

Live and digital engagement with the visual arts

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Abstract: We explore the determinants of the choice of attendance at museums and consumption of electronic media and digital engagement with visual arts. By using data from the 2012 Survey of Public Participation in the Arts of the United States, we estimate bivariate probit (recursive) models, in order to explain which variables determine the individual choice of each alternative way of satisfying a cultural need. We explain this choice in terms of variables that account for differences in personal cultural capital, labour status and occupation, demographics, disability, geographical and other socio-economic characteristics, within an individual model of optimal allocation of resources. Significant differences in the determinants of traditional participation versus digital participation emerge in the estimated models.

Keywords: cultural participation, live attendance, digital engagement, bivariate probit model.

JEL codes: C55, D12, Z11.

1. Introduction

Digitization has profoundly transformed the way cultural products and services are produced, distributed and consumed. Apart from transforming each of the aforementioned dimensions, it has also blurred the distinction between them. We often read terms such as prosumption or produsage to describe the new hybrid types of cultural engagement (Bruns, 2013; Tepper *et al.*, 2008). Electronic and digital media consumption of cultural goods has become a more frequent cultural habit for the overall population of Western countries than live attendance. For instance, according to the data for the United States derived from the *2012 Survey of Public Participation in the Arts (SPPA)*, 37% of the population attended a live performance and 39% some visual arts event or activity at least once in the previous year, whereas 71% consumed art through electronic media: TV, radio, handheld or mobile devices, Internet, DVD, CD, tape or record-player (NEA, 2013). Given that the type of participation has been expanded, this fact challenges some of the traditionally well known facts of the determinants of cultural participation (Seaman, 2005), such as the aging of audiences, and opens new research questions.

The relationship between different means of cultural engagement needs further attention. Alternative ways of participation are not necessarily competing or even “cannibalizing” with each other, but very often are either successive or simultaneous complements. According to Marty (2007), Information and Communication Technologies (ICT) is present before, during and after the enjoyment of a physical visit to a museum, shaping expectations and modelling different experiences. Visitors get information to make an informed decision about what to see. They complement their visit with digital outputs (such as apps), and can latter extend the experience of their visit by making use of those contents. Digital engagement can be, in some cases, more active than the actual visit itself, allowing the visitor space for creative and active involvement (such as in the co-creation or co-curatorship).

Digitalization could enlarge the participation to a wide range of cultural goods; however, among all possible artistic manifestation, we concentrate in museums and visual arts for a number of reasons. First, visual arts turn out to be

one of the most popular cultural activities in the U.S. among the life ways of cultural engagement as measured in the *SPPA*: 59% of U.S. adults went at least once to the movies, 39% to visual arts, and 37% to some performing arts event or activity (NEA, 2013). Electronic and, more important, digital access to contents related to visual arts are increasing, and have already overcome visits in terms of popularity. For the year 2012, an estimated proportion of 7.9% got engaged with the visual arts through handheld device or mobile, a proportion similar to engagement through TV or radio, and slightly higher than through the internet (NEA, 2013). Second, this is a manifestation in which relatively little research has been conducted (as opposed to music, for instance, where the impact of electronic media and digital access and piracy have driven lot of research).

This paper aim to fill this lacuna and to investigate whether physical and digital participation are competing each other. We explore the determinants of the choice of attendance at museums and art galleries and/or media and digital engagement with visual arts through handheld or mobile devices and through Internet. While cultural personal capital is assumed to be needed for both, the physical condition of the individual and time constraints may condition physical attendance. Data are derived from the 2012 *SPPA*, periodically run as a supplement of the *Current Population Survey* by the U.S. Bureau of the Census. Data for the 2012 release were collected from a sample of people over 18 years of age in July 2012. We estimate a trivariate probit models to explain which variables determine the individual choice of one or another way of satisfying cultural need (establishing the choice between no physical engagement and physical engagement, and no media and media engagement). We explain this choice in terms of variables that account for differences in personal cultural capital, labour status and occupation, demographics, disability, geographical and other socio-economic characteristics. We find that the effect of variables that characterize the socialization on visual arts, tastes and, more important, education determine participation in both equations. However, more differences emerge when considering the effect that different resources have in one type or another of engagement: in-site and on-line.

The remainder of the work is structured as follows. Section 2 analyses alternative ways of accessing cultural goods, and how differences in personal

resources explain differences in cultural participation. The methods and models to be estimated are discussed in Section 3, along with a description of the data source and the variables. The main results of the estimated bivariate probit are presented in Section 4. Last, Section 5 concludes the paper.

2. Conceptual Framework

Unlike visits to museums and art galleries, virtual and electronic media access to cultural institutions is such that it is technologically possible to grant access at any time and from anywhere in the world. The convergence of the cultural experiences has given audiences the chance to access their choice from anywhere, and whenever they wish, breaking down the barriers of time and place (Bakhshi and Throsby, 2010). Interactivity and connectivity are two other characteristics of those new cultural experiences produced through electronic and digital access to visual arts contents. Because of those characteristics, the Internet provides direct communication between suppliers of cultural goods and services and users, and it allows for perfectly bidirectional communication. Digitization raises the possibility that arts and cultural organizations can overcome the traditional constraints imposed by physical location, thereby, expanding their audience reach (Bakhshi and Throsby, 2010; NEA, 2010). For instance, given that museum demand tends to be very seasonal (Johnson, 2003), the “on-line attendance” can decrease this seasonality. Further, ICT have created better access to museums by using systems of virtual or augmented reality to enrich the “in-site” visiting experience (Ateca-Amestoy, 2013; Navarrete, 2013). In this way the demand for museums it is not linked to place or location and the consumption of cultural goods can happen anytime and anywhere (Ateca-Amestoy, 2013; NEA, 2010).

Following the time allocation and commodity framework, first proposed by Becker (1965), and further developed for cultural goods by Lévy-Garboua and Montmarquette (1996), we assume that cultural goods are transformed into cultural experiences together with some other personal resources. To do this, individuals must allocate some of their income (thus, demand will depend on income itself, and on the relative price of the good with respect to other complements and substitutes), some time, cognitive resources to appreciate it and, if the cultural experience is of a social nature, the company of others. Cultural

consumption has also explained in terms of the affirmation of social status, by which high status was linked to highbrow cultural consumption. This “distinction” hypothesis was overcome with the discovery of status being related to omnivorous and voracious cultural consumption. Recent research on consumption patterns document some major shifts during the last decade, by which the link between status and cultural engagement has blurred (Van Eijck and Majorana, 2013).

From the supply side perspective, Starr (2004) argues that ICT enables cultural goods to be produced more cheaply, leading to a reduction in price and a consequent expansion in the size and diversity of audiences. Potts (2013) analyses how digitization alters the relative prices of alternative ways of accessing culture and cultural goods themselves, when compared with other substitutes and complements, while Nguyen et al. (2013) show that consumption of music through streaming services (such as Spotify or YouTube) has no impact on the consumption of physical music (such as CDs and live music). Several sociological studies have contributed to better understanding the digital divide in the arts (Norris and Inglehart, 2013). For instance, some highlight the existence of a gender gap on the Internet (Bimber, 2000; Ono and Zavodny, 2003), and possible age barriers linked to a decline of cognitive ability in old age (Freese et al., 2006). Contributions that explore the relationship between social status and digital engagement have found evidence of the emergence of a “digital distinction” (Zillen and Hargittai, 2009). Further, technological innovation is helping to spread knowledge to more people because it has dramatically changed the market of arts, especially in terms of the expansion and diffusion of culture, given that more materials are available to more people (Tepper *et al.*, 2008).

The determinants of physical attendance have been studied for different cultural goods (a review is provided in Seaman, 2005). However, less is known on the determinants of participation in the arts through digital devices, with the big exception of music and cinema, probably the two industries to which illegal digital access has harmed most. Nowadays, this is an important question, because the use of information technologies has become crucial in different aspects of daily life. It is also relevant from the cultural manager point of view, since institutions have to provide both “in-site” and “on-line” services to cultural audiences.

When analysing live and digital participation, there are two main issues that we study. First, we consider the determinants of each type of engagement (are the determinants of electronic consumption similar to those of personal participation?). Second, we consider the links between digital and physical participation. Researchers have found intriguing the relationship between digital and live engagement: are they substitutes, complements, or completely unrelated goods? Loomis *et al.* (2003) asserts that 70% of people visiting a museum website would subsequently be more likely to visit a real museum. Montoro-Pons and Cuadrado-García (2011) find evidence of live concerts creating a demand for recorded music. Nguyen *et al.* (2013) test the relationship between online streaming consumption of music and material and live music consumption for a sample of French individuals. They find no effect for recorded music and a positive one for live music consumption, providing evidence of possible new business models that take advantage of streaming and other types of dematerialization of cultural goods). In a paper that explores the links between attendance to live and to broadcast live theatre performances, Bahkshi and Throsby (2014) do not find evidence of any cannibalization of digital broadcasts to cinemas on live attendance to the theatre for a programme of the UK's National Theatre Live broadcasts. Using another source of evidence, the "Audience Finder" tool by the UK's Audience Agency, Bahkshi and Whitby (2014) conclude that, actually, it is likely that "live simulcast" has boosted local theatre attendance in those neighbourhoods that have been more exposed to the programme.

In this work we consider two alternative cultural goods, though not mutually exclusive in their consumption: visits to museums and art galleries and consumption of visual arts through handheld or mobile devices and Internet. In what follows, we shall maintain that different technologies govern the transformation of cultural goods into those cultural experiences: attendance and media consumption. While the full price of live attendance is not likely to go down due to the impact of digitization, the full price of digital engagement decreases steadily because of process and product innovations created by ICT.

On the one hand, visits to cultural institutions and attendance at events are a time-intensive activity. Moreover, the individual has to face a given opening schedule, so has to accommodate her free time in programming those activities.

Though no special equipment is required, and entry prices can be zero (or a voluntary contribution in case of visitors' donations), the opportunity cost of the time dedicated to the visit will determine part of the full price of that type of experiences. Visits to museums are a relatively urban phenomenon. Even if it also relates to cultural tourism, studies have found that it is more likely that individuals attend cultural events if they live in a metropolis and urban environment (Seaman, 2005). On the other hand, home-based cultural practices require certain types of equipment. Though the price of these has decreased steadily, it is still true that the fraction of cultural expenditure of households dedicated to the purchase of media is very high. Despite the importance and the potential of digital equipment in the participation in the arts, very few studies have been conducted in this field during recent decades, while most of studies focus on the traditional definition of museum (Johnson, 2003; Fernández-Blanco and Prieto-Rodríguez, 2011 and Frey and Meier, 2006).

As in other leisure activities, the individual decision is a question of optimal allocation of resources, among them time and money (NEA, 2011). According to data derived from the *Consumer Expenditure Survey* of the U.S. (3rd quarter 2012 to 2nd quarter 2013 – coinciding with the period in which the 2012 SPPA was conducted), the average expenditure on entertainment of a consumer unit was of 2,586 USD (around 5% of expenditure), with 1,872 USD (4.8% of expenditure) for units where the highest level of education of any member was less than college graduate, and 3,702 USD (5.2% of expenditure) for those where the highest level of education of any member was college graduate. The figures for the “fees and admissions” category are 612 USD (1.2%), 269 USD (0.7%), and 1,151 USD (1.6%), for the aggregate and the aforementioned types of household, respectively. The pattern of expenditure changes a bit for the “audio and visual equipment” category, with figures of 989 USD (1.9%) for all units, 858 USD (2.2%) for households with less than college, and 1,142 USD (1.8%) for more than college (U.S. Bureau of Labor Statistics, 2014).

Considering this analytical framework, we use the data derived from the *2012 Survey of Public Participation in the Arts* to explore the individual decision-making process of engagement with the visual arts by visiting museums and with

electronic and digital consumption. In particular, in this work we are going to test the following hypotheses:

Demographic variables: age, sex and race

Life-cycle and age effects can influence participation rates through two different ways. On one side, the learning-by-consumption processes, which emphasizes the fact that the more performances one attends, the more enjoyable they become, so the life-cycle effect suggests a non-linear relationship between arts participation and age. This is the reason for assigning dichotomous variables for each age class. On the other side, younger people are more likely to be “digital native”, thus we can expect a different impact on traditional and online visits. Since the digital divide has been found to have a generational component, we expect an age effect in favour of younger generations.

There is no intrinsic reason to expect different participation rates between men and women. Although different experiences during childhood may play a role, e.g. boys tend to participate more in sports and less in arts and music than girls (Katsuura, 2008). We also include a set of dummy variables regarding the race of the individual (white, black and other race). These last two groups of variables can be included in what Seaman (2005) calls “mixed factors” that can have an influence on both types of participation.

Cultural capital variables

Participation in the arts is generally accepted to be an important kind of cultural capital, and the empirical literature that finds a positive relationship between high culture, higher educational achievement and higher income supports this view (Upright, 2004). “Cultural capital could be defined as the acquired taste that enables the possessor to appreciate the art. We visit museums because we feel richer knowing how to appreciate art” (Klamer, 2002: 462). In fact, in the case of cultural goods, the material and physical aspects of consumption appear to lose out to the cultural, symbolic and other non-material aspects (Ateca-Amestoy, 2008).

Education is expected to have a positive linear relationship with attendance: the higher the level of education, the higher the likelihood of a person attending

the performing arts. The assumption behind this is that better-educated individuals have a greater capacity to appreciate and understand the qualities of artistic performances. Moreover, to consider the quantities of past cultural consumption transformed into cultural capital, we focus on educational level to capture the effect of general human capital.

The role of occupation

As for occupational status, employed people have a higher probability of attending; in this paper we take into account people employed full time, part-time the unemployed and the retired. However, for income, as Borgonovi (2004) pointed out, the opportunity cost of participating in the performing arts increases with income level. This again can have a different impact on physical and online participation.

There is already some evidence of a “digital divide” that relates status to the access and use of digital technologies. For cultural engagement, we can imagine that people working in certain occupations may be more likely to engage both in-site and on-line. This is derived from the notions of “creative class”, “creative industries” and “creative occupations” (Florida, 2001; Higgs and Cunningham, 2008; Cunningham, 2011). Testing for the hypothesis that individuals of the “creative class” engage in leisure activities following the patterns described by Florida (2001), Bille (2010) finds that being a part of this “creative class” has implication in the leisure and cultural habits, though.

Household income

When thinking about resource allocation, one must start with some measure of available income. According to the demand theory, the positive relationship between income and participation implies that arts participation is not an inferior good, and that an higher income increases demand. However, in this case it is instructive to study the how participation under the two types of goods considered may have a difference relationship.

Disability and health status

Another variable to describe the available resources for participation is the individual health status. We consider the individual health status, measured as a binary variable that determines if an individual has some disability. This fact can influence negatively physical participation, but *ceteris paribus* could influence positively digital visits, if there were a trade-off between both. The inclusion of this variable allows us further to isolate the effect of decaying health capital with age, from pure age of life-cycles effects (Seaman, 2005). Surprisingly, health status has very rarely been considered an important individual resource for cultural participation.

Bille (2010) controls for disability (in the form of suffering a handicap that restricts mobility) in the estimation of the determinants of leisure and cultural engagement in Denmark. She only finds statistically significant effects in some of the leisure alternatives, out of the 35 considered, and we cannot infer a clear pattern from her results. This is the case of fiction reading (negative), magazines (positive), theatre-going (negative), visiting non-art museums (negative), sport and fitness, walking (negative), and attending at evening school (negative). The effect of health status has been considered in sports participation and active engagement (as in Muñiz *et al.*, 2014), and the impact of cultural participation in health and individual well-being conditions has been explored (Galloway, 2006). At the same time, physical difficulties are among the most important reasons for old people not to get digitally engaged (Pew Research Center, 2014).

Household composition variables

Household size, the marital status, and the number of children in the family (no child, one child, two children and three or more children) are also considered in our analysis. All these factors play a role in determining the time available for individuals and the opportunity cost of the time dedicated to leisure time. Time constraints determine substitution effects between leisure activities. According to McCarthy *et al.* (2001), the nature of the performing arts makes them particularly susceptible to time constraints, as they require extensive planning and dedication to be enjoyed.

Geographical variables

Turning to the geographical variable, we consider whether the individual lives in a city, a town or in a metro or non-metropolitan area. This is because location is not relevant for access, but for visits. To live far from a museum directly influences the time constraint and thus can have a negative impact on physical participation.

3. Estimation: 2012 SPPA Data and Empirical Specification

3.1. Data and descriptive statistics

The data used in this analysis are taken from the 2012 *Survey of Public Participation in the Arts* (NEA, 2013). This is a periodically survey that is run as a supplement of the *Current Population Survey* by the Bureau of the Census. Data for the 2012 release were collected from a sample of people over 18 on May 2012. This dataset compiles information on participation in the arts by US citizens. The dataset contains information on attendance at different artistic activities (such as jazz, Salsa and Latin music, classical music, opera, musicals, theatre plays, ballet, dance, art museums, arts and crafts, and visits to historical parks and monuments) and also covers other types of cultural practice, such as the consumption of cultural goods through the media and some types of artistic active practices. 37,266 questionnaires were completed for a representative sample of households in the USA. The sample was drawn up following a multi-stage strata design with clusters, based on information from the Bureau of the Census. In each of the selected households, all individuals over 18 were interviewed. A weighting variable makes the sample representative for the adult civilian population by age, sex, and ethnic origin. The structure of the survey is such that there are core and non-core modules, so not every respondent is asked all the questions in the survey. This limits the analysis that can be done with the data derived from the 2012 SPPA (some variables cannot be jointly introduced in the analysis).

Table 1 provides a detailed description of the variables used in our models. As discussed earlier, there are a two binary dependent variables (one for each access alternative), and a broad range of independent variables is included. The following variables are included in the estimated models.

In order to take into account online and physical visits to a museum, we consider three different dependent variables *musego* and *handheld* and *internet*. In

the case of the *musego*, we would like to take into account the physical visit to a museums, then the variable is equal to 1 if the individual answers positively to: “*Visited an Art Museum during last 12 months*”. In the case of *handheld*, we consider individuals that give a positive answer to the following questions: “*Do you use any handheld or mobile devices to download or view any visual arts such as painting, sculpture, graphic design, or photography?*”, while in the case of *internet* he individual answers positively to: “*Do you Use the Internet to watch, listen to or download any programs or information about the visual arts, such as painting, sculpture, graphic design, or photography*”.

In our sample, 22.70% of 12,130 respondents declared having visited a museum during the previous year (*musego*). For electronic and digital consumption of visual arts, the sample size shrinks due to the module structure of the survey. We have 15.49% of the respondents (4737) that used handheld or mobile devices, and 6.32% (out of 6339 people) that used the internet. Combining those three alternatives, we have that 24.26% of the observations in the sample (4345 people) declared digital and electronic access (*musmedia* variable).

3.2. Empirical specification

We address the choice of individuals with respect to the consumption of the visual arts, either by visiting museums and galleries (*musego*) or by electronic and digital media, i.e. by digital engagement (*musmedia*). We estimate a bivariate probit model, i.e. jointly estimating the binary decision of engaging in each alternative, in order to take into account the information contained in the data more efficiently, as in Collins *et al.* (2009), Prieto-Rodríguez and Fernández-Blanco (2000) and Montoro-Pons and Cuadrado García (2011). Other alternatives for the modelling of alternative decisions are presented in Favaro and Frateschi (2007) or Cox *et al.* (2010).

We choose a bivariate model. The two dependent variables are: *musego* equal to 1 if an individual attends a museum or a gallery and 0 otherwise; *musmedia* equal to 1 if the individual accesses visual arts through the use of electronic media, and 0 otherwise. Given this set of dependent variables, we are able to study the issue whether visits and online visits can be considered as substitute or complementary goods (the methodology that we use is based in

Montoro-Pons and Cuadrado-García, 2011). We further extend the method to a recursive bivariate model to capture a twofold effect of the potential cross-effect of participation: a direct one (one of the dependent variable is included as explanatory variable in the other equation), and an indirect one (through the tetracronic correlation between unobserved error terms).

The complementary or substitute nature of different means of access to cultural goods has been explored and the literature has still not found conclusive evidence. If we consider other types of cultural activities, substitution effects prevail, for example in art forms such as film and music, while live performing arts and visual arts can be considered as complements, given that performing arts can be protected by the high consumer value (Bakhshi and Throsby, 2010). Evidence from other research on participation at music events has concluded that there is a high complementarity between attendance at concerts of popular music and listening to recorded popular music (Montoro-Pons and Cuadrado-García, 2011). According to Borgonovi (2004), substitution effects will prevail in the case of television, while museum visits and attendance at other performing arts events will produce a complementary effect. This complementarity trait has also been found in a number of public policy reports (NEA, 2011).

The bivariate probit model takes the usual following form (Greene, 2007), with the dependent and independent variables corresponding to those specified in Table 1, and following the discussion presented in this section:

$$\begin{aligned}
 y_1^* &= x_1' \beta_1 + \varepsilon_1, & y_1 &= 1 & \text{if } y_1^* > 0, & 0 \text{ otherwise,} \\
 y_2^* &= x_2' \beta_2 + \varepsilon_2, & y_2 &= 1 & \text{if } y_2^* > 0, & 0 \text{ otherwise,} \\
 E[\varepsilon_1 | x_1, x_2] &= E[\varepsilon_2 | x_1, x_2] = 0, \\
 \text{Var}[\varepsilon_1 | x_1, x_2] &= E[\varepsilon_2 | x_1, x_2] = 1, \\
 \text{Cov}[\varepsilon_1, \varepsilon_2 | x_1, x_2] &= \rho.
 \end{aligned}$$

With y_1 for live attendance and y_2 for handheld (internet) consumption

This is further complemented by the estimation of a recursive bivariate probit (Greene and Hensher, 2010) that has the following structure:

$$\begin{aligned}
 y_1^* &= x_1' \beta_1 + y_2 \gamma + \varepsilon_1, & y_1 &= 1 & \text{if } y_1^* > 0, & 0 \text{ otherwise,} \\
 y_2^* &= x_2' \beta_2 + \varepsilon_2, & y_2 &= 1 & \text{if } y_2^* > 0, & 0 \text{ otherwise,}
 \end{aligned}$$

We assume that the underlying and unobserved values for y_i are such that a linear relationship between these explanatory variables is presented:

$$y_i = f(x_i) = f(De_i, Se_i, H_i, S_i, O_i, Dis_i, Ind_i) \quad (1)$$

The characteristics of the individual and the household are presented by those variables, and summarized in Table 1. Please note that, in framework, there are some variables that determine the taste or skills of the individual for cultural consumption, whereas a second group represents individual and context resources (such as health status, an individual resource, or household income, a resource that describes the availability of money by the household). The descriptive statistics of the dependent and independent variables are presented in Table 2 .

4. Results and discussion

The results from the bivariate and for the bivariaterecursive probit models that takes into account physical participation and participation through handheld or mobile devices are presented in Table 3. In columns 2 and 3 of the table we report the results when the dependent variables are *musego* and *handheld* respectively, while in columns 4 and 5 we take into account the impact that *musego* has on handheld. In column 6 and 7, we present the results of the impact of *handheld* on *musego*. The explanatory variables are chosen in order to test the hypotheses derived from the theoretic models presented in the previous section: demographic variables, socio-economic variables, variables that determine resources availability, variables that explain personal endowment of cultural capital, contextual factors, health conditions and employment sectors.

Following Prieto-Rodríguez and Fernández Blanco (2000), we expect some variables to exert a similar effect, particularly those variables that shape the individual taste for visual arts and the common cultural capital needed to appreciate and to transform cultural goods (museum visits or visual electronic and digital contents, respectively) into meaningful cultural experiences. We also expect that variables that relate to the different production function and resources needed for that transformation to have a different effect in each equation of the bivariate model.

We start discussing that we obtain for the equation that explains visits to museums and art galleries (*musego*). The effect of age is only statistically significant in this in-site visits model for the oldest group of the population, with a positive effect. This is also the case with being a woman, which increases the probability of having visited museums during the previous year. However, with respect with being white, both black people and individuals from other/s race/s have a lower probability of visiting museums. The effect of going to college and having upper education is positive, as expected, and statistically significant. Remember that we consider jointly the occupational status and the occupation of the individual if employed. Here, with respect to being employed at a office and administrative support occupation, we find that for visits there is a positive effect of belonging to a professional and related occupation. This is the category where most of the creative occupations are classified (including economists, and, more importantly, computer and mathematical, architecture and engineering, education training and library, and arts, design, entertainment, sports and media occupations).

The aforementioned results make reference to variables that mostly influence on the cultural capital and tastes of the individual. However, we have also considered variables that determine other resources availability. For instance, we find no statistically significant effect for having a household income, but positive and monotone for the two upper categories of household income. For health status, measured as a binary variable for having some impeding disability, we have a negative and statistically significant effect. Having a sensorial, motor or psychological disability decreases the probability of visits to museums and art galleries. With respect to being married, we find a positive effect for being single. The presence of one child in the household decreases the probability of visit, with no statistically significant effect for higher number of children. For this result, it could be the combination of two different effects. On the one side, children reduce time availability of adults to allocate to leisure activities; on the other, visiting to museums is an informal educational activity, typically done in the family. This second effect seems to be confirmed with data derived from the *American Time Use Survey* analysed by the NEA in 2011, by which 44.6% of the people that recorded having visited a museum did it with their children (NEA, 2012). Last, the

results seem to confirm the typical urban characteristic of museum visiting. With respect to living in a central area, all the other types of habitat exert a negative effect on the probability of visiting museums and art galleries.

We do not find statistically significant effects for any age category in the model that explains participation to visual arts through handheld or mobile devices. Neither for being a woman or with reference to racial variables. Having a college education or above has a positive impact in the probability of electronic and digital consumption of visual arts (and no differences are found for this effect across the two equations). For occupational status and occupation, with respect to the office baseline, being employed at a service occupation reduces the probability of engagement, as well as being employed in a transportation occupation.

When considering the impact of variables that have to do with the availability of resources, we find the following results. For household income, there is not a statistically significant effect. Electronic and digital equipment at home would certainly depend on the level of household income, but the use given to those devices may show different patterns. We do not find conclusive evidence for disabilities in this equation of the model. It can be well the case that, while increasing the accessibility to cultural contents of people with moving difficulties, electronic and digital media do not help too much (or are not seen as an attractive alternative) to people with sensorial troubles.

We find here too the positive effect of being single with respect to married, and no statistically significant effect for the presence of one or two children in the family, while we find a positive effect on having three or more children. This can be attribute to the fact that children and adult sometime help how to use electronic devices together. Last, and surprisingly, we find that the place of residence of the individual has also an impact in this type of engagement (though the coefficients for some categories are different across the equations).

In the following columns of the same table we can observe the impact that physical visits has on the participation through digital equipment, (columns 4 and 5) and viceversa (columns 6 and 7). We find that while *musego* has a positive impact on the participation through *handheld*, no impact is found on the impact that participation through digital equipment has on physical participation. For what concerns the other variables, results hold for almost of variable with the

exception of the occupation categories. In fact, in this case also working in the installation, maintenance and repair occupation reduce the probability to attend with compared to the baseline category.

Table 4 presents the results from the recursive probit model when both physical participation and participation through Internet is taken into account. As before, while columns 2 and 3 we report the results when the dependent variables are *musego* and *internet* respectively, in columns 4 and 5 we take into account the impact that *musego* has on *internet* participation and in column 6 and 7, we present the results of the impact of internet on physical participation. While the dependent variables are slight different the explanatory variables remain the same. The sign and significance of the main explicative variable hold across the two estimations, with few exceptions. While to be employed in the installation, maintenance and repair sector in all estimations reduce the probability to physical attend to museums, working on the transportation and material moving significantly reduce both type of participation physical and through internet. The health status variable has no impact on the physical and through internet participation to visual arts. Finally, while to be divorced increase the probability to physical attend with respect to married people. To have one child, now reduce both type of participation.

5. Conclusions

Traditional participation in the arts, in the form of attendance at performing arts and visits to cultural institutions, is not the only or main way of enjoying pleasurable and enriching experiences. In the era of information and communication technology (ICT), technological progress has also influenced cultural consumption, bringing new opportunities of media consumption with the internet and other digital media. Technological changes have dramatically determined the way in which art and entertainment is produced and consumed. For many cultural manifestations, the development of ICT has introduced new ways of transmitting or mediating those immaterial cultural goods. Despite the importance and the potential of digital equipment in the participation in the visual arts, very few studies have been conducted in this field during recent decades

(Ateca-Amestoy, 2013), while most of studies focus on the traditional definition of museum (Johnson, 2003; Fernández-Blanco and Prieto-Rodríguez, 2011 and Frey and Meier, 2006). To fill this *lacunae*, we explore the determinants of the choice of attendance at museums and art galleries and/or media and digital engagement with visual arts.

By using data from the 2012 *Survey of Public Participation in the Arts* of the United States, we estimate bivariate probit models to explain which variables determine the individual choice of one or another way of satisfying a cultural need. We explain this choice in terms of variables that account for differences in socio-economic and demographic characteristics, household composition, geographical variable, health status and occupation sector. We have found evidence of the similar effects on both types of behaviour of variables that determine the cultural capital, early socialization and some type of taste for the visual arts. However, when analysing the results for variables that incorporate the effect of the availability of other resources over the participation decision, we have found some differences.

In conclusion, since ICT devices and apps are permeating everyday life of individuals and firms, some people are afraid that the virtual life is overtaking the real life, undermining physical participation. Very often, in the case of arts participation, media consumption and the online visit have been understood as a substitute for physical participation. In this paper, we have demonstrated that this is not corresponding to the real consumer choices. The online visit is a new way of consuming arts. Consumers use the electronic devices to get informed and decide about a visit. In fact, we have found that ICT devices increase the participation through the traditional way of consume cultural goods. On the other side, ICT devices change the way in which the visit is experienced. For instance, in the case of social networks, consumers use that technology to record, disseminate and transform cultural goods into a new digital “good” that can be consumed by other members of the same community, incentivising the information and the curiosity to get a traditional visit to the same art gallery or museum by other consumers.

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Table 1 – Variables used in the analysis

Variable	Definition
Dependent variables	
musego	Did you visit an art museum or gallery during the last 12 months?
handheld	During the last 12 months, did you use handheld to view visual art online, such as paintings, sculpture, or photography?
internet	During the last 12 months, did you use internet to view visual art online, such as paintings, sculpture, or photography?
Explanatory variables	
<i>De - Vector of demographic variables</i>	
Age	Age
Sex	Female, Male
Race	Ethnic: White, Black, Indian
<i>S - Vector of cultural variables</i>	
Edu	Own education level: having tertiary education
<i>Se - Vector of occupational variables</i>	
Occup	Occupational status: employed, unemployed, not in labor force.
Occu	Occupation of the worker (10 categories, according to <i>2010 Census Occupational Classification</i>)
<i>Di - Vector of Health status</i>	
Disa	Disabilities: eyes, ear, mobility, psychological...
<i>H - Vector of household resource variables</i>	
Inc	Household income
Hhold	Household size
Marital	Marital Status: married, widowed, single, separated or divorced
Child	Number of children
<i>O - Vector of Geographical Variables</i>	
Central	Principal city
Balance	Balance
Nometro	Non-metropolitan

Data from the 2012 Survey of Public Participation in the Arts (NEA, 2013)

Table 2 – Descriptive statistics

Variable	Type	Obs	Mean	Std. Dev	Min	Max
musego	D	12,130	0.227	0.419	0	1
handheld	D	4737	0.155	0.362	0	1
internet	D	6339	0.063	0.243	0	1
age1	D	37,266	0.084	0.278	0	1
age2	D	37,266	0.165	0.371	0	1
age3	D	37,266	0.170	0.375	0	1
age4	D	37,266	0.188	0.391	0	1
age5	D	37,266	0.182	0.385	0	1
age6	D	37,266	0.211	0.408	0	1
male	D	37,266	0.471	0.499	0	1
white	D	37,266	0.839	0.368	0	1
black	D	37,266	0.088	0.283	0	1
otherrace	D	37,266	0.073	0.261	0	1
edu	D	37,266	0.403	0.491	0	1
employ	D	37,266	0.609	0.488	0	1
unemp	D	37,266	0.047	0.212	0	1
notforce	D	37,266	0.343	0.475	0	1
Management, business, and financial operations occupations	D	37,266	0.111	0.314	0	1
Professional and related occupations	D	37,266	0.150	0.357	0	1
Service occupations	D	37,266	0.114	0.318	0	1
Sales and related occupations	D	37,266	0.065	0.247	0	1
Office and administrative support occupations	D	37,266	0.083	0.275	0	1
Farming, fishing, and forestry occupations	D	37,266	0.006	0.078	0	1
Construction and extraction occupations	D	37,266	0.034	0.181	0	1
Installation, maintenance, and repair occupations	D	37,266	0.023	0.149	0	1
Production occupations	D	37,266	0.040	0.196	0	1
Transportation and material moving occupations	D	37,266	0.039	0.194	0	1

Continued.

Continued.

Variable	Type	Obs	Mean	Std. Dev	Min	Max
hinc1	D	37,266	0.222	0.416	0	1
hinc2	D	37,266	0.260	0.439	0	1
hinc3	D	37,266	0.317	0.465	0	1
hinc4	D	37,266	0.201	0.401	0	1
disa	D	37,266	0.128	0.334	0	1
married	D	37,266	0.578	0.494	0	1
widowed	D	37,266	0.066	0.248	0	1
divorced	D	37,266	0.137	0.344	0	1
single	D	37,266	0.219	0.414	0	1
nochild	D	37,266	0.716	0.451	0	1
child1	D	37,266	0.117	0.322	0	1
child2	D	37,266	0.108	0.310	0	1
child3plus	D	37,266	0.059	0.236	0	1
central	D	37,266	0.224	0.417	0	1
balance	D	37,266	0.372	0.483	0	1
non_metro	D	37,266	0.216	0.411	0	1
otherh	D	37,266	0.188	0.391	0	1

Note: D=dichotomous, Ca=categorical, C=continuous, I=integer. See, also, Table 1.

Table 3 – Bivariate probit model for museum visits and handheld

	museumgohandheld				museumgohandheld1				museumgohandheld2			
	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.
handheld									0.219	0.142		
musego							1.146*	0.634				
age2	-0.185	0.127	0.016	0.133	-0.171	0.126	0.086	0.144	-0.139	0.134	0.085	0.128
age3	0.029	0.140	0.036	0.152	0.038	0.139	0.023	0.159	0.096	0.148	0.086	0.144
age4	0.059	0.144	0.108	0.155	0.063	0.143	0.089	0.163	0.109	0.152	0.203	0.147
age5	0.117	0.153	-0.065	0.165	0.121	0.151	-0.124	0.171	0.190	0.161	0.138	0.156
age6	0.400**	0.179	-0.092	0.200	0.389**	0.179	-0.269	0.219	0.420**	0.191	0.301	0.186
<i>(baseline: age1)</i>												
female	0.255***	0.072	0.013	0.081	0.255***	0.072	-0.094	0.102	0.262***	0.075	0.038	0.077
<i>(baseline: male)</i>												
black	-0.400***	0.135	-0.209	0.144	-0.407***	0.137	-0.061	0.170	-0.396***	0.142	-0.246*	0.139
otherrace	-0.271**	0.124	-0.107	0.145	-0.282**	0.129	-0.004	0.163	-0.287**	0.127	-0.233*	0.139
<i>(baseline: white)</i>												
edu: college or above	0.386***	0.079	0.266***	0.088	0.390***	0.079	0.126	0.129	0.350***	0.082	0.232***	0.082
<i>(baseline: less than college)</i>												
unemp	-0.077	0.147	-0.163	0.173	-0.090	0.148	-0.146	0.175	-0.134	0.152	0.001	0.159
notforce	0.018	0.121	-0.024	0.141	0.034	0.122	-0.034	0.144	0.006	0.127	0.009	0.130
Management, business, and financial operations occs	0.112	0.129	-0.060	0.150	0.118	0.131	-0.111	0.160	0.095	0.136	-0.058	0.140
Professional and related occupations	0.341***	0.119	0.146	0.134	0.339***	0.119	0.010	0.164	0.290**	0.126	0.154	0.125
Service occupations	0.090	0.133	-0.310**	0.151	0.107	0.135	-0.365**	0.152	0.056	0.139	-0.318**	0.145
Sales and related occupations	0.215	0.152	-0.011	0.177	0.216	0.153	-0.098	0.190	0.194	0.160	-0.155	0.169
Farming, fishing, and forestry occ.	-0.218	0.540	-0.510	0.399	-0.237	0.549	-0.493	0.416	-0.132	0.569	-0.666	0.416
Construction and extraction occ.	-0.094	0.264	-0.032	0.253	-0.098	0.259	-0.016	0.253	-0.237	0.280	-0.083	0.242
Installation, maintenance, and repair occ.	-0.422	0.271	-0.420	0.326	-0.462*	0.277	-0.316	0.348	-0.474*	0.279	-0.215	0.268
Production occupations	-0.175	0.242	-0.379	0.277	-0.184	0.243	-0.351	0.295	-0.245	0.263	-0.187	0.256

Continued.

	museumgohandheld				museumgohandheld1				museumgohandheld2				
	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	
hinc1: less than 25000USD	-0.005	0.109	-0.094	0.128	-0.024	0.112	-0.095	0.134	-0.016	0.115	0.001	0.122	
hinc3: 50000 to 99999USD	0.172*	0.095	0.017	0.104	0.150	0.098	-0.044	0.111	0.185*	0.100	0.050	0.099	
hinc4: more than 100000USD	0.436***	0.105	-0.017	0.113	0.425***	0.105	-0.197	0.144	0.473***	0.111	-0.000	0.108	
<i>(baseline: hinc2: 25000 to 49999USD)</i>													
impeding disability	-0.312**	0.134	-0.149	0.147	-0.312**	0.132	-0.042	0.157	-0.274*	0.141	-0.001	0.142	
<i>(baseline: no impeding disability)</i>													
widowed	-0.332	0.232	-0.141	0.238	-0.325	0.231	0.001	0.254	-0.328	0.257	-0.143	0.219	
single	0.243**	0.105	0.249**	0.106	0.245**	0.103	0.163	0.124	0.292***	0.111	0.198*	0.103	
divorced	0.103	0.098	0.036	0.111	0.096	0.099	-0.004	0.118	0.119	0.105	0.000	0.105	
<i>(baseline: married)</i>													
child1	-0.289**	0.113	-0.098	0.119	-0.304***	0.113	0.013	0.139	-0.289**	0.119	-0.076	0.114	
child2	0.023	0.118	0.031	0.124	0.014	0.118	0.025	0.127	0.005	0.123	0.016	0.122	
child3plus	0.039	0.141	0.286*	0.156	0.017	0.151	0.289*	0.164	0.089	0.149	0.235	0.153	
<i>(baseline: no children)</i>													
balance	-0.324***	0.082	-0.112	0.095	-0.323***	0.083	0.018	0.122	-0.356***	0.086	-0.220**	0.089	
non metropolitan	-0.556***	0.110	-0.111	0.123	-0.560***	0.110	0.103	0.172	-0.584***	0.115	-0.228*	0.117	
not identified	-0.329***	0.107	-0.190	0.117	-0.320***	0.107	-0.061	0.143	-0.335***	0.113	-0.221**	0.110	
<i>(baseline: central)</i>													
_cons	-0.888***	0.199	-1.087***	0.216	-0.884***	0.198	-1.354***	0.236	-0.916***	0.213	-0.821***	0.200	
rho	0.493***	0.051			-0.211	0.402			0.403***	0.079			
aic		4.81E+07					4.81E+07					4.91E+07	
bic		4.81E+07					4.81E+07					4.91E+07	

Note: ***p<0.01, **p<0.05, *p<0.1

Table 4 – Bivariate probit model for museum visits and internet

	museumgointernet				museumgointernet1				museumgointernet2			
	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.
handheld									-0.747*	0.451		
musego					0.626	0.487						
age2	-0.106	0.119	0.357**	0.168	-0.103	0.119	0.409**	0.178	-0.047	0.122	0.342**	0.167
age3	0.102	0.130	0.113	0.186	0.102	0.129	0.099	0.196	0.106	0.127	0.092	0.183
age4	0.065	0.131	0.212	0.189	0.068	0.131	0.211	0.200	0.083	0.128	0.221	0.187
age5	0.149	0.137	0.221	0.190	0.155	0.136	0.199	0.202	0.160	0.133	0.228	0.186
age6	0.262*	0.151	0.008	0.216	0.267*	0.150	-0.058	0.236	0.244	0.149	-0.015	0.211
<i>(baseline: age1)</i>												
female	0.224***	0.064	-0.076	0.087	0.227***	0.064	-0.138	0.108	0.196***	0.065	-0.065	0.087
<i>(baseline: male)</i>												
black	-0.397***	0.122	-0.524**	0.214	-0.398***	0.123	-0.468**	0.239	-0.422***	0.119	-0.501**	0.209
otherrace	-0.210*	0.112	-0.023	0.148	-0.216*	0.114	0.027	0.165	-0.191*	0.110	-0.018	0.142
<i>(baseline: white)</i>												
edu: college or above	0.433***	0.069	0.311***	0.105	0.434***	0.069	0.230*	0.133	0.436***	0.068	0.299***	0.104
<i>(baseline: less than college)</i>												
unemp	-0.045	0.131	-0.288	0.183	-0.044	0.131	-0.303	0.198	-0.075	0.127	-0.256	0.183
notforce	0.044	0.105	0.013	0.163	0.043	0.106	0.003	0.173	0.041	0.102	0.036	0.162
Management, business, and financial operations occs	0.082	0.119	-0.107	0.180	0.081	0.119	-0.136	0.191	0.064	0.117	-0.116	0.177
Professional and related occupations	0.256**	0.108	0.140	0.162	0.259**	0.109	0.086	0.178	0.252**	0.106	0.146	0.160
Service occupations	-0.035	0.120	0.013	0.183	-0.034	0.120	0.022	0.192	-0.028	0.119	-0.029	0.191
Sales and related occupations	0.134	0.138	-0.172	0.214	0.134	0.138	-0.218	0.232	0.104	0.136	-0.156	0.215
Farming, fishing, and forestry occ.	-0.132	0.515	-0.004	0.471	-0.134	0.518	0.020	0.497	-0.129	0.481	0.057	0.447
Construction and extraction occ.	-0.187	0.232	-0.333	0.313	-0.184	0.232	-0.318	0.323	-0.206	0.229	-0.364	0.298
Installation, maintenance, and repair occ.	-0.431*	0.234	-0.306	0.357	-0.427*	0.235	-0.238	0.375	-0.428*	0.228	-0.288	0.349
Production occupations	-0.290	0.208	0.002	0.282	-0.296	0.210	0.063	0.304	-0.252	0.196	0.014	0.275
Transportation and material moving occupations	-0.413*	0.227	-0.786**	0.400	-0.407*	0.226	-0.756*	0.415	-0.464**	0.226	-0.797**	0.372
<i>(baseline: employed at office and administrative support occs)</i>												

Continued.

Continued.

	museumgohandheld				museumgohandheld1				museumgohandheld2				
	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	coef.	S.E.	
hinc1: less than 25000USD	-0.116	0.093	-0.012	0.143	-0.119	0.093	0.018	0.154	-0.105	0.091	-0.024	0.140	
hinc3: 50000 to 99999USD	0.113	0.083	0.016	0.113	0.113	0.083	-0.010	0.123	0.105	0.081	0.020	0.110	
hinc4: more than 100000USD	0.455***	0.094	0.035	0.129	0.453***	0.095	-0.071	0.160	0.425***	0.095	0.052	0.128	
<i>(baseline: hinc2: 25000 to 49999USD)</i>													
impeding disability	-0.162	0.109	0.200	0.154	-0.162	0.110	0.253	0.164	-0.116	0.110	0.180	0.158	
<i>(baseline: no impeding disability)</i>													
widowed	-0.173	0.162	-0.023	0.215	-0.175	0.162	0.021	0.230	-0.164	0.158	-0.039	0.215	
single	0.266***	0.093	0.108	0.117	0.271***	0.093	0.049	0.132	0.254***	0.092	0.122	0.115	
divorced	0.154*	0.088	0.171	0.123	0.154*	0.088	0.147	0.131	0.161*	0.085	0.191	0.122	
<i>(baseline: married)</i>													
child1	-0.364***	0.103	-0.258*	0.137	-0.359***	0.104	-0.195	0.149	-0.371***	0.101	-0.276**	0.134	
child2	-0.041	0.107	-0.210	0.145	-0.038	0.107	-0.219	0.153	-0.064	0.105	-0.171	0.148	
child3plus	0.048	0.134	0.412**	0.169	0.051	0.136	0.430**	0.180	0.109	0.133	0.444***	0.168	
<i>(baseline: no children)</i>													
balance	-0.368***	0.073	-0.127	0.102	-0.365***	0.075	-0.051	0.119	-0.354***	0.072	-0.152	0.105	
non metropolitan	-0.524***	0.097	-0.169	0.147	-0.524***	0.097	-0.055	0.172	-0.501***	0.097	-0.172	0.144	
not identified	-0.332***	0.094	-0.162	0.132	-0.330***	0.095	-0.094	0.144	-0.325***	0.091	-0.165	0.130	
<i>(baseline: central)</i>													
_cons	-0.914***	0.181	-1.772***	0.263	-0.923***	0.181	-1.998***	0.292	-0.857***	0.182	-1.772***	0.247	
rho	0.534***	0.059			0.145	0.274			1.095**	0.476			
aic		4.75E+07					4.75E+07					4.75E+07	
bic		4.75E+07					4.75E+07					4.75E+07	

Note: ***p<0.01, **p<0.05, *p<0.1