519	1.00	-0.05479	-0.57
Quart3	0.14680	1.40	0.17839	1.86	0.06733	0.62	0.10862	1.12
Urb2	0.25960	1.78	0.25762	1.98	0.15809	1.06	0.22720	1.70
Urb3	0.34965	4.32	0.41322	5.47	0.27695	3.30	0.33192	4.45
N	12325		14655		12325		14655	
Ll	-16371.71		-19251.78		-16138.5		-19070.56	
AIC	32801.43		38561.56		32343.01		38207.11	
BIC	33016.59		38781.75		32587.85		38457.66	

CHAPTER 4
FREQUENCY OF PARTICIPATION IN SPORTS AND CULTURAL ACTIVITIES: A DISAGGREGATED ANALYSIS

4.1 Introduction

While sports and culture have been defined in an aggregate way in previous chapters, the goal of this study is to carry out a separate analysis of different sports and cultural activities to determine whether there are differences in individuals' behavior in relation to specific activities.

Not all sports are similarly intensive in time nor require the same amount of expenditures for their practice (Taks et al. 1994). Moreover, previous literature on this topic has found relevant differences among individuals in the type and intensity of sports activities. However, as Breuer et al. (2011) point out, there is a gap in the literature on sports participation regarding individuals' recreational participation in specific sports. Few studies have examined this issue and most of them have just performed a descriptive analysis (e.g. Leslie et al. 2004; and Ifedi, 2008)

In this chapter, we study sports participation and frequency in the following types of sports:

1) Group *versus* individual sports: The practice of group sports involves more limitations than individual sports since they require coordination with other people.

2) Sports requiring facilities *versus* those that do not require facilities: Sports that require facilities for their practice may be more time-intensive than others, since individuals

need to move to the sports infrastructures. Moreover, these activities are usually more expensive if people have to pay a fee to use the facilities.

3) Outdoor *versus* indoor sports: Weather may affect the practice of specific activities that take place outdoors.

4) Walking: Although it is questionable if it can be included as a sports activity, it is a physical activity that requires some effort.

Therefore, we have a total of seven dependent variables related to sports or physical activities.

Regarding culture, there is a well-established distinction in the economics literature between highbrow and lowbrow culture and, as discussed in Chapter 1, a number of studies have focused on analyzing what kinds of audience attend those events. Highbrow culture encompasses all activities that are usually considered traditional and old art forms, whereas new art forms are considered as popular/low/mass art forms (Heilbrun and Gray, 2001).

In our specification, we make a threefold classification of cultural activities:

-Cinema

-Performing arts (theater and music).

- Visits to museums and historic and artistic heritage.

We believe that this disaggregated analysis is especially relevant nowadays because despite being in a context of general decline in cultural consumption there are significant differences across activities. There has been a decline in cinema attendance, theater and concerts, but dance is the performing art with major problems according to the information provided by Sociedad General de Autores y Editores (SGAE, 2013).

In the empirical specification, we use the same database as in previous chapters, namely the Spanish Time Use Survey 2002-2003. All the dependent variables are defined as the number of times the individual has practiced the activity in the four weeks prior to the survey. Regarding the econometric methodology, we estimate Zero-Inflated Negative Binomial count data models because in the previous chapter this specification was shown to be the best for our data. Nevertheless, we perform some prior comparative analysis among different count data specifications that support this choice.

The covariates included to explain individual decisions include demographic and socio-economic factors: gender, age, family composition, educational level, labour status, wages, non-labour income, seasonality, population size covariates and, finally, health in sports estimates.

Unlike the previous chapters in which separate estimates were run by gender, here we pool men and women to avoid small sample size problems. However, gender is included as a covariate since previous studies have found that male and female participation may differ according to the type of sports or cultural events.

With the estimated coefficients, we compute for each individual in the sample the marginal effect of the main covariates on the expected frequency, the probability of being a potential participant, and the expected frequency conditioned on participation. To the best of our knowledge, this is the first research that computes a decomposition of the marginal effects in count data models in relation to specific sports and cultural activities.

The rest of the chapter is organized as follows. In Section 2 we define our dependent variables and provide descriptive information about them. In Section 3 we discuss the econometric specification. In Section 4 we comment on the main results and the marginal effects of the covariates. Finally, Section 5 summarizes and concludes.

4.2 Descriptive Analysis

The aim of this section is to present summary information about the dependent variables considered in this chapter, distinguishing by gender.

As stated in the introduction to this Chapter, apart from walking - which is treated as a separate category - we make three classifications of sports: individual *versus* group sports; indoor *versus* outdoor sports; and activities that require the use of facilities *versus* those that do not require it.

Note that a particular sport is included in all three classifications. For example, running is considered as an individual sport, a sport that does not require facilities and an outdoor activity. It is also important to note that the classification is somewhat arbitrary, since the survey information is not detailed enough for some sports. For instance, football can be played indoors or outdoors and the survey does not specify this information.

In our classification, 'individual' sports include running, cycling for pleasure, skiing, mountaineering, fitness, swimming, gymnastics, and skating; the other 'group' are sports that require other participants - football, tennis and boxing - or special equipment - golf and sailing.[58] The sports that are assumed to require facilities are football, boxing, fitness, swimming, skating, gymnastics, skiing, tennis and golf, whereas we consider that running, cycling, mountaineering, and water sports do not require facilities. Outdoor activities

[58] A similar classification is proposed by Humphreys and Ruseski (2007).

encompass running, cycling, skiing, mountaineering, tennis, golf, and water sports. Football, boxing, fitness, swimming, skating, and gymnastics are indoor activities

Table 4.1 provides information about the number and percentage of participants in the activity and the mean frequency of participants, in all sports activities defined. The number and the percentage of participants are always higher for men than for women except in the case of walking.

Table 4.1 Number Times in Previous Four Weeks for Participants (Sports)

	Males				Females			
Variable	*Obs.*	*Particip (%)*	*Mean (only participants)*	*Std. Dev. (only participant)*	*Obs.*	*Particip (%)*	*Mean (participant)*	*Std. Dev. (participant)*
Walking	6194	50.3	14.93413	10.89675	9008	61.47	16.19139	10.64115
Individual	3202	25.98	12.8916	11.5205	3192	21.78	12.0436	9.8015
Group	2203	17.87	6.9473	6.4142	575	3.92	5.8365	5.6140
Outdoor	2668	21.65	9.3812	8.5964	1150	7.85	7.8087	7.4985
Indoor	2944	23.89	10.7184	9.6576	2851	19.45	11.5114	8.7474
Facilities	3416	27.72	10.7521	9.9035	3051	20.82	11.4317	8.9320
No Facilit	2046	16.60	9.7043	8.6398	846	5.77	8.1809	7.5000

The highest differences by gender are found in the case of group sports, outdoor sports and those that do not require facilities. In both cases, female participation is much lower than that of males, especially in the case of group sports. Within group sports, there is greater male participation in all these activities, with the difference being particularly relevant in the case of football: only 211 women take part in this sport compared to 1473 men.

Focusing on the frequency of sports participation by participants, the value of this variable is again often greater for men than for women. The only exceptions are indoor sports and sports that require the use of facilities to practice them.

Turning now to cultural activities, we have divided them into three groups based on the classification of Heilbrun and Gray (2001). In their survey, these scholars discuss the live performing arts and the fine arts of painting and sculpture, as well as their associated institutions (museums, etc.). As these authors note, this election is not arbitrary. In addition, the groups considered are internally coherent (Heilbrun and Gray, 2001).[59], We therefore distinguish between going to the cinema, attendance at performing arts, and cultural visits.[60] On the one hand, performing arts are live events that require the spectator to move where the performance takes place, and the shows can be repeated as many times as the public demand it. Our definition of performing arts includes both classical music concerts or other genres considered as high culture in the literature (i.e. opera, operetta…) as well as concerts usually classified as popular music because the available data do not allow them to be separated. Therefore, in this case music encompasses both high and popular music spectacles.

[59] However, these authors excluded motion pictures and popular music.

[60] Some cultural activities included in the survey have not been considered here because of the low individual participation (attending conferences, folklore shows and going to libraries are not included).

On the other hand, cinema is a popular art form and, unlike performing arts, it is not a live show. Finally, visits to museums and heritage constitute important tourist attractions that provide entertainment and which are also motivated by "cultural" elements that increase individual knowledge and skills (Brida et al. 2013).

Table 4.2 includes the number and percentage of participants by gender and the average frequency of participation by participants in the cultural activities defined. Here, gender differences are not as pronounced as those observed for some sports. Contrary to what happened in sports, the number of female participants is always greater than that of men for all activities defined, although looking at the percentages, in the case of cinema male participation is slightly higher than female participation. However, the average frequency of participation in those activities is always slightly lower for women than for men, though the differences are negligible.

Table 4.2 Number Times in Previous Four Weeks for Participants (Culture)

	Males				**Females**			
Variable	*Obs*	*Particip (%)*	*Mean (participant)*	*Std. Dev. (participant)*	*Obs*	*Particip (%)*	*Mean (participant)*	*Std. Dev. (participant)*
Cinema	3806	30.88	2.2076	1.8738	4320	29.48	2.0984	1.5767
Performances	1355	10.99	1.8185	1.6835	1762	12.02	1.8099	1.8072
Visits	1444	11.72	3.0083	3.6227	1929	13.16	2.7460	3.2573

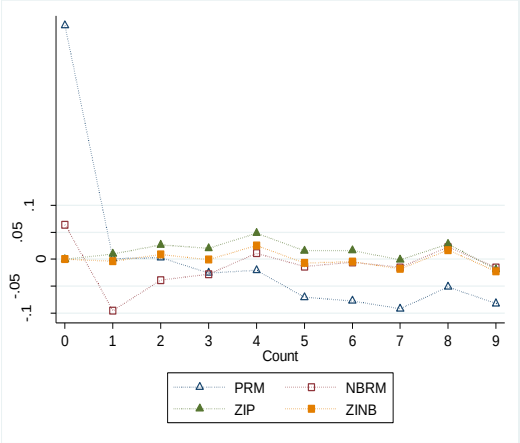
Summarizing these results, the descriptive data show that males tend to be more likely to play sports and practice them more frequently than women, whereas females are more likely to participate in cultural activities. However, gender differences in the frequency of cultural participation are very small.

4.3 Empirical Specification

The frequencies of participation in the activities defined are count data that show a relatively high percentage of non-participants. Thus, given the results of previous chapter we analyze individual frequency of participation in sports and cultural activities by estimating Zero-Inflated Negative Binomial (ZINB) count data models. Moreover, following Long and Freese (2006), we performed some preliminary estimates of different count data specifications to check that the ZINB model is the most suitable for our data.

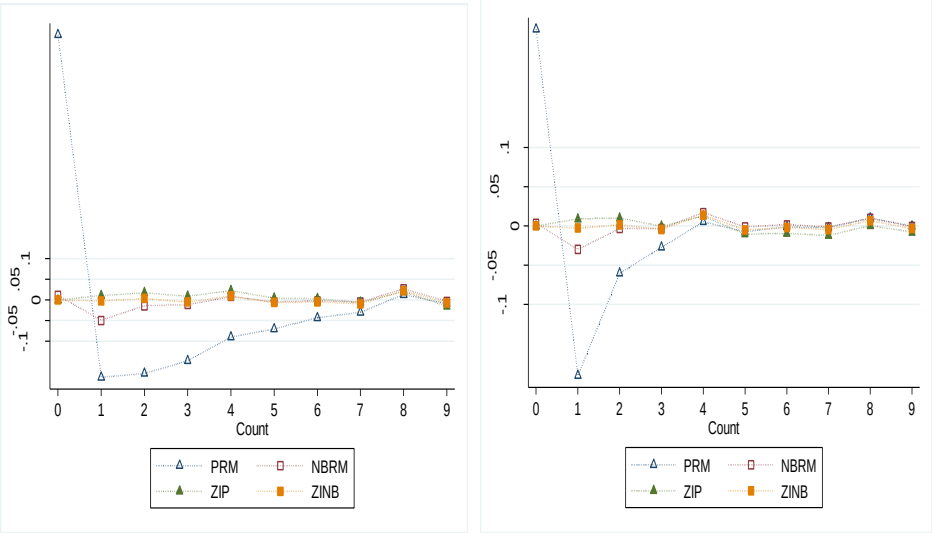
Figures 4.1-4.10 show the difference between the observed probabilities and the average predicted probabilities for each value of the dependent variables and for the following count data models: Poisson, Negative Binomial, Zero-Inflated Poisson and Zero-Inflated Negative Binomial.

Figure 4.1: Difference between observed probabilities and average predicted probabilities (Walking)



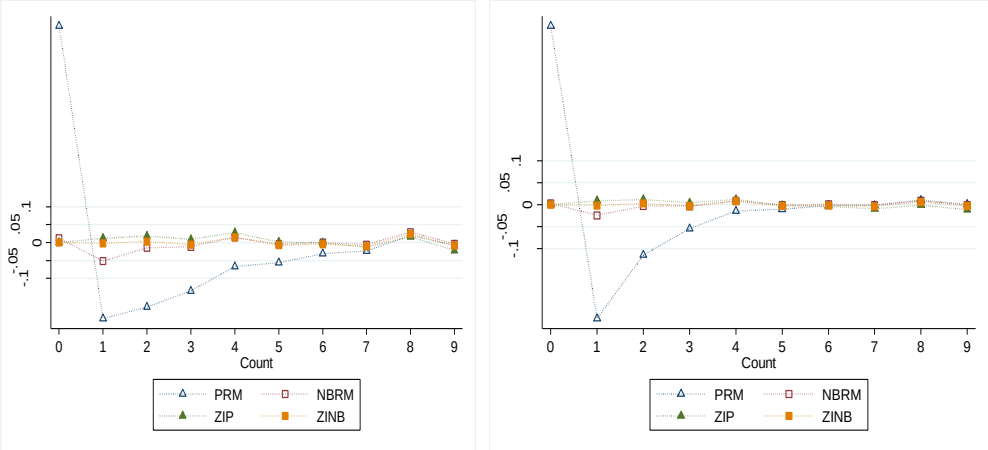
Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

Figures 4.2 and 4.3: Difference between observed probabilities and average predicted probabilities (Individual and Group Sports)



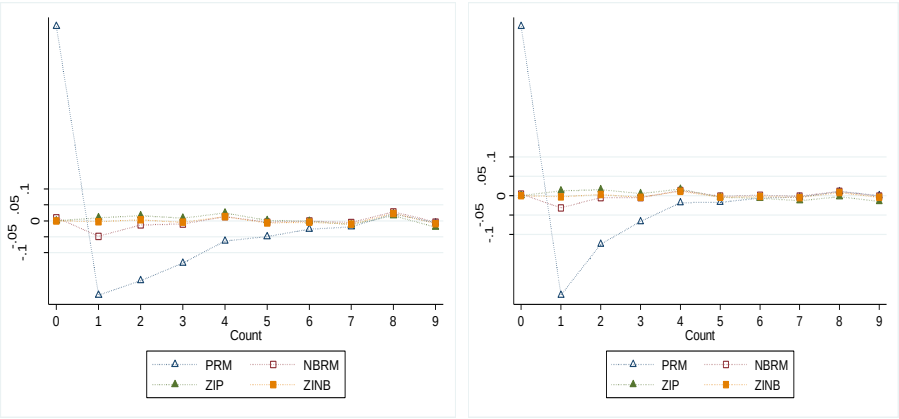
Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

Figure 4.4 and 4.5: Difference between observed probabilities and average predicted probabilities (Facilities /No Facilities Sports).



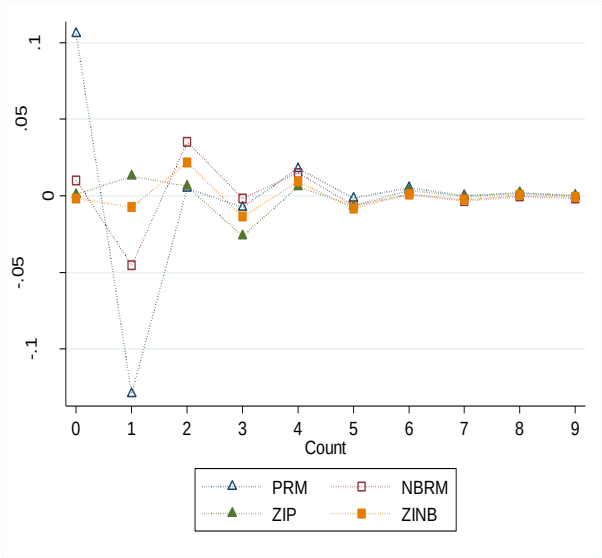
Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

Figures 4.6 and 4.7: Difference between observed probabilities and average predicted probabilities (Indoor and Outdoor Sports)



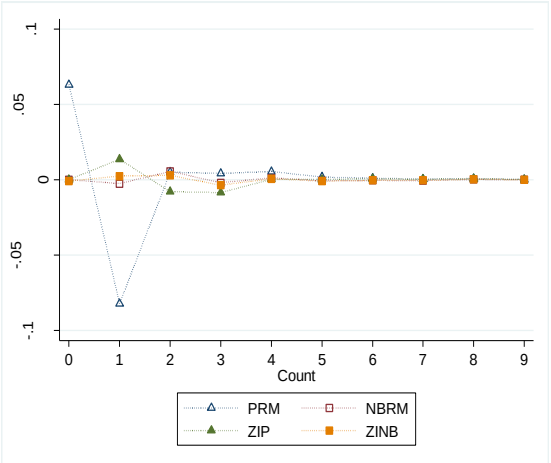
Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

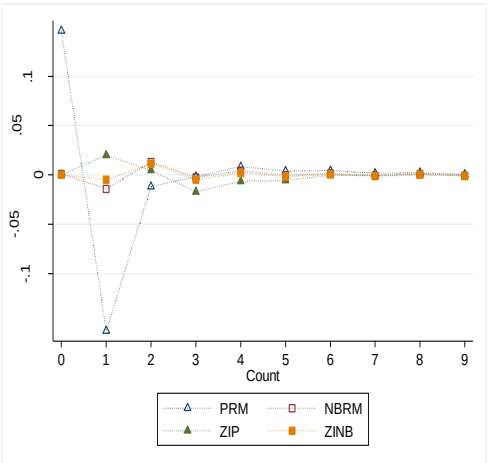
Figure 4.8: Difference between observed probabilities and average predicted probabilities (Cinema Attendance)



Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

Figures 4.9 and 4.10: Difference between observed probabilities and average predicted probabilities (Cultural spectacles and cultural visits)





Note: PRM denotes Poisson Regression model. NBRM denotes Negative Binomial Regression Model. ZIP denotes Zero-Inflated Poisson Model. Finally, ZINB denotes Zero-Inflated Negative Binomial Model.

In all cases the differences between observed and predicted probabilities are smaller in the case of ZINB models, so that their predictions are more accurate than those of the other specifications considered.

We outlined the ZINB specification in detail in Chapter 3. As explained then, this model assumes two types of individuals: those that would never participate in the activity and, consequently, whose observed frequency is zero, and those who may or may not participate, in which case their observed frequency may be zero or positive.

The set of covariates included in both parts of the model are: age and age squared, health (only for the sports analysis), marital status, number of children younger than 12, a dummy equal to one if there are more than two adults living at home, non-labour income, labour status, logarithm of hourly earnings (as in previous chapter, this variable is equal to observed wage for workers and predicted wage for non-working people), as well as dummies to control for the term and degree of urbanization. In addition, we include a gender dummy since we cannot run separate regressions by gender because of small sample size.

4.4 Results

In this section we present the results of our estimates and discuss the marginal effects of the main covariates on the expected frequency and on the probability of being a potential participant.

Tables 4.3- 4.7 provide information about the estimated coefficients and t-statistics of the ZINB models.

Table 4.3 Walking

Frequency Covariates	*Coef.*	*t*
Gender	-0.03644	-2.51
Age	-0.00782	-2.32
Agesq	0.01676	4.39
Married	-0.00855	-0.55
Nchild12	-0.00107	-0.10
Adult3	0.00913	0.71
Ill	0.05025	3.48
Quart1	0.03201	1.94
Quart2	0.04502	2.75
Quart3	0.09675	5.89
Urb2	-0.03206	-1.42
Urb3	-0.01302	-1.05
Educ1	-0.02673	-1.83
Educ2	-0.03885	-2.06
Educ3	-0.03963	-1.62
Labour	-0.27762	-18.71
Lwage	-0.00302	-0.18
Nlabinc	-0.00004	-6.13
P(A=1)	*Coef.*	*t*
Gender	0.38186	12.86
Age	-0.01567	-2.02
Agesq	-0.00827	-0.90
Married	0.04460	1.23
Nchild12	0.14163	6.47
Adult3	0.20823	7.08
Ill	0.16532	4.55
Quart1	0.14895	4.12
Quart2	0.16375	4.48
Quart3	0.15265	4.03
Urb2	0.10321	2.09
Urb3	0.04487	1.60
Educ1	-0.13674	-3.85
Educ2	-0.23440	-5.66
Educ3	-0.42235	-8.02
Labour	0.42913	13.35
Lwage	-0.19168	-6.12
Nlabinc	-0.00010	-6.43
N	26980	
Ll	-72979.57	

Table 4.4 Individual and Group Sports

Frequency				
Covariates	*Coef.*	*t*	*Coef.*	*t*
Gender	0.07490	2.86	0.18150	3.28
Age	-0.00784	-1.14	-0.05936	-4.31
Agesq	0.00854	1.03	0.07938	4.49
Married	-0.04833	-1.52	-0.07950	-1.13
Nchild12	-0.00088	-0.04	-0.03368	-0.84
Adult3	0.05716	2.17	0.00434	0.09
Ill	0.05982	1.77	-0.14444	-1.95
Quart1	-0.01548	-0.47	0.08133	1.46
Quart2	0.01319	0.40	-0.00402	-0.07
Quart3	0.04047	1.26	0.03450	0.59
Urb2	-0.03086	-0.69	-0.06301	-0.86
Urb3	-0.03562	-1.49	0.02264	0.54
Educ1	-0.01329	-0.34	0.02356	0.26
Educ2	-0.00739	-0.18	-0.08413	-0.93
Educ3	-0.04186	-0.89	-0.08644	-0.89
Labour	-0.15477	-5.32	-0.18394	-3.66
Lwage	0.06488	2.25	0.12113	2.63
Nlabinc	-0.00001	-0.90	-0.00003	-1.29
P(A=1)	*Coef.*	*t*	*Coef.*	*t*
Gender	-0.16195	-4.73	-1.85784	-31.52
Age	0.02846	3.07	0.12193	8.05
Agesq	-0.01037	-0.93	-0.06908	-3.65
Married	0.31486	7.50	0.08765	1.23
Nchild12	0.15960	5.94	0.05180	1.24
Adult3	0.26334	7.47	0.26280	4.76
Ill	0.14508	3.12	0.31132	3.82
Quart1	0.10275	2.36	0.14211	2.17
Quart2	0.03000	0.69	-0.05877	-0.90
Quart3	-0.22215	-5.01	0.04984	0.72
Urb2	0.04744	0.80	0.00979	0.11
Urb3	0.10811	3.28	0.18935	3.75
Educ1	-0.49613	-9.85	-0.46927	-5.44
Educ2	-0.86324	-16.07	-0.90963	-10.38
Educ3	-1.09848	-17.55	-1.29421	-12.84
Labour	0.06664	1.74	0.05203	0.89
Lwage	-0.34250	-9.22	-0.24132	-4.20
Nlabinc	-0.00018	-10.80	-0.00017	-6.92
N	26980		26980	
Ll	-35612.61		-14670.07	

Table 4.5 No require/require Facilities Sports.

Frequency				
Covariates	*Coef.*	*t*	*Coef.*	*t*
Gender	0.21047	4.66	-0.06956	-2.62
Age	-0.00639	-0.54	-0.02074	-2.95
Agesq	0.00875	0.60	0.02725	3.21
Married	0.04366	0.78	-0.07542	-2.26
Nchild12	-0.05668	-1.65	-0.00774	-0.37
Adult3	0.05313	1.24	0.03637	1.39
Ill	-0.03111	-0.47	0.06621	1.92
Quart1	0.07308	1.41	-0.03613	-1.12
Quart2	0.06635	1.28	-0.00317	-0.10
Quart3	0.03010	0.58	0.08100	2.50
Urb2	-0.08396	-1.14	-0.02851	-0.64
Urb3	-0.02963	-0.76	-0.02614	-1.10
Educ1	-0.03240	-0.46	0.00520	0.13
Educ2	-0.06425	-0.91	-0.01528	-0.36
Educ3	-0.07205	-0.93	-0.06163	-1.29
Labour	-0.19283	-3.95	-0.17505	-6.10
Lwage	0.01325	0.32	0.09963	3.45
Nlabinc	-0.00006	-3.38	0.00001	0.47
P(A=1)	*Coef.*	*t*	*Coef.*	*t*
Gender	-1.11343	-22.86	-0.37598	-10.74
Age	0.01330	0.96	0.06882	7.37
Agesq	0.02430	1.41	-0.04560	-4.01
Married	0.34443	5.71	0.27275	6.31
Nchild12	0.06954	1.90	0.15598	5.73
Adult3	0.20897	4.19	0.26779	7.42
Ill	0.34349	4.67	0.14465	3.05
Quart1	0.20416	3.40	0.05274	1.19
Quart2	0.13732	2.29	-0.02034	-0.46
Quart3	-0.00451	-0.07	-0.17412	-3.83
Urb2	-0.00021	-0.01	0.04056	0.68
Urb3	0.04395	0.96	0.16226	4.84
Educ1	-0.33618	-4.38	-0.52427	-10.17
Educ2	-0.75860	-9.75	-0.87598	-16.03
Educ3	-0.96639	-10.88	-1.15070	-18.00
Labour	-0.08863	-1.65	0.12399	3.21
Lwage	-0.35899	-7.10	-0.32688	-8.69
Nlabinc	-0.00012	-5.14	-0.00021	-12.31
N	26980		26980	
Ll	-17114.3		-34707.44	

Table 4.6 Outdoor and Indoor Sports.

Frequency				
Covariates	*Coef.*	*t*	*Coef.*	*t*
Gender	0.23598	5.67	-0.09037	-3.30
Age	-0.00779	-0.74	-0.01924	-2.68
Agesq	0.01164	0.89	0.02637	3.04
Married	0.01178	0.23	-0.07419	-2.18
Nchild12	-0.05403	-1.79	0.00564	0.26
Adult3	0.07617	1.97	0.04435	1.66
Ill	-0.07329	-1.21	0.07705	2.21
Quart1	0.02583	0.54	-0.02369	-0.72
Quart2	0.04773	1.00	-0.01091	-0.32
Quart3	0.03413	0.72	0.05693	1.73
Urb2	-0.10750	-1.62	-0.02516	-0.55
Urb3	0.00338	0.09	-0.02223	-0.91
Educ1	-0.03015	-0.46	0.00576	0.14
Educ2	-0.06522	-1.00	-0.02538	-0.60
Educ3	-0.03229	-0.45	-0.09922	-2.07
Labour	-0.20266	-4.57	-0.15106	-5.12
Lwage	0.01683	0.44	0.11695	3.95
Nlabinc	-0.00005	-3.23	0.00001	0.19
P(A=1)	*Coef.*	*t*	*Coef.*	*t*
Gender	-1.15774	-25.95	-0.25637	-7.16
Age	0.02857	2.26	0.06749	7.11
Agesq	0.00641	0.41	-0.04364	-3.77
Married	0.28846	5.22	0.28427	6.39
Nchild12	0.07886	2.38	0.16360	5.75
Adult3	0.31416	6.77	0.23416	6.38
Ill	0.34146	5.23	0.09906	2.03
Quart1	0.10343	1.89	0.09645	2.12
Quart2	0.11951	2.15	-0.03865	-0.85
Quart3	0.01382	0.24	-0.23112	-4.98
Urb2	0.01595	0.21	0.01787	0.30
Urb3	0.09355	2.21	0.16668	4.85
Educ1	-0.38710	-5.56	-0.51687	-9.69
Educ2	-0.86299	-12.14	-0.83587	-14.77
Educ3	-1.14175	-14.09	-1.05745	-16.01
Labour	-0.06987	-1.40	0.14832	3.77
Lwage	-0.42575	-9.02	-0.26967	-7.03
Nlabinc	-0.00019	-8.76	-0.00018	-10.71

Table 4.7 Cinema, Cultural Spectacles and Cultural Visits.

Frequency						
Covariates	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Gender	0.08321	2.61	0.03594	0.49	0.25055	3.44
Age	-0.02390	-2.60	0.00380	0.16	0.05528	2.78
Agesq	0.03015	2.58	0.01175	0.41	-0.05835	-2.51
Married	-0.32418	-6.56	-0.53461	-4.24	-0.15741	-1.70
Nchild12	-0.20072	-5.48	-0.06302	-0.85	-0.25657	-4.12
Adult3	0.05344	1.64	0.00257	0.03	-0.16217	-2.20
Quart1	-0.06097	-1.63	-0.12609	-1.19	-0.25490	-3.01
Quart2	-0.17460	-4.55	-0.11008	-1.33	-0.09653	-1.20
Quart3	-0.17467	-4.19	0.16278	1.81	0.31082	3.28
Urb2	0.02777	0.51	-0.32605	-2.64	-0.23676	-2.09
Urb3	0.01941	0.65	-0.10271	-1.41	-0.16203	-2.33
Educ1	-0.00462	-0.08	0.30230	2.25	0.20309	1.75
Educ2	0.00075	0.01	0.46677	3.41	0.27652	2.34
Educ3	0.09832	1.33	0.45316	2.76	0.49237	3.81
Labour	0.01627	0.43	-0.14633	-1.53	-0.33111	-3.89
Lwage	0.03116	0.79	0.08376	0.98	-0.01391	-0.17
Nlabinc	0.00007	4.68	0.00007	1.86	0.00001	0.41
P (A=1)	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Gender	0.37559	4.58	0.54263	3.42	0.48911	4.84
Age	0.15173	6.84	0.15657	3.99	0.00173	0.07
Agesq	-0.09059	-3.80	-0.14752	- 3.41	-0.01009	-0.37
Married	0.42568	4.89	0.02444	0.11	0.07431	0.73
Nchild12	0.18920	3.22	0.38185	3.04	0.17981	2.50
Adult3	0.30716	4.70	0.47123	3.73	0.37161	4.18
Quart1	-0.16580	-2.12	0.28552	1.70	0.07536	0.69
Quart2	0.01269	0.16	-0.20215	-1.30	-0.02597	-0.25
Quart3	0.16683	1.98	-0.10516	-0.65	0.08814	0.87
Urb2	0.21796	1.88	-0.00391	-0.02	0.17403	1.19
Urb3	0.41657	6.53	-0.28784	-2.18	0.43790	5.06
Educ1	-0.72597	-9.03	-0.48481	-2.99	-0.59277	-5.51
Educ2	-1.40258	-14.21	-1.29171	-5.38	-1.43036	-9.26
Educ3	-1.89813	-13.83	-2.50514	-4.85	-2.38163	-5.94
Labour	-0.48179	-6.33	-0.46941	-2.66	-0.13084	-1.26
Lwage	-0.45553	-5.31	-0.39591	-2.43	-0.34217	-3.49
Nlabinc	-0.00026	-7.06	-0.00047	-5.14	-0.00029	-3.95
N	26980		26980		26980	
Ll	-25077.67		-12632.87		-15344.83	

Beginning with participation decisions, gender is significant for all sports and cultural activities covered. Furthermore, this variable has very high levels of significance, especially in sports activities, and affects sports and cultural participation in a different way: while women are more likely to participate in cultural activities, they are less likely to practice sports. Walking is the only exception to the previous statement, with women more likely to walk than men.

Although age is usually significant and displays a U-shaped relationship in participation decisions, the minimum values are generally reached at high age levels , so that we can conclude that participation decreases with age. The only activities in which age does not affect the probability of participation are sports that do not require facilities and cultural visits. Moreover, it is worth noting the case of walking: this is the only activity which younger people are less likely to practice. This may be because walking does not require great physical effort, so that older people can do it.

The educational level always has the same effect of increasing the probability of participating in all sports and cultural activities.

Marital status usually has a negative influence on the probability of practicing sports, except for group sports and walking for which the variable is not significant. Regarding cultural activities, it only has a significant and negative effect on cinema attendance. The number of children at home also reduces participation in all sports and cultural activities except group sports, and the presence of more than two adults in the household also has a negative effect. Therefore, the general conclusion is that family responsibilities tend to reduce the likelihood of practicing sports or attending cultural events.

Participation in sports activities is also determined by season. In particular, the probability of participating in some sports decreases during winter and spring, whereas in summer the probability of practicing sports increases (whenever the variable is significant). In the case of cultural events, the probability of going to the cinema increases in winter and decreases in summer, as expected, and the probability of attending theatre or music concerts is also greater in winter. These results could be explained because of the supply of film premieres and also by the fact that weather may influence individual preferences towards these indoor events.

Sports and cultural activities have an urban character, since participation generally decreases in smaller population areas. However, it is not significant in sports that do not require infrastructure and this result may be because the best infrastructures are generally located in large cities. However, the probability of attending performing arts events is higher in populations under 100,000 inhabitants. Although this result might be surprising if we had only considered high culture, we must remember that our definition of performing arts also includes popular culture, and many local festivals and celebrations are held in small towns.

As happened in the previous chapter, in which we analyzed sports and cultural activities in the aggregrate, the labour situation has a different effect on sports and cultural activities. Thus, having a job either decreases or does not affect the probability of practicing sports whereas it increases the probability of making cultural visits. It seems that the availability of time may be a barrier to practicing some sports.

Regarding health, individuals who have a chronic illness are less likely to play sports. Finally, hourly wages and non-labour income are always significant for cultural and sports activities. Both covariates positively affect the probability of being a participant in leisure activities.

Focusing now on the effect of the covariates on frequency decisions, gender is always significant except for cultural performances. The sign of the coefficients indicates that males participate more frequently than females in individual, group and outdoor sports and sports that do not require facilities, whereas females participate more frequently than males in indoor sports, sports requiring infrastructures, and walking. In cultural activities, participation is greater among females but the frequency of cinema attendance and cultural visits is higher for males.

As with the participation decisions, age - when significant - generally displays a U-shaped relationship with respect to frequency. The exception is the case of cultural visits, where it has an inverted U-shaped effect.

We also note the results for educational covariates. On the one hand, the number of times that individuals practice indoor sports decreases for those individuals with higher educational levels. Moreover, walking is practiced less frequently by individuals with primary or high school education. On the other hand, the frequency of cultural visits and attendance at cultural performances increases for individuals with higher educational levels.

Family variables are not generally significant in explaining sports frequency but they usually have a negative influence on the frequency of attendance at cultural events.

The season is less important in explaining the frequency than the probability of participation. However, we have obtained some interesting results. The frequency of walking is highest during the first half of the year and the practice of indoor sports and sports that require infrastructure increases in summer. In the case of cultural activities, cultural visits and attendance at cultural performances are more frequent during the summer months. This result was expected since many high culture festivals, as well as popular celebrations, take place in summer. In addition, many people are on holidays so

they are more likely to visit monuments and museums. In fact, cultural visits are less frequent in winter. Finally, the frequency of cinema attendance is lower in spring and summer.

While the population size variables were generally significant for participation, these variables are only significant for explaining the frequency of cultural visits and attendance at cultural performances.

The number of times individuals practice any sports or walk is lower when they are working.[61] However, in the case of cultural activities, this covariate is only significant for cultural visits. We assume that commuting several times to visit museums and heritage sites involves a lot of time, so that this activity is especially affected by the labour situation.

In participation decisions, hourly wages were significant for all leisure activities analyzed. However, wages are not significant in explaining the expected frequency of attendance at cultural activities. For sports, wage increases the frequency of practicing individual, group and indoor sports and sports that require facilities. In general, indoor sports and sports that require facilities will be relatively more expensive than other sports since individuals usually have to pay a fee to practice them.

Non-labour income has different effects on sports and cultural activities. The frequency of attending cinema and cultural performances increases with non-labour income, whereas this covariate diminishes the frequency of walking, playing outdoor sports and sports that do not require facilities. We believe that this is an interesting result as this negative effect on sports might reveal the presence of proletarian sports (Wilson, 2002). In other words, although participation increases with non-labour income for all sports, some

[61] However, Humphreys and Ruseski (2007) found that employed people spend more time participating in group sports.

individuals might want to differentiate themselves by moving away from the practice of certain sports associated with the lower classes (Bourdieu, 1984; Peterson, 1997).

Finally, the illness covariate also yields interesting results in the frequency decision for sports activities. While this explanatory variable generally had a negative effect on sports participation, the results on frequency are mixed. It only has a negative influence on the frequency of playing group sports, whereas it has a positive effect on the frequency of individual and indoor sports and sports that require facilities. Moreover, individuals with illnesses also walk more frequently. It is reasonable that people with illnesses play sports that may have a therapeutic effect or can be practiced without substantial physical effort, e.g., swimming or yoga.

Apart from analyzing the positive or negative influence of the variables included, we believe it is also interesting to compute the marginal effects of the main covariates in order to check whether there are relevant differences in the response of the dependent variables to changes in the independent variables.

Therefore, and as we did in previous chapter, we computed the marginal effect of some socio-demographic and economic variables. Specifically, for each individual we have obtained the total effect of the covariate on the expected number of counts, as well as two partial effects: the change in the probability of being a potential participant, i.e., of belonging to the Not-Always Zero group, and the change of the expected frequency conditioned on participation.[62]

We computed the marginal effects of the following variables: sex, educational level, occupation, wage and non-labour income, and in the case of the economic variables we present the elasticities. These variables usually have high values of significance in the

[62] See Chapter 3 for a detailed analysis of how the marginal effects have been computed.

estimations. In the case of cultural activities, we also calculated the marginal effects of family-related variables (marital status and number of children in the household), given the relevance of these factors.[63]

The mean values of the total and partial marginal effects on the participation and frequency of participation in the various activities are presented in Tables 4.8-4.17. Table 4.18 provides information about the mean elasticities of participation and frequency with respect to wage and non-labour income.

Table 4.8 Marginal Effects: Walking

	Total Marginal Effect		**Marginal Effect Probability Potential Participant**		**Marginal Effect Expected Number Of Counts Conditioned on A_i=0**	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.6161	0.0875	0.0425	0.0048	-0.0115	0.0022
Educ2	0.2280	0.0392	0.0226	0.002	-0.1816	0.0358
Educ1	0.2564	0.0607	0.0320	0.0024	-0.4082	0.0806
Gender	-1.6607	0.3210	-0.0897	0.0068	-0.5493	0.1103
Labour	-3.9484	0.6586	-0.1005	0.0077	-4.192	0.4969

Table 4.9 Marginal Effects: Individual Sports

	Total Marginal Effect		**Marginal Effect Probability Potential Participant**		**Marginal Effect Expected Number Of Counts Conditioned on A_i=0**	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.4353	0.0776	0.0478	0.0081	-0.4038*	0.0396
Educ2	0.8095	0.2213	0.0662	0.0147	0.0701*	0.0069
Educ1	0.8306	0.2839	0.0715	0.0211	-0.1585*	0.0155
Gender	0.5468	0.2381	0.0273	0.0093	0.8909	0.0834
Labour	-0.5981	0.3149	-0.0112	0.0039	-1.8438	0.1509

*Note: * This variable is not significant*

[63] The family variables are not generally significant in the explanation of the sports practice frequency, therefore we did not compute their marginal effects for those activities.

Table 4.10 Marginal Effects: Group Sports

	Total Marginal Effect		Marginal Effects Probability Potential participant		Marginal Effect Expected Number Of Counts Conditioned on $A_i=0$	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.2152	0.1780	0.0387	0.0293	-0.0126*	0.0031
Educ2	0.1411	0.1205	0.0358	0.0316	-0.6241*	0.1511
Educ1	0.1955	0.2295	0.0290	0.0298	0.1424*	0.0345
Gender	0.9657	0.8364	0.1502	0.1191	1.0619	0.2445
Labour*	-0.1555	0.1978	-0.0043*	0.0040	-1.0756	0.2496

*Note: * This variable is not significant*

Table 4.11 Marginal Effects: Facilities Sports

		Total Marginal Effect		Marginal Effects Probability Potential Participant		Marginal Effect Expected Number Of Counts Conditioned on $A_i=0$
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.4067	0.0824	0.0542	0.0109	-0.4782*	0.0665
Educ2	0.6008	0.1757	0.0616	0.0165	-0.2185*	0.0304
Educ1	0.8093	0.3325	0.0741	0.0268	0.0559*	0.0078
Gender	0.4672	0.1571	0.0621	0.0232	-0.7350	0.1000
Labour	-0.6878	0.3871	-0.0204	0.0079	-1.8601	0.1840

*Note: * This variable is not significant*

Table 4.12 Marginal Effects: No facilities Sports

	Total Marginal Effects		Marginal Effects Probability Potential Participant		Marginal Effect Expected Number Of Counts Conditioned on $A_i=0$	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.1879	0.1138	0.0238	0.0134	-0.0638*	0.0095
Educ2	0.3059	0.2027	0.0398	0.0248	-0.2660*	0.0397
Educ1	0.1888	0.1380	0.0243	0.0168	-0.2794*	0.0417
Gender	1.0397	0.5875	0.1029	0.0608	1.7894	0.2372
Labour*	-0.1229	0.1232	0.0082	0.0057	-1.6389	0.2472

*Note: * This variable is not significant*

Table 4.13 Marginal Effects: Indoor Sports

	Total Marginal Effects		Marginal Effect Probability Potential Participant		Marginal Effect Expected Number Counts Conditioned on $A_i=0$	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.2105	0.0478	0.0409	0.0095	-0.7627	0.0993
Educ2	0.4909	0.1459	0.0523	0.0153	-0.3389*	0.0441
Educ1	0.7585	0.3166	0.0677	0.0258	0.0635*	0.0083
Gender	0.2068	0.0657	0.0397	0.0158	-0.9704	0.1244
Labour	-0.6118	0.3284	-0.0229	0.0094	-1.6326	0.1641

*Note: * This variable is not significant*

Table 4.14 Marginal Effects: Outdoor Sports

	Total Marginal Effects		Marginal Effect Probability Potential Participant		Marginal Effect Expected Number Counts Conditioned on $A_i=0$	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.3667	0.2069	0.0396	0.0189	0.2567*	0.0419
Educ2	0.3987	0.2423	0.0556	0.0312	-0.2736*	0.0446
Educ1	0.2582	0.1818	0.0347	0.0227	-0.2430*	0.0396
Gender	1.3150	0.7325	0.1334	0.0747	1.8857	0.2610
Labour*	-0.1951	0.1937	0.0079*	0.0051	-1.6189	0.2633

*Note: * This variable is not significant*

Table 4.15 Marginal Effects: Cinema

		Total Marginal Effects		Marginal Effect Probability Potential Participant		Marginal Effect Expected Number Counts Conditioned on $A_i=0$	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.1911	0.0520	0.0899	0.0324	0.1279*	0.0374
Educ2	0.1512	0.0493	0.1244	0.0372	0.0067*	0.0020
Educ1	0.1498	0.0663	0.1237	0.0426	-0.0058*	0.0017
Gender	-0.0168	0.0507	-0.0587	0.0260	0.1056	0.0310
Labour	-0.2959	0.1547	0.0771	0.0326	0.0206*	0.0061
Married	-0.1656	0.1148	-0.0694	0.0281	-0.4214	0.0886
Nchild12	0.1032	0.0455	-0.0297	0.0131	-0.2540	0.0757

*Note: * This variable is not significant*

Table 4.16 Marginal Effects: Cultural Spectacles

	Total Marginal Effects		Marginal Effect Probability Potential Participant		Marginal Effect Expected Number Of Counts Conditioned on A_i=0	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.0990	0.0477	0.2250	0.0689	-0.0063	0.0021
Educ2	0.1104	0.0408	0.1729	0.0294	0.0713	0.0240
Educ1	0.0713	0.0358	0.0954	0.0212	0.1040	0.0351
Gender	-0.0310	0.0178	-0.0973	0.0309	0.0144	0.0054
Labour	-0.1160	0.0793	0.0856	0.0268	-0.0589*	0.0216
Married	-0.0404	0.0191	-0.0044	0.0014	-0.2279	0.0690
Nchild12	0.0032	0.0247	-0.0688	0.0222	-0.0252*	0.0094

*Note: * This variable is not significant*

Table 4.17 Marginal Effects: Cultural Visits

	Total Marginal Effects		Marginal Effect Probability Potential Participant		Marginal Effects Expected Number Counts Conditioned on A_i=0	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Educ3	0.3841	0.1427	0.2190	0.0201	0.2444	0.0877
Educ2	0.2001	0.0820	0.1772	0.0249	0.0718	0.0258
Educ1	0.1190	0.0589	0.0940	0.0249	0.1733	0.0622
Gender	0.0028	0.0554	-0.0877	0.0256	0.2435	0.0910
Labour	-0.0708	0.0543	0.0236*	0.0069	-0.3221	0.1207
Married	-0.1235	0.0930	-0.0134	0.0039	-0.1542	0.0574
Nchild12	-0.0977	0.0991	-0.0324	0.0095	-0.2464	0.0939

*Note: * This variable is not significant*

Table 4.18 Wage Elasticity

	WAGE ELASTICITY					
	Total Elasticity		Probability Potential Participant		Expected Number of Counts	
SPORTS	*Mean*	*St.Dv.*	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*
Walking	0.0792	0.0216	0.0823	0.0217	-0.0030*	0
Individual	0.3230	0.0451	0.2581	0.0451	0.0649	0
Group	0.3348	0.0342	0.2137	0.0342	0.1211	0
Facilities	0.3448	0.0504	0.2452	0.0504	0.0996	0
No Facilities	0.3302	0.3302	0.3170	0.0364	0.0132*	0
Indoor	0.3266	0.0372	0.2097	0.0372	0.1170	0
Outdoor	0.3757	0.0576	0.3589	0.0576	0.0168*	0
CULTURE	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*
Cinema	0.2709	0.1385	0.2398	0.1385	0.0312*	0
Spectacles	0.2894	0.1044	0.2057	0.1044	0.0838*	0
Visits	0.2100	0.0735	0.2240	0.0735	-0.0139*	0

*Note: * This variable is not significant*

Table 4.19 Non-labour Income Elasticity

	NON-LABOUR INCOME ELASTICITY					
	Total Elasticity		Probability Potential Participant		Expected Number of Counts	
SPORTS	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*
Walking	-0.0019	0.0180	0.0488	0.0381	-0.0506	0.0407
Individual	0.1485	0.1100	0.1617	0.1197	-0.0131*	0.0106
Group	0.1567	0.1260	0.1888	0.1499	-0.0321*	0.0258
Facilities	0.1935	0.1444	0.1868	0.1396	0.0067*	0.0054
No Facilities	0.0497	0.0421	0.1288	0.1011	-0.0791*	0.0636
Indoor	0.1728	0.1293	0.1700	0.1272	0.0028*	0.0023
Outdoor	0.1246	0.1001	0.1921	0.1493	-0.0675	0.0543
CULTURE	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*	*Mean*	*St. Dv.*
Cinema	0.2377	0.2005	0.1533	0.1554	0.0843	0.0678
Spectacles	0.3379	0.2541	0.2540	0.2140	0.0839	0.0674
Visits	0.2280	0.1711	0.2122	0.1612	0.0159*	0.0127

*Note: * This variable is not significant*

We start by comparing the marginal effects of the covariates on individual and group sports. Educational variables have a positive effect on the expected frequency of participation in both types of sports. However, their effect on individual sports is more than double that of group sports, and this is due to their greater impact on the probability of being a potential participant. On the contrary, labour status has a negative effect, which is almost four times greater for individual sports than for group sports.

Another noteworthy result is the influence of gender: the marginal effects of this variable are positive and higher for group sports than for individual sports. In particular, the probability of participating in group sports is 0.15 greater for men than women, whereas for individual sports this difference is around 0.03.

Regarding the influence of the economic variables, they have a positive and greater effect on the probability of participating than on the frequency. All the elasticities are less than one, although the response to changes in own earnings is higher than that of changes in non-labour income.

When we compare the total marginal effects of sports that require facilities *versus* those that do not require facilities, we observe that gender is the variable with the greatest – and positive - impact on sports that do not require the use of infrastructure, with its effect being much lower on sports that do require facilities. Conversely, education and labour status, although with opposite effects, have a much higher absolute total marginal effect on sports played using facilities than on the rest. The partial effects corroborate these results. On the one hand, the probability of participating in sports that do not require facilities is 10 points higher for males than for females and the expected frequency of practice of males conditioned on being a participant increases by almost 2 times over the previous four

weeks. However, in the case of sports requiring facilities, the positive effect of gender on the probability of participation is lower and its effect on the conditional expected frequency is negative. On the other hand, the educational variables have also a greater positive impact on the probability of practicing sports requiring infrastructures. As for the elasticities, the most distinctive result is the low impact of the economic variables on the conditional expected frequency.

Regarding indoor/outdoor sports, gender is the variable with the greatest impact on the expected frequency of practicing outdoor sports of all variables included in the Table, with its effect being much lower in the case of indoor sports. However, in both cases males have a greater expected number of counts. When we analyze the partial effects, we find that males have a probability of practicing outdoor sports some 0.13 points higher than females, compared to 0.04 for indoor sports. In contrast, men who play indoor sports practice them less often than women, contrary to what happens in the case of outdoor sports. With respect to the labour situation, workers have an expected frequency 1.6 times lower than non-workers in both categories of sports. Finally, the probability of participation is more sensitive to wage changes in the case of outdoor sports, though the elasticity value is below one.

With regards to walking, workers and males are less likely to practice this activity, and with lower expected frequency. In particular, the expected frequency of workers who walk is 4.19 times less than that of non-workers. In addition, educational variables have less influence. The wage and non-labour income elasticities are very small.

When comparing cultural activities, the total marginal effects of education are among the highest, whereas gender has a much more modest effect. The influence of education is mainly due to its greater impact on the probability of participating. Specifically, the probability of being a potential participant in cultural performances and cultural visits is

around 0.22 points higher for people with university studies. In the case of cinema, the effect is also positive, but much lower. The variables related to family responsibilities (marital status and children) generally affect negatively and have relatively high total marginal effects compared to other variables. Moreover, compared with the rest of covariates analyzed they have a greater impact on the expected frequency of attendance than on the probability of participating.

As for wage and non-labour income elasticities, there are no major differences among cultural activities and monetary variables primarily affect the probability of being a potential participant.

4.5 Conclusions

In this chapter we have conducted a disaggregated analysis of culture and sports, studying differences and similarities between specific leisure activities. In particular, we have analyzed individual participation and frequency during the previous four weeks in walking, individual/group sports, indoor/outdoor sports, sports that require and do not require facilities, cinema attendance, cultural performances (high and popular culture), and cultural visits to museums and cultural heritage.

The database used is the Spanish Time Use Survey 2002-2003 and, given the high rates of non-participation in these activities, individuals' leisure behavior has been modeled through ZINB count data models. In the empirical specification, we assume that individual decisions about these leisure activities depends on gender, other personal and family characteristics, economic variables, place of residence and season.

With the estimated coefficients we performed a decomposition of the marginal effects of the main significant variables, thereby enabling us to quantify their influence on the participation and frequency decisions. As far as we are aware, this is the first time a decomposition of the marginal effects of socio-economic covariates has been carried out to discuss frequency and participation habits of individuals in sports and cultural activities.

In sports, gender and the labour situation tend to be the most relevant variables, although there are some interesting differences among sports. Sports participation is predominantly male, although women are more likely to walk. However, educational covariates are among the most important for explaining cultural participation. In frequency decisions, the time-intensive nature of sports is evidenced through the negative influence of labour status, whereas family responsibilities negatively affect the frequency of cultural activities.

The wage and non-labour income elasticities show that the probability of participation is generally more sensitive to changes in the economic variables than the frequency of participation. In addition, there is greater variability among wage participation elasticities of sports activities than those of cultural activities, where all wage elasticities are around 0.23. Finally, wage elasticities are usually greater than non-labour income elasticities.

In summary, the aggregation of activities may hide relevant differences in the effect of the covariates on the probabilities of participation and on the frequency of participation. Thus, public authorities should take into account these differences if they want to promote specific activities.

GENERAL CONCLUSIONS AND AGENDA

The main goal of this thesis is the analysis of individual participation in two leisure activities: sports and culture. To this end, we have carried out three essays which differ in the definition of these activities and/or in the empirical methodologies applied.

Both culture and sports are especially interesting forms of entertainment for public authorities, given the potential positive externalities associated with their practice such as improved health and social integration. Moreover, both activities have led to two burgeoning and expanding branches of the economics literature, although most studies analyze them separately.

This thesis offers three main contributions to the literature. First, we specify and estimate a structural model of individual daily time allocation to sports and culture defined in broad terms - including active and passive participation - and allowing correlation between these.

Second, we analyze the number of times individuals have played sports and attended cultural events in the previous four weeks, comparing for the first time two econometric models that have been previously applied in the literature, namelycount data models and double-hurdle models. In addition, we perform a thorough analysis of the results by computing the individual marginal effects of the main covariates, the wage and non-labour income elasticities, and the Oaxaca-Blinder decomposition to gain further insights into gender differences -.

Third, we perform a comparative analysis of the covariates that affect different sports and cultural activities. We can thus check differences and similarities in individual participation and frequency decisions regarding the practice of specific sports and attendance at different types of cultural activities.

The three pieces of research in this dissertation have been carried out using the Spanish Time Use Survey 2002-2003. This is the only Spanish dataset that contains two sources of information about participation in sports and cultural activities: time allocation in a specific day, and frequency of participation in the previous four weeks. Our studies have been conducted on the subsample of working age population, as we assume that the behavior of this group may differ from the rest.

Our analysis addresses two types of decisions: participation and how often to participate. Indeed, one of the characteristics of the data on the leisure activities studied is that there are many non-participants. Statistically, this issue is relevant as an excess of zeros leads to methodological problems for the analysis of the individual making-decision procedure. Consequently, specific methodologies have been applied to address these two types of decisions in our research. The Heckman selectivity method has been used in Chapter 2, the double-hurdle model specification has been estimated in Chapter 3 and zero-inflated count data models have been applied in Chapters 3 and 4.

The results obtained in the different empirical specifications allow us to corroborate that participation and frequency are two distinct types of decisions, as the effect of the covariates on both decisions is not the same.

Moreover, despite the advance of societies, there is still an unequal distribution of housework by gender that may influence individuals' allocation of leisure time. Therefore, we have run separate estimates for males and females in Chapters 2 and 3 and our results

reveal that there are gender differences regarding their decisions to take part in sports and cultural activities. In addition, a Oaxaca-Blinder decomposition was applied in Chapter 3 to analyze gender differences and we find that most of the differences between males and females in terms of the frequency of participation are due to the different characteristics according to gender. In Chapter 4 we define sports practice and culture in a more specific way and this prevents us from making separate estimations by gender. Nevertheless we include a gender binary variable and we obtain interesting differences between males and females regarding the types of activities practiced. For instance, men have a higher probability of participating in all sports except walking. Their frequency of practice is also higher, with the exception of sports that require facilities, indoor sports and walking. In the case of cultural activities, men are less likely to participate, but their frequency of participation is higher than that of women. Moreover, family variables generally have a negative or non-significant effect on individual decisions about culture and sports.

With regards to other results, in Chapter 2 we estimate a system of equations for the relative demand of daily time allocated to sports and culture applying the SURE methodology, and we obtain a positive correlation between the random terms. Thus, we conclude that there are unobserved factors that simultaneously affect the time spent on sports and cultural activities.

In Chapter 3 we find that Zero-Inflated count data models are more suitable than double-hurdle models for the analysis of the number of times the individuals have practiced sports or attended cultural activities in the previous four weeks, in spite of the high observed frequencies for some individuals in the sample. Education has a positive effect on the probability of being a potential participant in both activities, but it does not significantly affect the frequency of sports practice of males. Moreover, the educational level has a greater effect on cultural participation than on sports.

Labor status also affects the practice of sports and attendance at cultural events. Specifically, the results in Chapter 3 show that having a job diminishes the practice and frequency of sports. On the contrary, working increases the probability of attending cultural events. When we analyze sports and culture in a more disaggregated way in Chapter 4, we find that the effect of this variable depends on the activity. For instance, it does not significantly affect either the probability of playing outdoor and group sports, or the probability of cultural visits. Moreover, being a worker does not influence the frequencies of cinema and performing arts attendance, but it reduces the frequency of cultural visits.

Two economic covariates are included in our studies: individual hourly earnings and non-labor income. The results in Chapters 3 show that when active sports and passive cultural activities are defined in the aggregate, both variables have a positive or non-significant influence on the probability and frequency of participation. Furthermore, the values of cultural participation elasticities are more than double those for sports. Finally, wage elasticities are generally greater than non-labour income elasticities. However, when we carry out a disaggregated analysis of activities in Chapter 4, we find out that non-labour income has a negative effect on the frequency of walking, playing sports that do not require facilities, and outdoor sports.

The relevance of education and earnings in explaining the probability of participation leads us to conclude that public policies for the promotion of sports and culture should be more focused on people with lower earnings and educational levels. Moreover, the negative effect of family responsibilities could be mitigated in part by promoting measures to facilitate the joint practice of sports and cultural activities. Finally, the differences found between the various sports and cultural activities could serve as

action guidelines for public authorities to develop policies to encourage individuals' participation in specific activities.

The results obtained in this dissertation suggest possible lines of future research that might extend the studies conducted so far. In the first place, an interesting extension of the comparative analysis performed in Chapter 3 would be to broaden it to include other econometric models previously applied in the literature. In the second place, another aspect for future research would be to apply the Oaxaca-Blinder decomposition by characteristics, as well as to specific activities, in order to determine which covariates are most important for explaining the gender differences in behavior with respect to sports and cultural participation. In the third place, the possible relationships between the allocation of time to leisure and labour market outcomes may be a fruitful line of research. Finally, it could also be interesting to make international comparisons using data from different countries but applying the same methodology to check differences in behaviour.

CONCLUSIONES GENERALES Y EXTENSIONES FUTURAS

El objetivo principal de esta tesis es el análisis de la participación individual en dos actividades de ocio: deporte y cultura. Para ello, hemos llevado a cabo tres ensayos, que difieren en la definición de estas actividades y/o en las metodologías empíricas aplicadas.

Tanto la cultura como el deporte son dos formas de ocio particularmente interesantes para las autoridades públicas, teniendo en cuenta los posibles efectos externos positivos asociados a su práctica, como son la mejora de la salud y la integración social de los individuos. Por otra parte, ambas actividades han dado lugar a dos importantes ramas en creciente expansión en la literatura económica. Sin embargo, la mayoría de los estudios que analizan estas actividades, lo hacen por separado.

Esta tesis ofrece tres contribuciones principales a la literatura. En primer lugar, se especifica y estima un modelo estructural de la asignación individual del tiempo diario al deporte y a la cultura, definiendo ambos conceptos en sentido amplio - incluyendo la participación activa y pasiva -, y permitiendo la correlación entre ellos.

En segundo lugar, se analiza el número de veces que las personas han practicado deporte, y asistido a eventos culturales en las últimas cuatro semanas, comparando por primera vez dos modelos econométricos que han sido anteriormente aplicados en la literatura: modelos de datos de recuento y modelos de doble valla. Además, se lleva a cabo un análisis exhaustivo de los resultados mediante el cálculo de los efectos marginales individuales de las principales variables explicativas, el cálculo de la elasticidades salarial y

de la renta no laboral, y la descomposición de Oaxaca-Blinder - para profundizar en el estudio de las diferencias de género -.

En tercer lugar, se realiza un análisis comparativo de las variables que afectan a diferentes actividades deportivas y culturales. Así, podemos comprobar las diferencias y similitudes en las decisiones de participación y de frecuencia de los individuos sobre la práctica de los deportes específicos y la asistencia a los diferentes tipos de actividades culturales.

Las tres investigaciones planteadas en esta tesis se han desarrollado a partir de la Encuesta de Empleo del Tiempo 2002-2003 que el INE ha llevado a cabo en España. Este es el único conjunto de datos españoles que contiene dos tipos de fuentes de información sobre la participación en actividades deportivas y culturales: la asignación de tiempo en un día y la frecuencia de la participación concreta en cuatro semanas anteriores. Nuestros estudios se han realizado sobre una submuestra de la población, la población en edad de trabajar, ya que se supone que el comportamiento de este grupo puede ser diferente del resto.

Nuestro análisis se centra en dos tipos de decisiones: participación y con qué frecuencia para participar. De hecho, una de las características de los datos sobre las actividades de ocio analizadas es que hay muchos individuos que no participan en la actividad. Estadísticamente, este tema es relevante ya que un exceso de ceros en los datos conduce a problemas metodológicos para el análisis del proceso de toma de decisiones del individuo. De este modo, se han aplicado metodologías específicas para hacer frente a estos dos tipos de decisiones en nuestra investigación. El método de selección muestral de Heckman se ha utilizado en el capítulo 2, la especificación del modelo de doble valla ha sido llevada a cabo en el capítulo 3 y los modelos de datos de recuento inflados en ceros se han aplicado en los capítulos 3 y 4 de la tesis.

Los resultados obtenidos en las diferentes especificaciones empíricas nos permiten corroborar que la participación y la frecuencia son dos tipos de decisiones distintas, y el efecto de las variables explicativas sobre ambas decisiones no es tampoco idéntico.

Por otra lado, a pesar del progreso de las sociedades en los países desarrollados, aún existe una distribución desigual de las tareas domésticas entre ambos géneros que pueden afectar a la asignación individual del tiempo de ocio. Por ello, hemos llevado a cabo estimaciones separadas para hombres y mujeres en los capítulos 2 y 3, y los resultados revelan que existen diferencias de género en relación con su decisión de participar en actividades deportivas y culturales. Además, una descomposición de Oaxaca - Blinder ha sido aplicada en el Capítulo 3 para analizar las diferencias de género y nos encontramos con que la mayoría de las diferencias en la frecuencia de la participación entre hombres y mujeres se deben a las diferentes características de género. En el capítulo 4 se ha definido la práctica del deporte y la cultura de una manera más específica y esto nos ha impedido hacer estimaciones separadas de género. No obstante, incluimos una variable binaria de género y obtenemos diferencias interesantes entre hombres y mujeres con respecto a los tipos de actividades practicadas. Por ejemplo, los hombres tienen una mayor probabilidad de participar en todos los deportes, con la excepción de los deportes que requieren instalaciones, deportes de interior y también la actividad de caminar. En el caso de las actividades culturales, los hombres son menos propensos a participar, pero su frecuencia de participación es más alta que la de las mujeres. Por otra parte, las variables que miden las responsabilidades familiares tienen generalmente un efecto negativo (o no significativas en las decisiones sobre la cultura y el deporte).

En cuanto a otros resultados, en el capítulo 2 se estima un sistema de ecuaciones de la demanda relativas acerca del tiempo diario dedicado a los deportes y a la cultura aplicando la metodología SURE, y se obtiene una correlación positiva entre los términos de

error aleatorios. Por lo tanto, se llega a la conclusión de que hay factores no observados que afectan simultáneamente el tiempo dedicado a las actividades deportivas y culturales.

En el capítulo 3 nos damos cuenta de que los modelos de datos de recuento inflados en ceros son más adecuados que los modelos de doble valla, para el análisis del número de veces que las personas han practicado deportes o han asistido a actividades culturales en las últimas cuatro semanas, a pesar de las altas frecuencias observadas para algunos individuos de la muestra.

La situación laboral del individuo también afecta a la práctica de deportes y a la asistencia a eventos culturales. En concreto, los resultados en el capítulo 3 muestran que tener un puesto de trabajo disminuye la práctica y la frecuencia de los deportes. Por el contrario, trabajar aumenta la probabilidad de que el individuo asista a eventos culturales. Cuando se analiza el deporte y la cultura de una manera más desagregada en el capítulo 4, se obtiene que el efecto de esta variable depende del tipo de actividad. Por ejemplo, no afecta significativamente ni a la probabilidad de la práctica de deportes al aire libre ni en grupo, ni a la probabilidad de realizar visitas culturales. Además, ser trabajador no influye en la frecuencia de asistencia al cine y la realización de la asistencia a las artes, mientras que sí que reduce la frecuencia de las visitas culturales.

Dos variables económicas están incluidos en nuestras investigaciones: Las ganancias salarias/hora del individuo y los ingresos no laborales. Los resultados en el capítulo 3 muestran que cuando el deporte activo y las actividades culturales pasivas se definen de forma agregada, ambas variables tienen una influencia positiva (o no significativa) en la probabilidad y en la frecuencia de la participación. Por otra parte, los valores de las elasticidades acerca de la participación cultural son más del doble que los valores en el caso del deporte. Por último, las elasticidades salariales suelen ser mayores que las elasticidades de la renta no laboral. Sin embargo, cuando hacemos un análisis desagregado de las

actividades en el capítulo 4, nos damos cuenta que la renta no laboral tiene un efecto negativo sobre la frecuencia de caminar, de jugar deportes que no requieren instalaciones y sobre los deportes que se realizan al aire libre.

La importancia de la educación y las ganancias salariales en explicar la probabilidad de participación nos lleva a concluir que las políticas públicas para la promoción del deporte y la cultura deberían estar más enfocadas hacia las personas con menores ingresos y menor nivel educativo. Por otra parte, el efecto negativo de las responsabilidades familiares podría ser mitigado en parte por la promoción de medidas para facilitar la práctica conjunta del deporte y la cultura. Por último, las diferencias encontradas entre las distintas actividades deportivas y culturales podrían servir como guías de acción para los poderes públicos de cara a desarrollar políticas para fomentar la participación del individuo en actividades específicas.

Los resultados obtenidos en esta tesis sugieren posibles líneas de investigación futura que podrían mejorar los estudios realizados hasta el momento. En primer lugar, una interesante extensión del análisis comparativo que se ha realizado en el capítulo 3, sería ampliar la comparación a otros modelos econométricos aplicados previamente en la literatura. En segundo lugar, otro aspecto para la investigación futura sería aplicar la descomposición de Oaxaca-Blinder tanto para las distintas características observadas, como a las distintas actividades específicas, tratando de averiguar qué variables son las más importantes para explicar las diferencias de género en el comportamiento con respecto a los deportes y a la participación cultural. En tercer lugar, las posibles relaciones entre la asignación del tiempo de ocio y los resultados del mercado de trabajo, pueden ser una fructífera línea de investigación en el futuro. Por último, podría ser también interesante hacer comparaciones internacionales a partir de datos procedentes de diferentes países,

aplicando las distintas metodologías utilizadas en esta tesis, para comprobar las diferencias en el comportamiento de los individuos.

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