

DETERMINANTS, EFFECTS, AND FUNDING OF ARTS  
CONSUMPTION

NEA “ART WORKS” GRANT DELIVERABLE  
(working paper)

THOMAS HALL  
ASSOCIATE PROFESSOR OF ECONOMICS AND FINANCE,  
CHRISTOPHER NEWPORT UNIVERSITY

AUGUST 12, 2015

## **A. Introduction/Executive Summary of Findings**

The research funded through this grant had three basic components: (1) to define “arts participation” and consider some determinants of this type of behavior; (2) to consider the relationship between arts participation and household income; and (3) to address the relationship between arts participation and reduced NEA funding in the period between the 1992 and 2002 editions of the SPPA (i.e., following precipitous declines in arts funding during the 1996/1997 budget years). We conducted these investigations, and supplemented them with other statistical analyses that seemed to be directly related to the original research questions in the grant proposal.

We conducted a three-phase analysis of arts participation data from the SPPA going back to 1982. Phase 1 of the project relates to univariate analysis of various methods to operationalize the concept of “arts participation,” including aggregate measures and individual categories (art museums, ballet, classical music, craft fairs, jazz, musicals, opera, and plays). We confirmed numerous findings from previous studies, even controlling for weighting, clustering, and stratification embedded in the survey design. We found that higher family income is robustly associated with more arts attendance, and this applies for female gender, high levels of education (college degree and/or graduate school), and residence in the western portion of the U.S. Our multivariate analysis demonstrated the robustness of these results in a survey regression setting.

Phase 2 of the project examined more closely the relationship between higher family income and greater levels of arts participation. Initially, we determined that the effect of higher income on arts participation varied somewhat by art category. Using the unique situation of free art museums in Washington, D.C., we conducted quasi-experimental tests and found mixed evidence to support the expected result that higher income leads to more arts participation. This was a rather surprising finding because it is difficult to measure; evidence from several tests showed that that increased arts participation actually might lead to higher income (rather than the other way around).

In Phase 3, we examined more closely two other issues related to arts funding and participation at the national level. First, we developed two types of tests to examine whether declines in specific line-items between the NEA 1995 to 1996 budget years were related to reduced participation using standard

econometric techniques for observational data (logit and negative binomial estimation). No consistent evidence was found using this approach. Yet, using a more sophisticated statistical approach based on declines in arts education funding, we approximated double-blind experiments. We found that treatment effects analysis using nearest-neighbor matching (on gender, natural log of income, education, ethnicity, urban location, and survey year) showed consistent and generally statistically significant evidence of an effect of the budget cuts. For every aggregated variable (combining 8, 7 or 6 of the individual categories) we saw findings consistent with the fact that students who were exposed to the reduction in arts funding (that is, survey respondents born after 1982, the “treated” group) had lower levels of arts involvement relative to their otherwise similar control matches.

Finally, we examined whether arts participation is related in any way to state-level changes in opinions over time, as measured by presidential election results. We found that changes in arts participation over the 2002 – 2012 timeframe (the years for which SPPA data include survey respondents’ location) were robust to consideration of presidential election voting margins, although respondents from more Democratic-leaning states were more likely to attend art museums and live jazz, and to a lesser extent, plays and craft fairs.

The conclusion of the project summarizes the findings, and calls for further research in the areas of latent class analysis as well as experimental verification of the treatment effects findings regarding how increased arts participation leads to higher income.

## **B. Phase 1: Definitions and Determinants of Arts Participation**

What is “arts participation”? Previous research<sup>1</sup> has operationalized this concept in a number of ways, either in terms of any participation over a given time period (SPPA survey responses in the form of yes/no) or in terms of the frequency of participation (how many times in the last year did the respondent participate in a given activity?). Part of the researcher’s decision as to which of these two approaches to use is governed by the design of the survey questions themselves.

### ***1. Definitions of Participation***

---

<sup>1</sup> For example, see NEA, 2013 *How a Nation Engages with Art*. NEA Research Report #57; a more academic but somewhat dated literature review is by Bruce Seaman, “Attendance and Public Participation in the Performing Arts: A Review of the Empirical Literature.” Andrew Young School of Policy Studies Research Paper Series, Working paper 06-25, August 2005.

(a) *Individual Arts Categories and Activities: Multiple Survey Styles*

Since their launch in 1982, the SPPAs have included questions about activity in a *yes/no format* for the following types of arts participation: jazz, classical music, opera, musicals, theatrical plays, ballet, art museums, and craft fairs. Starting in 1992, questions regarding the *frequency of attendance* were introduced. But the earlier versions of the survey did not include them. Given that one of the primary purposes of this grant research is to assess how arts participation has changed over time (especially in the wake of the 1996/7 funding issues), we chose to focus on data coming from the questions that have remained consistent over a long period. This allows us to examine over a large timespan both disaggregated types of arts participation (the categories of jazz, classical music, opera, musicals, theatrical plays, ballet, art museums and craft fairs) as well as an aggregate measure, described below.

Although richer data exist on frequency of participation (e.g., number of times in last year a respondent has participated in a single category), and other types of arts (e.g., salsa, dance) in later surveys, we wish take advantage of the long-term nature of the simple questions relating to any participation at all (and we code these responses with dummy variables taking the value of 1 for “yes” answers and 0 for “no” answers<sup>2</sup>). Initially, we examine how attendance at each individual category of arts participation has changed over time. We then examine trends in overall (aggregated) arts participation trends as well.

(b) *Aggregating Responses on Arts Participation*

The original proposal associated with this grant research included possible methods for aggregating responses on arts participation from a given survey respondent. For example, principal components analysis could be used to determine “underlying” or latent characteristics of respondents. Unfortunately, given that the SPPA only consistently included Bernoulli

---

<sup>2</sup> For each category of arts participation, three responses other than “yes” and “no” exist: “no response”, “refused”, and “don’t know”. Given the low frequency of these three types of observations (e.g., for the classical music category, the percentages are 0.0017, 0.0074, and 0.0017, respectively—meaning none of them were even 1% of the sample), we omit them from our analysis and only consider the “yes” and “no” responses when conducting empirical tests reported herein.

distributed answers (yes or no) in both early and later iterations, principal components analysis is not appropriate. That method operates under the assumption that the analyzed variables be continuous in nature, and preferably with a normal distribution. Neither of those conditions applies to the SPPA data on individual forms of arts participation.<sup>3</sup>

To analyze arts participation across multiple categories in time, we construct a variable, “arts participation”, that is the sum of all categories (at least, those consistently included in SPPA since 1982) for a given respondent. For example, a respondent who attended ballet at least once last year, and also attended an opera performance—but answered “no” to participation in all other categories—would get a score of “2”. Conversely, a respondent who only attended an art museum—but participated in no other arts activities categories—would receive a score of “1” for this new (aggregated) variable. The analysis below specifies whether we are using disaggregated categories (e.g., ballet or opera) as opposed to when we are using the aggregated variable that is the sum of the various categories.

## **2. Univariate Findings on Arts Participation**

### *(a) Overall trends in arts participation (individual categories and aggregated score)*

We now present some findings on how arts participation has varied over time, both by individual arts category as well as for the aggregated variable. **Figure 1** presents a graphical representation of the responses in the various categories over time. Each line segment corresponds to a given survey year. For example, the portion of respondents who had attended at least one opera event is indicated first, with six separate line segments corresponding to survey years 2012 (the top, orange segment) through 1982 (the bottom, dark blue segment). The length of the line indicates the portion of respondents that replied “yes” to the survey question regarding participation over the last year in that category. Thus, in 2012, three percent of

---

<sup>3</sup> Another problem with using principal components analysis is that it is not appropriate for data that is categorical in nature. For such data (e.g., frequency of participation), an alternative statistical method known as latent class analysis is better. For studies using LCA in arts participation, see Ateca-Amestoy, 2008 and Fernandez-Blanco and Prieto-Rodriguez, 2009.

respondents had attended an opera. The category with the highest average attendance, craft fairs, was attended by as many as 40.9% in 1992. That means that two-fifths of all survey respondents attended a craft fair in the last twelve months from the survey date. The categories have been sorted such that the least attended category (opera) is on the top of the chart, whereas the most attended category (on average over time) is at the bottom of the chart (craft fairs).

The overall finding is that, in every category, arts participation has declined from 1982 to 2012. During the initial period, from 1982 until 1992, several categories (opera, ballet, jazz, theatrical plays, art museums, craft shows) show an increase in participation rates, but this is eventually reversed for all of them. On its own, this finding might support the contention that declining arts funding in the 1996/7 period is consistent with declining arts participation in the period from 2002 – 2012. A more definitive examination of this idea will be presented below, however.

What about overall participation (aggregated across all eight arts participation categories, so abbreviated AP8) over time? *Figure 2* gives the overall picture, in that the average survey respondent attended about one and a half (1.55) categories tracked by the survey. This number showed an increase up until 1992, but then a precipitous decline from 1992 to 2002 and then further declines thereafter. By 2012, the average respondent had only been involved in 1.24 categories of arts participation.

*(b) Age and Arts Participation*

Any time that a fairly consistent trend over time is observed in data, it is natural to examine age cohort data. Meaning, is this finding of declining arts participation due to the aging population of the United States? Or, is it due to the dominance of one age group (e.g., Baby Boomers) but not indicative of a long-run trend across generations? To answer this question, we consider two more figures that break the data into two types of categories: respondent age at the time of the survey, and long-term demographic changes based on age cohorts (i.e., decade in

which the respondent was born). Because we are examining the survey questions that were asked in a consistent manner over time, we can tease out the long-term relationship between the aging of the population over time and arts participation in the various survey years.

*Figure 3* presents data on the aggregate arts participation variable over time. For example, the level of aggregate arts participation for individuals aged 18 to 24 at the time of the survey is indicated by the blue line. This figure was 1.463 in 1982, but by 2012 had declined to little over 1. That is to say, in 1982, the average person in the youngest survey category (18 to 24) attended almost one-and-a-half arts categories. But 2012, that had declined almost one third to only one category. The findings are similar across time in the relatively younger categories, with declines of 31%, 36%, 22%, and 3%, respectively in categories 25-34, 35-44, 45-54, and 55-64. It is interesting, however, that the 65-74 category actually increased arts participation by 18% (from 1.187 to 1.401); in the oldest 75+ category, the increase was a substantial 45% (from 0.631 to 0.915). Admittedly, these participation rates were from a low base (the lowest two categories in 1982, represented by the light blue and orange lines). Nevertheless, the findings are consistent with the generally improving health of the U.S. population during the time period covered by the SPPA studies: if elderly Americans are healthier, it is more likely they will be able to attend an arts event or museum in person.

Because the distribution of individuals in the various age categories is not uniform over time (e.g., there was a “baby boom” as well as other instance of variation in birth rates during the time covered by the SPPA data), it is important to examine whether age cohort characteristics account for the trends identified above. In *Figure 4*, we present findings of how overall (aggregated) arts participation has varied based on the decade in which the survey respondent was born. The oldest cohort, including individuals born prior to 1920, starts at a low level in 1982, and declines in 1986 and 1992. By 2002, unsurprisingly, there are no observations for this cohort. The fact that the rate generally declines over time as this cohort ages is also not surprising, given the general decline in health associated with aging.

Most of the other age categories, however, also show declines in aggregate arts participation. The youngest age cohort, those born in the 1990s, witness slightly declining arts participation during the only two survey years that include them (2008 to 2012); this is also true for the cohort born in the 1980s and 1970s. Again, this finding is consistent with an argument that the cut in arts funding in the 1996/7 led to a permanent reduction in the level of arts participation by Americans over time. We will investigate the relationship between age and arts participation in more detail, and will use both univariate and multivariate approaches to examine robustness (meaning, to determine if the findings still hold once we control for a host of demographic factors like income, gender, educational attainment, ethnicity, region, and survey year).

### ***3. Regional, Demographic, and Educational Determinants of Arts Participation***

Previous academic studies of SPPA data analyzed basic demographic information, but not always in a multivariate framework, and have excluded the latest data year (2012), which only became available recently. We now delve more deeply into the panel data and contribute to those analyses by considering a baseline demographic model employing the “usual suspects” from a literature review of arts demand (Seaman, 2005): income, education, and age. Unlike the analysis above, we supplement our univariate analysis with a multivariate approach, meaning that we can hold constant certain factors (e.g., age) as we explore the relationship between various potential determinants of arts participation. In addition, because the SPPA data include by necessity only a sub-set of the population of the United States, it is important to consider the representativeness of the sample. Because we have fairly good information on key characteristics of the overall population of the country (gender, age, income, race), we can adjust the statistical results to incorporate the fact that our data may not be exactly representative of the population as a whole.

(a) *Univariate Findings: Income, Education, and Gender*

Before conducting multivariate analysis, we wanted to consider univariate relationships between two important determinants of arts participation (income and education level) vis-à-vis the aggregated (AP8) and disaggregated categories of arts participation. We constructed dummy variables taking the value of “1” if a respondent indicated participation in that particular form of art over the past year (art museum, ballet, classical, craft fair, jazz, musical, opera, and play). The variable AP8 is simply the sum of all eight sub-category dummy variables. We also constructed a variable called AP7 which omits craft fair (due to some inconsistent data collection for this category in the earlier period<sup>4</sup>), and it is included to verify the robustness of the AP8 findings. Estimations of these models employ negative binomial regression.<sup>5</sup> In addition, we estimate logit models using each of the 8 arts participation categories separately (following the methods of Cameron and Trivedi, 1998). All estimations use survey weights and stratification per the SPPA data set variables provided by the National Endowment for the Arts.<sup>6</sup>

(1) *Income*

It is not surprising that people from higher-income households have more means at their disposal to purchase tickets for concerts, museums, and other forms of arts participation. To illustrate the statistical relationship between real income and arts participation in various categories, **Table 1** provides univariate results with various measures of arts participation as the dependent variables, and with real income as the independent variable. The general finding is that higher levels of income (specifically, measured as the natural log of inflation-adjusted family dollar income) are indeed associated with higher levels of arts participation, but the relationship

---

<sup>4</sup> For some reason, survey years 1982 and 1985 have very few observations for this variable relative to the data set as a whole, possibly due to different versions of the survey instrument being applied, and one or more such versions did not include this question.

<sup>5</sup> When using count data, it is common in the cultural economics literature (Brida, et al, 2013) to employ zero-inflated poisson analysis (as opposed to negative binomial). The construct we are using (AP9 or AP7), however, is not a true count variable because it does not reflect repeated instances of identical behavior, but rather reflects a sum of various types of participation behavior among various categories of art.

<sup>6</sup> In STATA 13, the command used to establish the survey analysis is: svyset varunit [pweight = weight\_normalized], strata (varstrat). Incorporating stratification generally allows “honest” reduction of p-values when assessing statistical significance—most of the findings presented in this deliverable were highly statistically significant even without using stratification, which is not surprising given the large number of observations, sometimes approaching 100,000 respondents.

is stronger for some categories than others. Thus, the coefficient on AP8 of 0.476 means<sup>7</sup> that, on average, a respondent with 10% higher income is about 5% more likely to have participated in any of the eight arts categories we assess.

The strength of the relationship between income and participation varies by arts category. The category with the closest relationship to income is musicals, and the coefficient of 0.740 can be interpreted to mean that, on average, a 10% higher level of income is associated with about a 7% increase in the likelihood that a survey respondent will attend a musical stage play over the preceding 12 months. The arts participation category with the weakest relationship to income is jazz, such that a 10% greater income is only associated with less than 5% increased likelihood of attendance over the previous 12 month period.

## *(2) Education*

It is well-known from previous research that higher educated individuals tend to be more likely to consume art as measured in the SPPA. To confirm this finding and create a baseline for the multivariate analysis considered below, we present in **Table 2** results from univariate analysis using dependent variables as specified. The independent variable, “highly educated”, takes a value of “1” for respondents who had graduated college (including those with an advanced graduate degree), and “0” for others.

The general results (for AP8 and AP7) show that a one-unit increase in the education variable is associated with between a 0.95 and 1.16 increase in the number of arts events attended. Among the individual categories, opera attendance has the strongest linkage to education (the coefficient means that a one-unit change in the independent variable education corresponds to a 1.634 average increase in the opera variable). The weakest linkages to education were for the categories jazz and, most pronounced, craft fair attendance. Across all

---

<sup>7</sup> A concise source for log-normal coefficient interpretation is at: <https://www.cscu.cornell.edu/news/statnews/stnews83.pdf>

categories, however, higher education was associated with an increased likelihood of participating in that form of art.

### *(3) Gender*

Past studies of SPPA data have shown that there is a gender bias to arts participation, in that women are more likely than men to consume art measured by the survey. Graphically, we depict the raw survey results in Figure 6.

Yet simple analysis of raw data, as in Figure 6, does not account for the fact that the surveyed sample is not identical to the overall US population, and distortions could exist. Therefore, we use survey-adjusted statistics possible with weighting and stratification of the data to confirm the robustness of the basic story that women participate in arts more than men do. **Table 3** indicates that, in a univariate setting, the finding holds: even adjusted for the SPPA sample's representativeness of the overall population, men are less likely than women to consume art—whether as measured in aggregate (AP8 or AP7) or in individual categories. The categories with the least participation of men vis-à-vis women are ballet (women are 60% more likely to attend) and craft fairs (47%). Men and women are most equal in terms of participation in jazz (where the difference is only 6.7%) and art museums (14.7%).

### *(4) Region*

Previous NEA research has noted that regional variation in arts participation exists. In general, we are interested in findings that can be compared over a large time period (going back to 1982) but this is not feasible for the geographical analysis because such questions only appeared on SPPA iterations in 2002, 2008, and 2012. In **Table 4**, we present summary statistics for the four regional groupings provided in the SPPA data: Northeast, Midwest, South, and West. The findings indicate that respondents located in the south were significantly less likely to have attended arts events, and this was especially the case for opera, art museums, plays, and

musicals. Midwesterners had few significant differences from national averages, with the exception that they were less likely to attend ballet and opera, but more likely to attend craft fairs, musicals and (marginally significant) plays. Northeasterners appeared particularly fond of art museums, musicals, opera, and plays. Westerners were above average participation in every category, with  $p$ -values almost uniformly at the 1% level or better (meaning the results were very unlikely due only to random chance).

The univariate analyses are widely consistent with prior findings, and form a key baseline for investigating the relationships among arts participation and various demographic data in the SPPA. But the results (especially the regional results) beg an obvious question: do they reflect actual tastes and preferences in the various geographical areas, or do they simply reflect the demographic composition of those areas, because arts participation is also associated with ethnicity, income, age, and other factors that also vary by region. To address this question, we turn next to multivariate analysis, which allows for us to determine whether relationships among arts participation determinants are robust, and to what extent they begin to deteriorate when considering a number of demographic issues together at the same time.

*(b) Multivariate analysis*

Univariate analysis of SPPA data conducted by NEA analysts has demonstrated clear regional patterns in terms of arts appreciation, measured in simple ways.<sup>8</sup> But it is also true that differences in income and other demographic variables might play a role in determining public participation in the arts. We use of a multivariate framework, incorporating survey econometrics (thus considering weighting as well as stratification, an artifact of SPPA survey design), in order to provide a clear picture as to the extent of variation.

The basic model we use in this part of the study is as follows:

---

<sup>8</sup> Each of numerous SPPA surveys going back to 1982 have been associated with basic statistical information such as cross-tabs and univariate analyses. For example, see: <http://www.nea.gov/research/SPPA/index.html>

$$AP_i = \alpha + \beta_1 ETHNIC_i + \beta_2 INCOME_i + \beta_3 EDUC_i + \beta_4 AGE_i + \beta_5 YEAR_i + \beta_6 REGION_i + \epsilon_i \quad (1)$$

indexed for each respondent  $i$ , where AP stands for arts participation (total of arts participation categories as explained above, either AP8 or AP7), ETHNIC is a battery of dummy variables for respondents' self-reported ethnicity, INCOME is real income (inflation-adjusted dollar family income), EDUC is a dummy taking the value of "1" for highly educated respondents (described above), AGE is a dummy variable taking the value of "1" for older individuals (those aged 55 and up).<sup>9</sup> Some models include the variable REGION, which represents a battery of dummy variables taking the value of "1" for survey respondents in that particular region—note that this last vector of dummy variables is available only from 2002 onwards because prior to that SPPA data do not include geographical information. The REGION dummies include Northeast, Midwest, and West, with South as the omitted (reference) category.

*(1) Multivariate baseline model*

Initially, we estimate two negative binomial models using AP8 and AP7 as the dependent variable, with results indicated in **Table 5**. Here we are interested in trends over the entire span from 1982, so we are forced to exclude regional dummies as well as consideration of Hispanic ethnic identity (SPPA questions did not include regional data nor the Hispanic question until after the 1980s).

The findings indicate that, even accounting for the representativeness of the sample with survey statistical techniques, overall reductions in arts attendance are occurring. Arts attendance on average was around 50% higher during survey years 1982, 1985, and 1992 compared to the most recent year (2012). The pace of this decline seems to have lessened, however, with data from the penultimate survey year (2008) showing only marginal declines

---

<sup>9</sup> To understand our bifurcation of the data set at age 55, refer to Figure 3, which shows that deterioration in arts participation is (generally) broadest among demographics that are younger than 55.

in 2012 attendance, as indicated by the relatively low magnitude of the coefficient for that dummy variable of 0.082. This indicates that, on average, people in 2008 were 8% more likely to attend an arts event than in 2012.

Findings related to gender, income, education, age, and ethnicity are interesting as well. Males attend around 30% fewer arts events. Higher income is also associated with greater arts attendance, although this effect is lesser than it was when considering income alone in the univariate analysis, above: the coefficient declined from 0.476 to 0.355, meaning about one quarter of the income effect on arts attendance disappears in the multivariate framework. This is likely due to the fact that higher income is correlated with things like gender, education, and ethnicity.

A very strong effect is indicated for education, such that highly educated individuals (with at least a college degree) increased the likelihood of attending an arts event by between 82.7% and 101.6% (depending on the specification). The dummy variable for older age individuals (those age 55 or older) was only significant in one specification (using AP7 as the dependent variable), and even then, the magnitude was not very high, with only a 4% greater prevalence of art attendance for individuals of age 55 or older.

The ethnic results are fairly consistent, and for the overall arts categories (AP8 and AP7), non-whites attended arts events less frequently. But a more nuanced story emerges when we consider individual categories, discussed below.

## *(2) Regional analysis*

The multivariate baseline model is interesting both in its indication that arts attendance has been decreasing over time, even when controlling for various potentially confounding issues such as gender, income, age, and ethnicity. But regional effects are also evident in the data, and analysis of this issue in a multivariate framework is presented in **Table 6**. The results there indicate the robustness of the result from the baseline model, in terms of

findings on income, education, gender, and ethnicity. In addition, however, we can investigate the consistency of the regional findings from Table 4, above, by seeing if they remain in the multivariate setting. We find that the regional differences from the univariate analysis are somewhat attenuated when controlling for various demographic factors. For example, in the previous analysis, for AP8 there was a difference of around 30% between Midwest and South attendance (Midwest was positive 4% and South was negative 26%). Yet in the multivariate analysis, with South as the omitted variable, Midwest only has a 15.7% coefficient. This means that about half of the difference between Midwest and South is robust to consideration of income, gender, education, age and ethnicity. The Northeast result is similarly attenuated in the multivariate setting. In a very interesting development, however, the finding for West is actually of greater magnitude once controls are in place, showing that the cultural differences between West and South are the most evident—compared to an otherwise similar person (by gender, income, education, age, and ethnicity) in the South, someone in the West will have an AP8 score that is about 0.3 higher. The deterioration in arts attendance over time is fairly robust to regional considerations as well, in that the coefficient for the penultimate survey year dummy is pretty close to 8% (here, 7.7%)—meaning that on average, arts attendance is down 8% in 2012 compared to 2008, even controlling for a host of demographic and regional variables.

### *(3) Individual Arts Categories*

In the univariate analysis, we found some important nuances when breaking the overall attendance measures into sub-categories of different types of art participation. We now do that in the multivariate setting. As before, the statistical models for the individual arts categories estimations are logit (so that dummy variables can be interpreted in terms of percentage likelihood), with adjustments for survey design (weighting and stratification).

The findings in *Table 7*, which similar to *Table 5* omit Hispanic and regional variables (due to lack of such questions on earlier survey instruments), indicate some important nuances relative to the overall variables (AP8 and AP7) from the baseline model. There are substantial differences in the various arts categories. First, we consider recent attendance patterns—the magnitude of the coefficient (and its level of significance) for the variable SPPA-2008. The higher this number for a given arts category, the greater is the decline in arts attendance between 2008 and 2012. The category with the greatest deterioration is therefore the category with the largest coefficient, and here that is musicals (18.9% or about 19% greater attendance in 2008 over 2012), followed by plays (15.3%). Two other categories (art museum and craft fair) saw 13% declines, with coefficients statistically significantly different from zero. The other four categories either saw small increases in attendance (jazz) or only minor declines that were not statistically significant at standard levels (ballet, classical music, and opera).

Gender differences were substantially different across arts categories, although the findings on ethnicity were pretty consistent with the baseline model. Those categories with the highest “gender gap” in terms of arts participation were ballet (76%) and craft fairs (61%) although musicals, plays, opera, and art museums were also dominated by female attendance. This was less so for jazz, where the small difference between male and female participation was not statistically significant. Jazz also stands out among the 8 categories we examined because of the ethnic composition of its audiences—the black ethnicity indicator variable was significantly lower in every other arts category, but was actually higher for jazz (by 62.5% even) and this finding is statistically significant.

In *Table 8* we turn to regional findings related to various arts categories. As before, the finding for West shows much higher participation in that region, and this is true across all arts categories, ranging from a low of 18% (ballet) all the way up to 61% (opera). Midwest attendance was particularly high (relative to the omitted category, South) in the areas of craft

fairs, musicals, and plays. Northeastern participation was greatest (relative to the South) for opera, musicals, and plays.

The findings for age were interesting. On the one hand, it is often stated that aging audiences create a problem for art, especially if it reflects generational shifts. On the other hand, if a certain category of art appeals to older participants, then a new generation of older people can replace a previous generation, with no necessary net decline in attendance for that category. *Figure 6* shows that both of these things are happening. To see this, we organize the eight categories under consideration by the coefficient for older attendees (the dummy variable taking a value of “1” for participants that are age 55 and up), and compare it to the dummy variable coefficient for SPPA-2008 to get a sense of recent declines (relative to 2012). For each category, we assess whether elderly respondents are more likely to attend, and then look at overall attendance as well.

The results are fairly interesting. In two categories (art museums and craft fairs), there has been a recent and rapid decline in attendance, but older individuals are not driving this because they are no less likely to attend than younger people. In two other categories (jazz and ballet), there has been no substantial decline in attendance, but again this is not being driven by older people because they are no more likely to participate in these categories. Interestingly, for classical music and opera, older attendees are more likely, but there has not been a substantial decline in participation from 2008 to 2012. This is consistent with the idea of generational replacement, such that older audiences are drawn to these types of events—this is an optimistic finding for those performances because it could indicate that new generations of older people are replacing previous generations. The pessimistic finding is for musicals and plays: for these categories, older people are more likely to attend, but there seems to be not sufficient replacement happening as overall attendance is declining substantially and this result is highly statistically significant (the coefficient for musicals shows about 19% decline between 2008 and 2012, and for plays the decline is 15%).

### ***(c) Summary of Phase 1***

In this phase of the research, we analyzed arts participation among eight different sub-categories that have been included on SPPA surveys going back to 1982. We initially considered raw data on this, and presented a number of graphs indicating arts participation in these categories. We next created a summary variable (AP8) that summed participation across all eight activities, and did some univariate analysis of this. Unlike previous univariate analyses of these activity categories, we considered the complex nature of the survey data and incorporated weighting and stratification in our analysis.

The multivariate analysis we conducted next showed some important findings: males are less likely to participate in art as measured on the SPPA surveys; higher income is associated with more arts attendance; and greater educational achievement is very strongly related to participation. Ethnic generalizations were hazardous, which was shown when breaking down the multivariate baseline model into the various categories—although, for example, the AP8 scores were generally lower for Blacks, that ethnic group was substantially more likely to attend jazz performances. Regional findings from univariate analysis were generally attenuated in the multivariate setting, showing that such differences were not as substantial as one might have believed simply by comparing average scores across the four regions (Midwest, Northeast, South, West).

With this deeper understanding of the data, we next turn to two important issues that relate to arts participation: first, its relationship to income and second, the “natural experiment” that resulted from a severe funding cut in the 1995/6 budgetary year.

### ***C. Phase 2: Economic Effects of Arts Participation***

In Phase 1 of the research, we identified a number of interesting findings regarding the relationship between income and arts participation. We confirmed in a rigorous way what some prior research has determined, that there is generally a positive relationship: individuals with higher incomes were on average

more likely to participate in art. In a number of statistical estimations, we found that this positive relationship was generally statistically significant (although there were certain exceptions, such as jazz). In this section, we consider two additional issues related to this: first, whether the relationship between arts participation and income varies by survey year and/or by respondent region; second, whether there is any evidence of a causal direction between arts participation and income.

### ***1. Relationship between arts participation and income (overall, by region, and over time)***

We now consider some interactions among the various regional and temporal variables to ascertain more in-depth knowledge of the relationship between participation and income. Interactive variables allow us to test whether two elements are (1) complementary, and thus the whole combined effect on the dependent variable (arts participation) is greater than the sum of the two individual elements, or (2) are substitutes, whereby the whole effect on the dependent variable is less than the sum of the effects of the two elements. Another way to think about interactive terms in this context is as a test to see if the impact of income on the likelihood to participate in art is different under varying circumstances (by year or region).

As in Phase 1, we will analyze both overall arts participation (variables AP8 and AP7, which sum attendance across a number of arts categories) as well as in individual activities. We employ similar statistical methods as before (negative binomial estimation for aggregated dependent variables, logit for individual activities; adjustments for survey complexities including weighting and stratification). But, in Phase 2, we use interactive terms to see whether location (Midwest, Northeast, West) and time period (dummy variables taking the value of “1” for each of the survey year iterations). The findings from these estimations are indicated in ***Table 9***, and we only report coefficients for the interactive terms for ease of presentation (we indicate levels of significance but do not report *t*-statistics or *p*-values).

Interactive terms can be interpreted in a number of ways, but for our purposes the sign and level of significance are important. A positive sign on an interactive coefficient indicates that the two

elements (e.g., income and survey year) are complementary, thus the whole combined effect on the dependent variable (arts participation) is greater than the sum of the two individual elements. This appears to be the case for the various survey years, whether looking at aggregated data or the individual arts categories (*Panel A*). The results are interesting in that there seems to be a highly complementary relationship between survey year dummy and income—this is to say that the whole effect of these two variables (survey year and income) is greater than the sum of their individual effects.

Focusing initially on AP8, the complementarity of the relationship between income and survey year varies substantially over time, both in terms of the magnitude of the coefficient and its level of significance. Across the various arts participation categories, 1992 stands out as a year with highly significant results (in nine out of ten specifications, the coefficient is positive and statistically significant). This is also the case for 2008, with six out of ten specifications indicating a complementary effect between survey year and income. This indicates that in 2008—relative to 2012—the combined impact of income with that survey year was greater than for other survey years, such as 1982, 1985, and 2002.

Turning to *Panel B*, regional variation has a very different result. The negative sign on most of the coefficients is indicative of the fact that income and regional dummy variables were substitutes. This means that the combined effect of region and income is *less* than the sum of the two factors separately. The presence of a significant interaction indicates that the effect of one predictor variable (here, income) on the response variable is different at different values of the other predictor variable (here, region). So, relative to the South (the omitted region category), we can see that there is a lesser effect of income on arts attendance in the Midwest, the Northeast, and the West. This is true for both the overall measures (AP8 and AP7). The story is less clear in the individual categories, however. Art museum attendance is more linked to income in the South than elsewhere. The relationship between income and attendance in the Midwest is least different from the South, and most different for the West.

With this understanding of the complex relationship between income and arts attendance, we now turn to a deeper analysis of the causal direction of the relationship between income and arts participation.<sup>10</sup>

## ***2. Assessing Causal Direction***

The finding demonstrated repeatedly that income and arts participation are related (positively correlated) does not clarify, however, the causal direction. On the one hand, it is not unreasonable to assume that individuals with more family income can afford to attend various arts events (many of which cost money). On the other hand, the result could be interpreted to mean that exposure to art might alter individuals' behavior (e.g., induce greater creativity) that in turn has a positive impact on income. This could be especially true for people in professions that rely on creative or innovative solutions to complex problems. Indeed, there is mounting evidence from the medical and psychological literature that appreciation and exposure to the arts is related to brain function.<sup>11</sup> So in which direction does the causality flow? Social scientists have used the term “endogeneity” to describe the fact that there may be confounding influences on the relationship between dependent and independent variables—this is the term used when the direction of causality between two measured variables is suspected.

Probably the best method for establishing the direction of causality is to use a double-blind, controlled experiment. In such a research design set up for the present issue (income and arts participation), we could randomly assign a set of individuals into two groups: one that is exposed to art (as measured on the SPPA, for example; this is the treated group), and one that is not (controls). We would then wait some period of time to allow the “treatment” (here, exposure to art) to have a

---

<sup>10</sup> We had originally intended to examine how early arts exposure is related to later arts consumption. The SPPA data we downloaded, however, did not have information on early arts exposure. In addition, we found that another source had already investigated this relationship, so we did not feel there was substantial value-added to a similar exercise on our part (Charles Gray, 1998, “Hope for the Future? Early Exposure to the Arts and Adult Visits to Art Museums,” *Journal of Cultural Economics*, 22: 87-98.) Instead of repeating that analysis, we conducted a quasi-experimental analysis using the case of Washington, DC as a natural experiment, which is what the next section of this report covers.

<sup>11</sup> Many articles have appeared recently in the popular press regarding how exposure to art can affect cognition in humans of various ages. A 2011 joint NEA-Department of Health and Human Services report discusses evidence-based claims for early childhood, youth and adolescence, and for older adults (The Arts and Human Development: Framing a National Research Agenda for the Arts, Lifelong Learning, and Individual Well-Being. National Endowment for the Arts, available at: <http://arts.gov/sites/default/files/TheArtsAndHumanDev.pdf>).

cognitive effect on the exposed population. Then, we would test to see if higher incomes prevail among the treated population as opposed to the control group. Such a research design goes beyond the scope of the research for the current investigation, and we would encourage future scholars to enact such a test.

Indeed, because such double-blind controls are expensive and difficult to carry out in practice, a number of other methods have been developed in order to attempt to discern causality using observational data, that is, data such as that in the SPPA surveys. One such approach (which we originally envisioned) would be usage of instrumental variables, such as parental education or early exposure to art. Using this method for the current causality question (whether income causes arts participation or whether arts exposure helps enhance income), a researcher identifies an additional variable that is correlated with income, yet is uncorrelated with the error term of the regression (we used the specification with results indicated in Table 7. Unfortunately, after much searching, we were unable to find any variables in the SPPA data that corresponded to these two conditions—indeed, almost every variable was correlated with the error term from the model presented in Table 7.

Another method to help ascertain the direction of causality is to take advantage of a natural experiment. In this case, the researcher leverages some clearly exogenous difference (exogenous is the opposite of endogenous) to clearly distinguish cause and effect. It is sometimes difficult to isolate a clearly exogenous difference in the SPPA data, but after consultation with statistical experts and careful consideration over the two-year time span of the engagement, we think that an interesting and useful case presents itself in the form of a natural experiment due to the difference in price among museums in Washington, D.C. (where many museums have no admissions fee) as opposed to the rest of the country, where admissions fees are generally charged.

a. *Empirical Test of the Causal Direction Income → Art*

The research set up is as follows. If the important causal relationship flows from income to art (meaning, higher income individuals can afford to pay for more art performances), then we would expect to see a large difference in the prevalence of arts attendance among otherwise similar individuals (income, demographics, etc.) in Washington, DC vis-à-vis other communities. If the causal relationship in the other direction is more powerful, that is, art exposure causes higher income (e.g., through enhanced creativity, which in turn fosters higher income on average), however, then we would not expect to see a major difference between Washington, D.C. (hereafter, DC) and other communities.

Fortunately, we have a substantial enough number of DC observations, indicated by FIPS-CBSA code 47900.<sup>12</sup> The SPPA data years 2008 and 2012 included this indicator, and there are 517 DC observations in 2008 (with 17,927 observations outside of DC) and 596 DC observations in 2012 (with 18,207 observations outside of DC). Rather than manually locate matches between DC and elsewhere, we use the STATA command “nnmatch” for this purpose. We match on income, gender, education level, ethnicity, and SPPA year (2008 or 2012).

The results are presented in **Table 10**, which indicates statistical “treatment effects” for each of the eight categories we consider in this study. Since the treatment is a dummy variable taking the value of “1” for people located in the Washington, D.C. area, the coefficients can be interpreted as the behavior of DC residents compared to otherwise similar people elsewhere (matched on income, gender, education level, ethnicity, and SPPA year).

The first coefficient, for art museums, is positive and significant, indicating that people in Washington are more likely to attend them. This is not surprising given that there are many free arts venues associated with the Smithsonian Institution, whereas in most other

---

<sup>12</sup> The US Census uses various FIPS codes to indicate the location of the respondent, for more information see: [http://www.census.gov/cps/files/Geographic%20Coding%20-%20Metro%20Areas%20\(since%20August%202005\).pdf](http://www.census.gov/cps/files/Geographic%20Coding%20-%20Metro%20Areas%20(since%20August%202005).pdf)

places in the United States, art museums generally charge admissions fees. So the evidence so far is consistent with a causal direction of higher income leading to arts attendance, because art museums aren't free elsewhere so it is likely that the fee acts as a disincentive to participate in this form of art. This should not be a surprising result to anyone trained in economic analysis, because there is a long tradition relating to pecuniary incentives and disincentives to various forms of human behavior.

The other findings create some nuance to this result, however. The craft fair finding is consistent with the idea that residents of Washington, D.C. visit more art museums because they are free relative to elsewhere. For craft fairs, which are presumably costless in both Washington, D.C. and elsewhere, there is no statistical significance to the treatment effects. This is an interesting finding, and we will exploit its meaning below when we investigate the other potential causal direction (from arts participation to income).

The income to arts attendance direction, however, is somewhat attenuated by the positive and significant coefficient on classical music, jazz, musicals, opera, and plays as indicated in *Table 10*. If the central argument (that art museum attendance is higher in DC than elsewhere because it is free) is to hold, it should also be the case that attendance at non-art museums should be about the same. So, perhaps demand *and* supply are driving the results—meaning, there is a higher proportion of venues available for various arts forms in Washington, D.C. compared to the rest of the country.

To determine the robustness of this effect, we re-estimate the matching specifications from *Table 10*, but include an additional matching term that takes the value of “1” for large cities (that is, observations indicated either as a “principal city” or as “central city of an s(msa)”). *Table 11* presents the results. The finding for art museums is hardly changed, in that the coefficient declines from 0.099 to 0.091, and the  $z$ -statistic is also very stable (3.95 changes to 3.97). For the other art participation categories, the findings from *Table 10* are much more attenuated, with coefficients declining by half or more, and much

lower levels of significance. This finding supports the idea that at least *some* of the greater art museum attendance in Washington, D.C. is due to free status, but the evidence is somewhat mixed due to still positive and significant coefficients (on jazz, musicals, operas, and plays) after controlling for metro status.

*b. Empirical Test of the Causal Direction Arts → Income*

Turning to the other causal argument, that arts attendance has a positive effect on income (through channels such as potential greater creativity, exposure to different ideas, etc.), the empirical set up is more difficult. We have just presented evidence (even if not wholly convincing) that, unsurprisingly, higher income individuals are able to afford attendance at more arts venues. But if this is the case, how can we measure whether arts attendance itself enhances income?

Our approach considers the fact that one category of arts attendance, namely craft fairs, tend to be costless. The lack of an admission fee means that anyone (irrespective of income) is able to attend such events. To identify the treatment effect, we split the data into two categories: people who attended a large number of craft fairs, and those that did not. The question of number of craft fairs was asked in 1992 and again in 2002 (but not before or since). Many respondents attended no craft fairs during those years, and the number ranged from a low of zero to a high of 91. Among those who attended at least one craft fair, the mean was 1.149, the median was 1, and the 90% value was 4. We chose 4 events as the cut-off for people who had “high” arts participation. This became the treatment variable (taking the value of “1” for all observations with 4 or more craft fairs attended). The outcome variable (what we hypothesize is being affected by the treatment) is the natural log of real income.

We found the treatment effect to be positive and highly significant (coefficient of 0.174 with  $z$ -statistic of 8.21). As a robustness test, we matched on respondent residence in

a major city (which was only available as a question in the 1992 SPPA version), with a very similar result (coefficient of 0.215 with  $\chi$ -statistic of 7.42). A further robustness test was conducted, using other years as well and slightly different question wording about metro status (see description of **Table 11** for details), with another very consistent finding (coefficient of 0.171 with  $\chi$ -statistic of 8.84). Overall, the findings are consistent with the idea that people who attend many arts events (here, 4 or more craft fairs) are wealthier than otherwise similar people (matched on age, education, ethnicity, and location).

Note that this is not a perfect test, however, for two reasons, one of which could lead us to believe that the effect is over-estimated, and one of which could lead us to believe the effect is under-estimated. First, because the opportunity cost of attending events is higher for individuals with higher income, we might be under-estimating the positive effect of arts attendance on income. Second, we might be over-estimating it because even though craft fairs tend to be free, some resources are required for transportation to and from them, and higher income people tend to have more reliable and available transportation options compared to others.

### ***3. Summary of Phase 2***

In Phase 2 of the research, we considered in more depth the relationship between arts attendance and income. First, we examined a number of interactive models considering how income and arts participation vary by region and over time. Second, we established two sets of empirical tests to assess the direction of causality. Initially, we considered a natural experiment, exploiting the fact that many free art museums exist in Washington, D.C. We found evidence that DC area residents were more likely to attend arts museums (relative to otherwise similar people who live elsewhere) and that was even robust to consideration of metro status (our proxy for supply of arts venues). Yet, we also found evidence that other art forms also were attended more often in by DC area residents, which weakens the clarity of the result for art museums. We

then conducted a test exploiting the costless admission to craft fairs to assess if there was any evidence for a causal direction showing more arts attendance enhances income (perhaps through a channel such as more creative problem-solving) and found robust evidence to confirm this hypothesis.

#### **D. Phase 3: Funding and Arts Participation**

In Phase 3 of this report, we consider the wider socio-economic impact of arts funding on arts participation. We have confirmed prior research in that there exists a highly robust correlation between income and arts participation. Because pecuniary incentives matter, it makes sense that if policy makers wish to increase the level of arts participation, under certain conditions, monetary subsidies for such activity should be allocated. The National Endowment for the Arts was established for very purpose of promoting arts, yet the amount of its funding has varied substantially over the years. A peculiar budgetary situation arose in the 1995/6 budgetary year, which allows us to conduct a natural experiment on how funding for the arts impacts arts appreciation over the long term. In addition, we consider another channel related to social values and arts participation, based on data concerning preferences over time as reflected in voting patterns for presidential elections in the time period since SPPA included region as a question (2002, 2008, 2012).<sup>13</sup>

##### ***1. The “Direct” Channel: NEA funding cut in 1995/6 budget year***

The first channel is “direct” in terms of NEA funding and arts participation. A previous study (Dokko, 2009) indicated how individual categories were cut, such that museum funding was cut by 60.2% but folk and traditional arts were cut by only 16.1%. Given the fact that SPPA data contain information on each of these broad categories, we can examine if declines in participation in one type

---

<sup>13</sup> We had originally planned to consider another channel, relating to whether crowding out or crowding in affected consumption in specific activities. We had planned on considering to what extent private contributions offset specific program reductions in the wake of the 1995-6 NEA budgetary reduction and subsequent declines in the real level of arts funding at the national level. Unfortunately the source for such data (various editions of AAFRC annual reports and data tables found at, e.g., <http://givingusa.org/product-category/2015-products/>) used by Borgonovi and O'Hare (2004) is not costless, and there was no provision in the grant budget to purchase such data. We believe this is worthy of consideration by future researchers, but goes beyond the scope of the present analysis. In place of this estimation, we performed robustness checks (age cohort analysis for the first channel).

of art (museum visits) was greater than declines in other types (craft fairs) in the key timeframe from 1992 to 2002, the decade surrounding the steep funding decline.

#### ***A. SPPA Categories and Budgetary Line Items***

Each of the eight SPPA categories conforms to several budgetary line items analyzed by Dokko (2009). Table 12 lists six budget line items (dance, folk/traditional arts, museums, music, opera/musical theater, theater) that are relevant for the eight categories of arts participation considered in our study. Some budget line items suffered more substantial funding shortfalls than others. This allows us to examine if deeper cuts in a particular budgetary category are associated with correspondingly deeper cuts in arts participation when we compare 1992 (before the budget cuts) to 2002, the first time the SPPA was conducted following the budget cuts.

We estimate a logit model (with results in the right-hand column of **Table 12**) where the dependent variables are the eight arts participation categories and the independent variables are log of real income, status as highly educated, status as 55 or older, ethnic dummy variables (black only, American indian/Alaskan native only, asian/Pacific islander only, Hispanic), and three dummy variables for survey year 2002, 2008, and 2012. By making the survey year 1992 the omitted (or reference) category, each of the year dummy coefficients in the model can be interpreted as the difference between that year and the current one.

The results are interesting—we see in general a decline in arts participation among the eight categories between 1992 and 2002, and this is often statistically significant (at the one-percent level for ballet, craft fairs, classical music, musicals, and plays). When we check whether the depth of the declines in these individual categories are correlated with the depth of budgetary line item reductions, the results do not support a narrow interpretation that 1995/6 budget cuts are responsible. We can do this by running a simple correlation between the column heading *Budget cut* and the column heading *Change, 92-02*. A positive correlation

coefficient would indicate that the depth of budget cut in a given category corresponds to lesser attendance in that category. A negative coefficient would indicate the opposite. In fact, we find the correlation to be -0.64, which does not support the argument that budget cuts in particular categories were associated with declines in participation for that category.

Examining the data deeper (see visual plots and line of best fit statistics shown in **Figure 7, Panels A-C**), we see that there is a clear outlier probably driving much of the results, it is the dot in the far lower right-hand side of *Panel A*. In Phase 1 and 2 of this study, we often found that craft fair participation behaves quite differently from the other categories, and we even developed a different variable (AP7) that excludes craft fair participation. *Panel B* shows the relationship among the seven categories once the craft fair outlier is removed, and it shows a positive relationship among budget cuts and participation declines. As we discovered in Phase 2 of the research, jazz seems also to be an outlier in terms of participation categories, so we construct a new variable (AP6) that is simply the combination of the other six category dummy variables (art museum, ballet, classical music, musicals, opera, and plays). The results are in *Panel C*, where we see a positive and statistically significant coefficient on the line of best fit, consistent with a positive correlation coefficient (0.467) among the budget cuts and participation declines. Of course, it can be dangerous from a causal inference perspective to simply eliminate observations that do not conform to prior expectations or desired results. We cannot say that, at this point, we have strong evidence that the budget declines are robustly associated with arts participation declines, so perhaps some additional tests can help us ascertain whether there are other pieces of evidence that can either confirm or disconfirm the hypothesis that budget cuts led to participation declines.

## ***B. Age Cohort Analysis (Robustness Check)***

To determine further the robustness of these findings, we conduct some additional analysis based on age cohorts. About 68% of arts education funding was cut in the 1995/6 timeframe, and we can examine whether children who were in school during that timeframe participated less in arts compared to similar-aged children in earlier (and later) times who were educated when arts education funding was more available.<sup>14</sup> We do this in two separate additional sets of statistical estimations.

### *1. Separating Age Group 18-24*

One complication for this sort of analysis is that the long-term demographic trend that has been taking place (the overall, secular decline in arts participation) could be driving any results that show a difference between 1992 and 2002. Meaning, if we do observe that 2002 participation is lower than 1992, it could be that this is due to overall long-term declines in arts participation and not due to any specific budgetary reduction. There are two issues to consider on this front. First of all, the drastic decline in NEA budgets in 1996 was not quickly reversed, and lasted for a long time. It is not inconceivable that the long-term secular decline in arts participation is in fact *due to or closely related to* the reduction in the NEA budget. It is not possible to disentangle this effect, even if that were desirable for purposes of causal inference. Second, we can control for the other two survey years (2008 and 2012) through use of dummy variables. So, with the 1992 dummy as the variable of interest, with 2002 the omitted category, 2008 and 2012 dummies become controls for the secular decline over time in arts participation identified in Phase 1 of the research.

We estimate a set of models (***Table 13***), where the dependent variables are the eight arts participation categories and the independent variables are log of real income,

---

<sup>14</sup> Gray, Charles, (1998) "Hope for the Future? Early Exposure to the Arts and Adult Visitations to Art Museums", *Journal of Cultural Economics* 22: 87-98.

status as highly educated, status as 55 or older, ethnic dummy variables (black only, American indian/Alaskan native only, asian/Pacific islander only, Hispanic), and a dummy variable for 1992. By making the survey year 2002 the omitted (or reference) category, each of the other year dummy coefficients in the model (1992, 2008, 2012) can be interpreted as the difference between that year and 2002.

The table can be interpreted as follows. We know that overall arts participation declined between 1992 and 2002. This was true for some types of arts more than others. But one of the largest budget cuts was to arts education (with a 68.8% decline in funding, this was worse than any of the eight categories we consider in this study). If children were in school during the 1995/6 time-frame, it is possible they saw either a reduction or total elimination of an arts program in the wake of that decision. So to determine if a change in budgets led to a change in arts appreciation and resulting decline in participation, we can separate out the effect on younger respondents (in the age 18-24 category).

*Table 13* provides results of these tests. For each category, if the coefficient for the 1992 SPPA year is positive, it means that participation was greater in 1992 than in 2002. The magnitude of the coefficients for the youth group (18-24) compared to the older group (25 or older) indicated whether the arts education decline affected longer-term appreciation and participation for the arts in the younger cohort that witnessed the fall-off in budgetary resources for arts education in the 1995/6 timeframe, as opposed to the older cohort. A coefficient of bigger magnitude on the 1992 variable means a greater decline between 1992 and 2002 for that cohort in that participation category.

The following arts categories saw bigger declines in 2002 for youth as opposed to for older individuals: art museums, ballet, and jazz. Some programs did not see a statistically significant difference (e.g., jazz or plays for the younger cohort). Yet, a large number of other arts categories (classical music, craft fairs, opera, plays, and the overall

categories of AP6, AP7, and AP8) witnessed a *lesser change* in participation among the older cohort relative to the younger cohort (meaning, the coefficient on the 1992 dummy was of greater magnitude for the younger as opposed to the older in the 2002 SPPA data). We conducted some additional analysis with interactive terms, but generally did not find results that were statistically significant. Again, we do not have conclusive evidence of declines in arts participation closely linked to budget cut line items.

## 2. *Treatment Effects of Youth on Participation*

Even if there were a causal link between NEA budgetary cuts and arts participation, it would be difficult to discern because there are many other sorts of arts funding (e.g., private sector donations). Indeed, some previous studies suggest that higher levels of funding might be pledged to arts programs in the wake of budget cuts (Borgonovi and O’Hare, 2004). It is also true that various other factors could confound discovery of a causal link, including the fact that the sample of younger respondents might differ in unobserved ways from older respondents. In addition, there were regional findings from earlier tests that could be confounding results—recall that people in the West tend to consume more arts than any other region, and this should be incorporated into a more careful research design.

One way to address the issue of confoundedness and unobserved additional causal mechanisms (e.g. regional location) is to employ quasi-experimental methods, as we did above when considering the Washington, D.C. natural experiment. In the present context, it makes sense to consider children who were in school during the budget cuts as the “treated” population, and those who came before (otherwise similar) as the control group. We match each treated observation with control observations based on natural log of household income, gender, metropolitan status, education level, ethnic

dummies, and survey year (2008 and 2012).<sup>15</sup> In addition, and unlike the findings from *Table 13*, we match region, that we found in Phase 1 to be a significant determinant of arts participation.

The results of these treatment effects estimations are shown in *Table 14*. For each category, we can see generally negative coefficients with a high level of statistical significance. All three of the aggregate measures (AP8, AP7, and AP6) showed a negative and significant coefficient. All categories indicated a negative coefficient on the treatment variable, and many of them were statistically significant at traditional levels (art museums, ballet, classical music, craft fairs, and opera).

These findings—the best econometric methods we could devise because they consider lots of unobservable characteristics among treated and control groups—are actually consistent with the idea that the “treated” population (that is, people who were born after 1982 and were in school when budget cuts occurred) participates in less art than otherwise similar people who are older.

## 2. *Changing Preferences over Time (an Opportunity Cost Channel)*

As mentioned above, it is difficult to disentangle the effects of NEA budget cuts on arts participation because there seems to be an overall trend of lower participation over time. Indeed, if we construct a new variable “vintage” that takes the value of 1 in 1982 and increases on a one-to-one basis with the SPPA survey year<sup>16</sup> and enter it into the baseline multivariate regression model<sup>17</sup> of Table 5, we find that this variable has negative coefficient (magnitude -0.02, *t*-statistic of 26.41), meaning that each year people attend fewer events in general on average. Over a decade, an otherwise similar person would attend 20% fewer arts events, and over the 31 year span of the data,

---

<sup>15</sup> Because SPPA data do not include respondents under the age of 18, we can only perform this analysis using data from survey years 2002, 2008, and 2012.

<sup>16</sup> So observations from 1985 have a value of 4; 1992, 11; 2002, 21; 2008, 27; and 2012, 31.

<sup>17</sup> Using AP8 as the dependent variable, negative binomial estimation, and omitting survey year dummies.

about 60% less attendance is indicated, all else equal and controlling for weighting, clustering, and stratification in the survey data.

Why has this been happening? It is unlikely that the entire effect is due to budget cuts in NEA funding, and broader socioeconomic changes are likely the causes. It is not simply the case that more music (etc.) is available due to the Internet, because radio and television and LP records have been available for some time. This could explain, for example, the comparative resilience of jazz compared to other clearly visual participation categories such as art museums, ballet, craft fairs, musicals, opera, and plays. Yet even classical music has seen a decline in participation, and that form of art has competed against radio for some time. This decline in arts attendance mirrors a similar decline in movie theater revenue over time as well.

Unfortunately, these concepts do not lend themselves to easy measurement, and cannot be simply entered into a regression model. One measure of social utility, however, lends itself readily to this form of statistical analysis, and that is political preferences. In the SPPA editions from 2002, 2008, and 2012, the identity of a respondent's state is recorded. We simply match the state-level election margin (that is, the percentage of people voting for the Democratic vs. Republican candidates, with higher numbers indicating larger Democratic majorities and smaller numbers indicating more Republican voters compared to the national average).

The resulting variable, presidential margin, has an average score slightly above zero (mean is 0.0499 and median is 0.046), indicating that the SPPA data have slightly more representation from Democratic-leaning compared to than Republican-leaning states over the 2012, 2008, and 2004 (the year we use to match against the SPPA 2002 data) election cycles. By region, the average score is 16.5% (Northeast), -1.0% (Midwest), -2.5% (South), and 11.5% (West).

So how does consideration of political preferences inform our analysis of arts participation over time? **Table 15** presents regression results indicating that the coefficient on the new presidential election margin variable is highly significant in the aggregate arts measures (AP8, AP7, and AP6). Broken down by category, however, the results vary substantially for the various forms of

arts participation. Jazz and art museum attendance (and, to a lesser extent, plays) have positive and highly significant relationship with election margins. Only one form of art (classical music) has a negative coefficient, indicating that states with heavier Republican margins are more likely to have greater attendance at these kinds of events—but it is important to note that the coefficient is not statistically significant. The other forms of art (ballet, musicals, and opera) have mildly positive relationships with election margin variable, but none of them are statistically significant at the 10% level (the craft fair dummy has a slightly significant coefficient but the p-value is only 0.109).

The more interesting result, however, is that even controlling for the important social indicator of political preferences as measured by presidential election margins, the coefficients for the SPPA year dummy variables (for 2002 and 2008, with 2012 as the omitted reference category as in **Table 8**) are still positive and highly significant, with the 2002 coefficient of greater magnitude than the 2008 dummy's coefficient (for AP8, AP7, and AP6, the coefficients for 2002 and 2008 are: 0.32 and 0.07; 0.29 and 0.07; and 0.29 and 0.09). This means that arts attendance in general is declining in spite of overall political victories for the Democrats (in 2008 and 2012).

### ***E. Conclusions and Suggestions for Further Research***

Previous research using SPPA data has documented a decline in arts participation over time, at least as measured in categories such as art museums, ballet, classical music, craft fairs, jazz, musicals, opera, and plays. However, those analyses have rarely considered complex aspects of the SPPA including survey design (hence, weighting, clustering, and stratification). Our study considered these eight traditional forms of arts participation, as well as some aggregated categories (AP8, AP7, and AP6). Even using proper survey methods, we found substantial declines in arts attendance over time. Our univariate analysis in Phase 1 confirmed typical relationships with arts participation for other variables (family income, female gender, age, and region).

In Phase 2 of the research, we examined in more detail the positive relationship between income and arts participation. We found some evidence that higher income causes higher arts participation using a

“natural experiment” of many free art museums in the Washington, DC region. Conversely, we used nearest-neighbor matching techniques and treatment effects analysis to explore whether higher arts attendance in fact caused higher income and this hypothesis was confirmed in a statistically significant way.

Finally, Phase 3 of the project examined arts funding at the national level, as well as a socio-political measure of changing attitudes in various states. We found some evidence that the reduction in arts funding during the 1995/1996 budget years (where arts education budgets were slashed) led to lower values of arts participation in children who were exposed to such reductions. We also found some evidence that the magnitude of reductions was associated with larger arts participation declines between 1992 and 2002, but that result depended on omission of two outlier categories (jazz and craft fairs). In terms of socio-political results, we found that SPPA respondents located in more Democratic voting areas were more likely to attend art museums, live jazz, and (somewhat) plays, but the other art forms did not have statistically significant results.

We see two areas that could benefit especially from further research. First, although principal components analysis is not recommended for Bernoulli-distributed variables (such as the 1/0 values for the eight arts categories measures), another method such as latent class analysis could be used to concatenate the data in a different way, as opposed to our measures of simply adding up the category variables (whether all eight of them using AP8, or the alternate measures AP7 and AP6 omitting craft fairs and then jazz as well). The overall finding (reduced participation over time) would likely be robust to this type of analysis, but some nuance (with concomitant policy implications) to the factors that combine to create arts participation could be derived. Second, it would be very interesting to design an experiment where, for example, randomly chosen college graduates are assigned to treatment and control groups, with treated groups being exposed to more arts attendance and participation over time. This would be a highly valid way to confirm the results on arts participation causing greater income that we uncovered using observational methods.

## ***F. References and Bibliography***

- Ateca Amestoy V. and J. Prieto-Rodriguez, 2013, Forecasting accuracy of behavioural models for the participation in the arts, *European Journal of Operational Research*, 229: 124-131.
- Ateca-Amestoy, V. 2008. Determining heterogeneous behavior for theater attendance. *Journal of Cultural Economics*, 32(2), 127-151, doi:10.1007/s10824-008-9065-z.
- Borgonovi, Francesca and Michael O'Hare. The Impact of the National Endowment for the Arts in the United States: Institutional and Sectoral Effects on Private Funding. *Journal of Cultural Economics*, February 2004, Volume 28, Issue 1, pp 21-36.
- Brida, Juan Gabriel; Vania Statzu; Marta Meleddu; Manuela Pulina. 2012. How much time do visitors spend in a cultural site? An empirical investigation. Available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1998272](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1998272)
- Brida, Juan Gabriel; Chiara Dalle Nogare, and Raffaele Scuderi. How Often to a Museum? Motivations Matter. 2013. Free University of Bolzano-Bolzen working paper.
- Cameron, A. C. and Trivedi P.K., 1998, *Regression Analysis of Count Data*. New York: Cambridge University Press.
- Cellini R. and Cuccia T., 2013. Museum and monument attendance and tourism flow: a time series analysis approach, *Applied Economics*, vol. 45(24): 3473-3482
- Dokko, Jane. 2009. "Does the NEA Crowd Out Private Charitable Contributions to the Arts?" *National Tax Journal* Vol. 62, No. 1. March: 57-75.
- Fernandez-Blanco, V., Orea, L., & Prieto-Rodriguez, J. (2009). Analyzing consumers heterogeneity and self-reported tastes: an approach consistent with the consumer's decision making process. *Journal of Economic Psychology*, 30(4), 622-633, doi:10.1016/j.joep.2009.04.005.
- Frey, Bruno. 1999, State Support and Creativity in the Arts: Some New Considerations. *Journal of Cultural Economics*. Volume 23, Issue 1-2, pp 71-85.
- Gray, Charles. 1998. "Hope for the Future? Early Exposure to the Arts and Adult Visits to Art Museums," *Journal of Cultural Economics*, 22: 87-98.
- Lambert, Diane, 1992, Zero-Inflated Poisson Regression, with an Application to Defects in Manufacturing, *Technometrics*, 34(1):1-14
- National Endowment for the Arts. 2013. *How a Nation Engages with Art*. NEA Research Report #57
- \_\_\_\_\_. 2009. *2008 Survey of Public Participation in the Arts*. Available at: <http://arts.gov/sites/default/files/2008-SPPA.pdf>
- \_\_\_\_\_. *The Arts and Human Development: Framing a National Research Agenda for the Arts, Lifelong Learning, and Individual Well-Being*. Available at: <http://arts.gov/sites/default/files/TheArtsAndHumanDev.pdf>.

Seaman, Bruce. 2005. "Attendance and Public Participation in the Performing Arts: A Review of the Empirical Literature." Andrew Young School of Policy Studies Research Paper Series, Working paper 06-25, August.

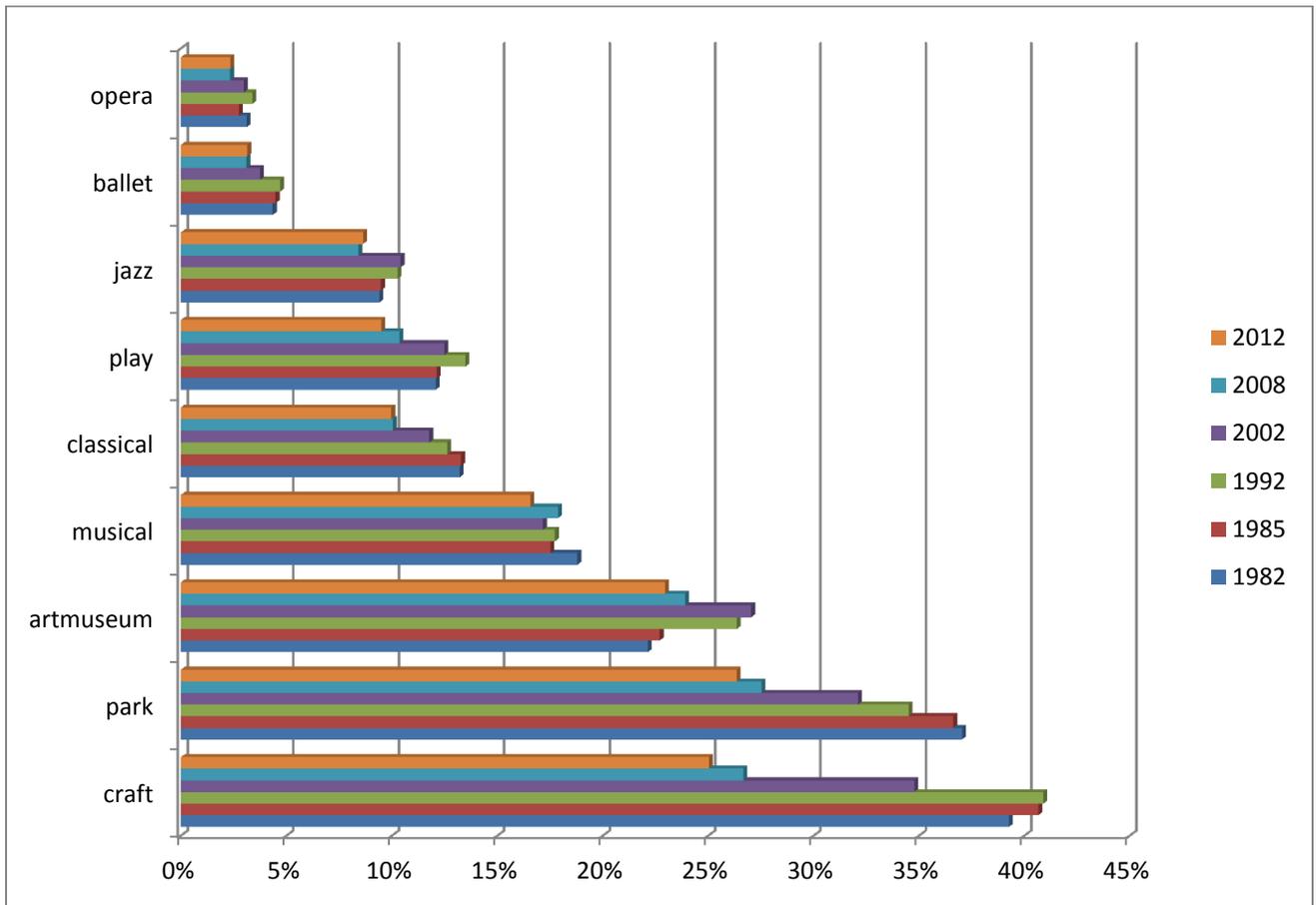
Statnews. 2012. "Interpreting Coefficients in Regression with Log-Transformed Variables" StatNews #83, available at: <https://www.cscu.cornell.edu/news/statnews/stnews83.pdf>

Tubadji, Annie, Brian J. Osoba, and Peter Nijkamp Culture-based development in the USA: culture as a factor for economic welfare and social well-being at a county level. September, 2014.

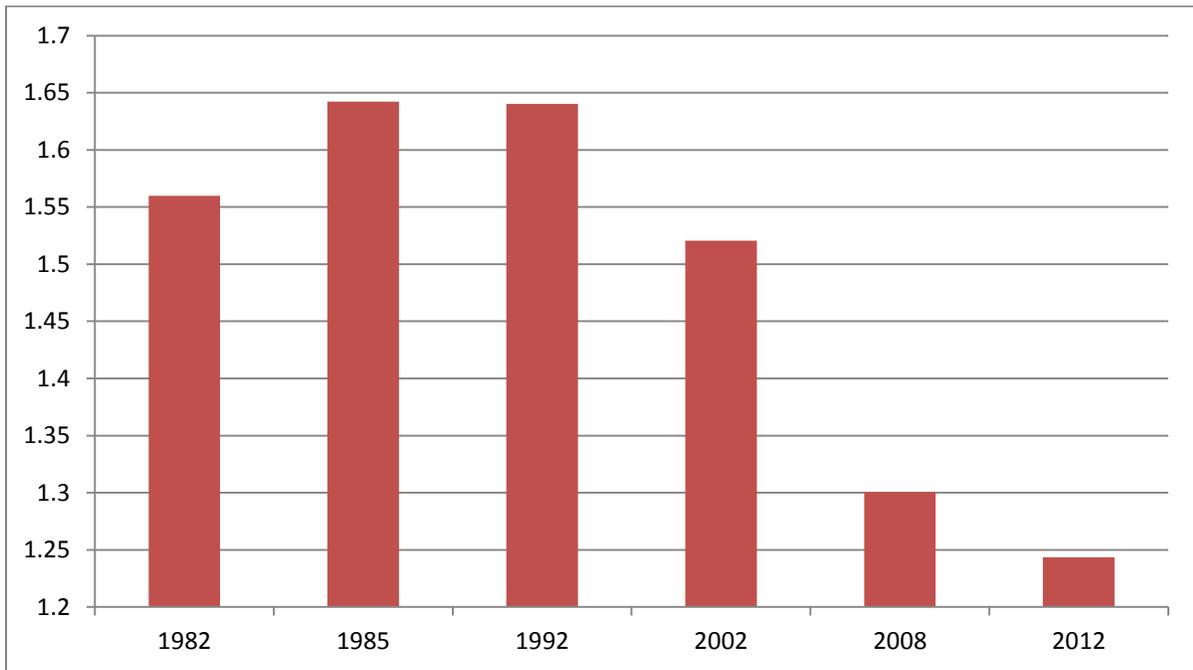
United States Department of Commerce, Census Division. FIPS Metropolitan Area Codes. Available at: [http://www.census.gov/cps/files/Geographic%20Coding%20-%20Metro%20Areas%20\(since%20August%202005\).pdf](http://www.census.gov/cps/files/Geographic%20Coding%20-%20Metro%20Areas%20(since%20August%202005).pdf)

Willis K.G., Snowball J.D., Wymer C. and Grisolia J., 2012, A Count Data Travel Cost Model of Theatre Demand using aggregate Theatre Booking Data, *Journal of Cultural Economics*, 36: 91-112

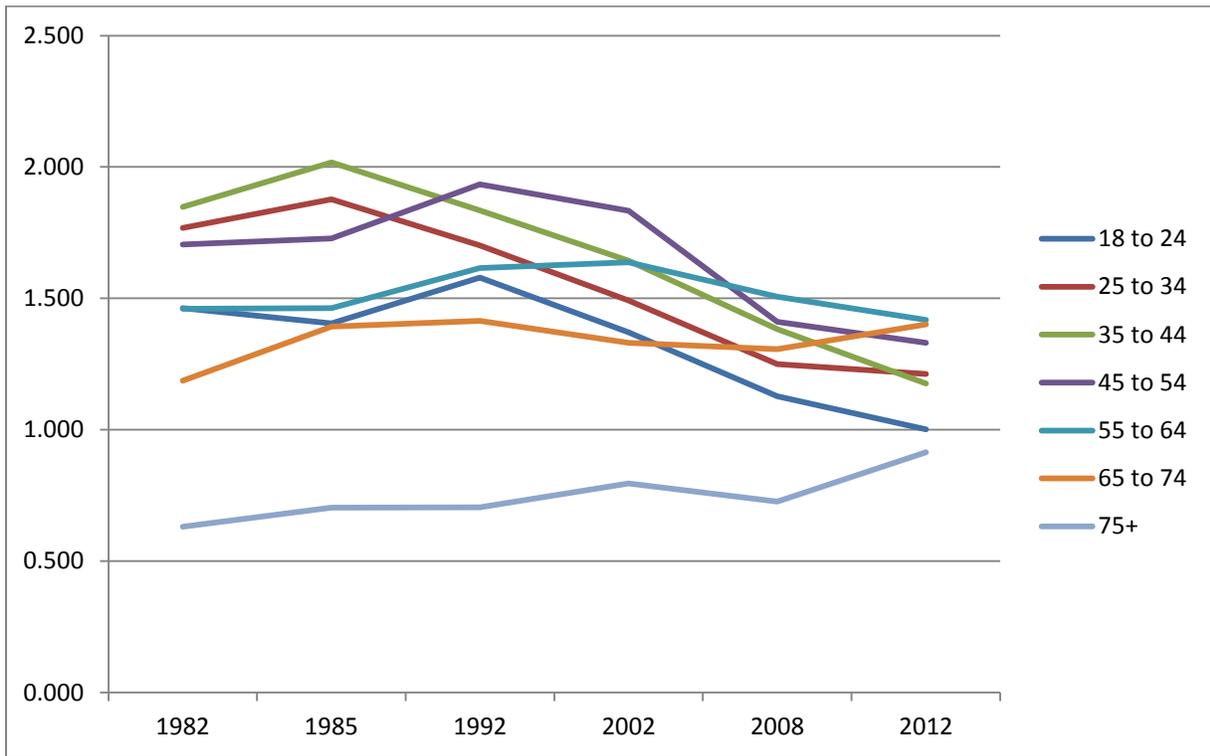
*Figure 1: Disaggregated Trends in Arts Participation (Univariate)*



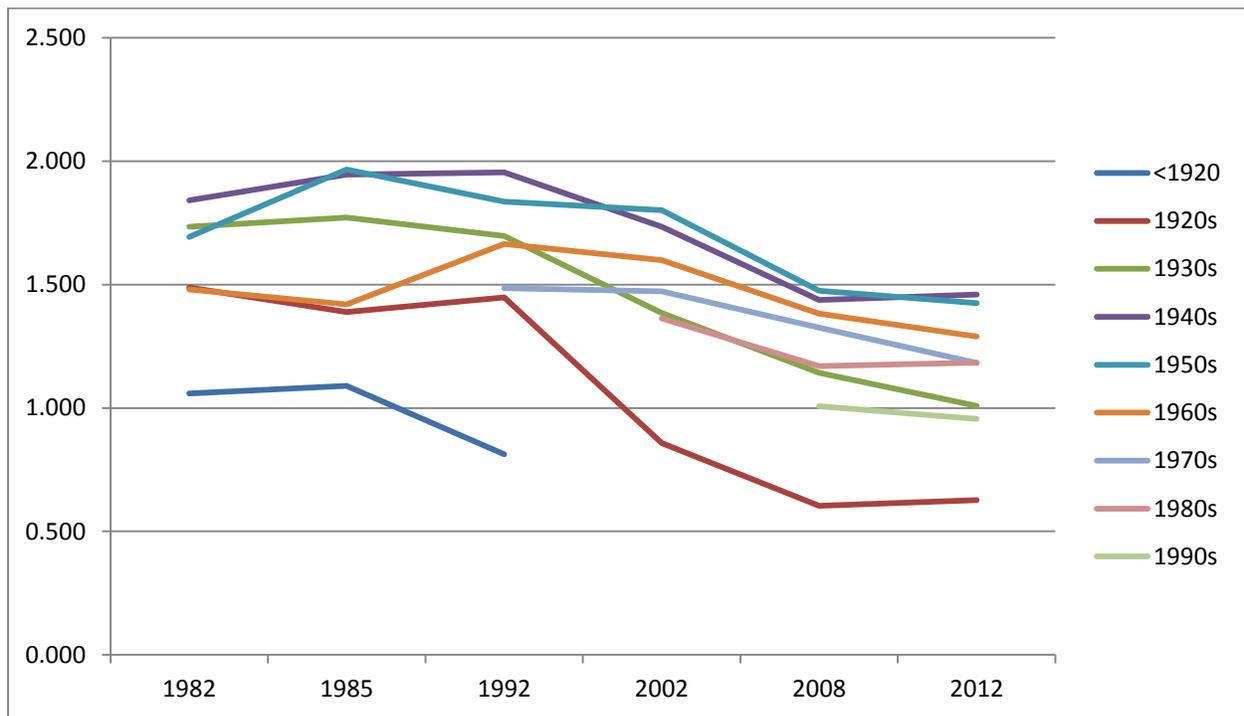
**Figure 2:** Trends in Arts Participation Over Time (Aggregated, AP8)



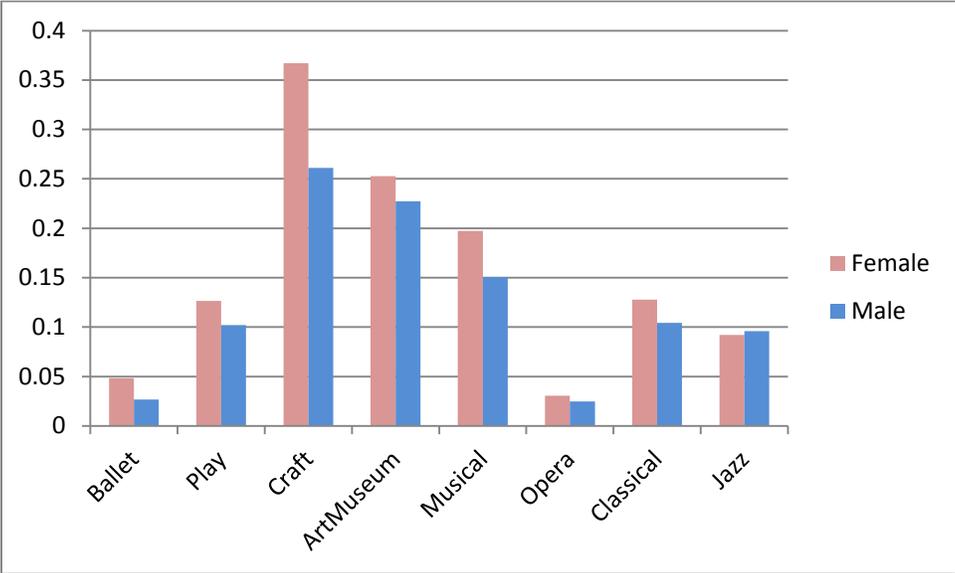
**Figure 3:** Trends in Aggregate (AP8) Arts Participation by Age of Respondent



**Figure 4:** Trends in Aggregate (AP8) Arts Participation Over Time by Generational Cohort



*Figure 5: Art Categories by Gender*



**Table 1: Univariate Results for Income**

This table shows regression results for univariate regression estimations using dependent variables as indicated. AP8 is the broader measure of arts participation (combining all 8 sub-categories included on all SPPA versions back to 1982). AP7 is AP8 but excluding craft fairs. Independent variable in all estimations is natural log of real income (assessed in 2009 dollars). Estimation is negative binomial for AP8 and AP7, logit for individual arts categories. Survey estimation (weighting and stratification) is used in all estimations.

<b>Dependent Variable</b>	<b>Income Coefficient (<i>t</i>-statistic)</b>	<b>Constant (<i>t</i>-statistic)</b>	<b>Observations</b>
<b>AP8</b>	0.476*** (43.22)	-5.046*** (-41.21)	61,305
<b>AP7</b>	0.499*** (37.85)	-5.591*** (-38.21)	83,152
<b>Art Museum</b>	0.684*** (41.99)	-8.472*** (-47.66)	83,426
<b>Ballet</b>	0.577*** (16.10)	-9.433*** (-24.02)	83,535
<b>Classical</b>	0.570*** (26.39)	-8.151*** (-34.52)	83,604
<b>Craft Fair</b>	0.464*** (26.42)	-5.754*** (-30.48)	61,252
<b>Jazz</b>	0.452*** (20.16)	-7.082*** (-28.85)	83,646
<b>Musical</b>	0.740*** (33.94)	-9.508*** (-40.03)	83,548
<b>Opera</b>	0.654*** (17.07)	-10.619*** (-25.47)	83,575
<b>Play</b>	0.630*** (29.95)	-8.827*** (-38.52)	83,505

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 2: Univariate Results for Education**

This table shows regression results for univariate regression estimations using dependent variables as indicated. AP8 is the broader measure of arts participation (combining all 8 sub-categories included on all SPPA versions back to 1982). AP7 is AP8 but excluding craft fairs. Independent variable (“highly educated”) in all estimations takes value of “1” for survey respondents who had either graduated college or had obtained an advanced graduate degree (and “0” otherwise). Estimation is negative binomial for AP8 and AP7, logit for individual arts categories. Survey estimation (weighting and stratification) is used in all estimations.

<b>Dependent Variable</b>	<b>Education Coefficient (t-statistic)</b>	<b>Constant (t-statistic)</b>	<b>Observations</b>
<b>AP8</b>	0.949*** (69.19)	-0.290*** (-96.64)	72,106
<b>AP7</b>	1.156*** (84.51)	-0.667*** (-192.70)	96,392
<b>Art Museum</b>	1.552*** (107.16)	-1.667*** (-198.23)	96,702
<b>Ballet</b>	1.412** (24.44)	-3.792*** (-83.15)	96,852
<b>Classical</b>	1.561** (31.46)	-2.639*** (-118.11)	96,949
<b>Craft Fair</b>	0.862** (22.07)	-1.082*** (-3,483.95)	72,361
<b>Jazz</b>	1.158*** (102.57)	-2.663*** (-240.93)	97,022
<b>Musical</b>	1.317** (41.64)	-2.014*** (-131.39)	96,876
<b>Opera</b>	1.634*** (172.86)	-4.253*** (-132.74)	96,920
<b>Play</b>	1.430** (44.90)	-2.594*** (-122.09)	96,820

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 3: Univariate Results for Gender**

This table shows regression results for univariate regression estimations using dependent variables as indicated. AP8 is the broader measure of arts participation (combining all 8 sub-categories included on all SPPA versions back to 1982). AP7 is AP8 but excluding craft fairs. Independent variable (“male respondent”) in all estimations takes value of “1” for survey respondents who indicated gender as male. Estimation is negative binomial for AP8 and AP7. Estimation is negative binomial for AP8 and AP7, logit for individual arts categories. Survey estimation (weighting and stratification) is used in all estimations.

<b>Dependent Variable</b>	<b>Education Coefficient (<i>t</i>-statistic)</b>	<b>Constant (<i>t</i>-statistic)</b>	<b>Observations</b>
<b>AP8</b>	-0.231*** (-26.63)	0.175*** (20.83)	72,116
<b>AP7</b>	-0.179*** (-21.20)	-0.166*** (-18.41)	96,430
<b>Art Museum</b>	-0.147*** (-11.07)	-1.18*** (-88.99)	96,741
<b>Ballet</b>	-0.604*** (-17.76)	-3.010*** (-133.67)	96,981
<b>Classical</b>	-0.222*** (-12.14)	-1.974*** (-120.79)	96,988
<b>Craft Fair</b>	-0.470*** (-28.86)	-0.619*** (-46.78)	72,371
<b>Jazz</b>	0.067*** (3.29)	-2.309*** (-122.39)	97,061
<b>Musical</b>	-0.329*** (-20.27)	-1.443*** (-107.38)	96,915
<b>Opera</b>	-0.220*** (-6.20)	-3.487*** (-120.74)	96,958
<b>Play</b>	-0.253*** (-14.25)	-1.977*** (-132.07)	96,859

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 4: Survey-Adjusted Mean Arts Participation Values by Region**

This table shows results of univariate regressions with dependent variables as indicated, with entire sample mean (median) indicated in the second column. AP8 is the broader measure of arts participation (combining all 8 sub-categories included on all SPPA versions back to 1982). AP7 is AP8 but excluding craft fairs. The sole independent variable in each estimation is a dummy taking the value of “1” for the indicated region, with t-statistic in parentheses. Survey estimation (weights and stratification) is used in all estimations. Estimation is negative binomial for AP8 and AP7, logit for individual arts categories. Unlike in Tables 1 and 2, coefficients for the constant terms (and their levels of significance) are omitted for ease of presentation.

Dependent Variable	Entire Sample Mean	Regional Univariate Results			
		Midwest	Northeast	South	West
<b>AP8</b>	1.121	0.04* (1.77)	0.075*** (3.50)	-0.263*** (-12.09)	0.214*** (11.48)
<b>AP7</b>	0.809	0.008 (0.32)	0.101*** (4.24)	-0.278*** (-11.71)	0.237*** (10.92)
<b>Art Museum</b>	0.241	-0.035 (-1.06)	0.076** (2.15)	-0.392*** (-12.80)	0.439*** (13.87)
<b>Ballet</b>	0.039	-0.238** (-2.55)	0.126 (1.63)	-0.137** (-2.11)	0.264*** (3.39)
<b>Classical</b>	0.117	0.011 (0.19)	0.022 (0.46)	-0.248*** (-5.10)	0.271*** (6.24)
<b>Craft Fair</b>	0.319	0.164*** (4.70)	0.010 (0.27)	-0.302*** (-8.84)	0.210*** (6.65)
<b>Jazz</b>	0.094	0.009 (0.20)	0.021 (0.43)	-0.195*** (-3.59)	0.212*** (4.93)
<b>Musical</b>	0.176	0.114*** (2.98)	0.270*** (6.53)	-0.375*** (-9.87)	0.112* (2.85)
<b>Opera</b>	0.028	-0.230** (-2.39)	0.232** (2.44)	-0.438*** (-5.41)	0.478*** (6.39)
<b>Play</b>	0.115	0.070* (1.69)	0.151*** (3.56)	-0.369*** (-9.32)	0.246*** (5.20)

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 5: Multivariate Baseline Model (excluding region)**

This table presents results of multivariate models with dependent variables AP8 (sum of all 8 categories of arts participation) and AP 7 (as AP8 but excluding craft fairs). Independent variables are income (log of inflation-adjusted income), highly educated (taking value of “1” for college graduates and those with advanced degrees), age (taking value of “1” for individuals age 55 or greater), ethnic dummy variables (omitted category is “white”), survey year dummies (omitted category is most recent survey year, 2012). T-statistics in parentheses; both columns result of negative binomial survey estimation accounting for weighting and survey stratification).

<b>Dependent Variable→</b>	<b>AP8</b>	<b>AP7</b>
<b>Male</b>	-0.327*** (-31.82)	-0.299*** (-28.36)
<b>Income</b>	0.355*** (29.94)	0.359*** (27.35)
<b>Highly Educated</b>	0.827*** (63.32)	1.106*** (81.33)
<b>Age &gt;55</b>	-0.011 (-0.66)	-0.045** (-2.55)
<b>Black (only)</b>	-0.286*** (-9.59)	-0.213*** (-7.98)
<b>Native American/Alaskan (only)</b>	-0.095 (-1.05)	-0.206* (-1.71)
<b>Asian/Hawaiian/Pacific Islander (only)</b>	-0.405*** (-7.95)	-0.327*** (-6.34)
<b>Other/multi</b>	-0.040 (-0.47)	-0.185** (-2.36)
<b>SPPA-1982</b>	0.515*** (15.86)	0.467*** (17.00)
<b>SPPA-1985</b>	0.506*** (11.65)	0.399*** (12.67)
<b>SPPA-1992</b>	0.525*** (20.45)	0.436*** (14.58)
<b>SPPA-2002</b>	0.344*** (13.33)	0.302*** (9.97)
<b>SPPA-2008</b>	0.082*** (3.30)	0.076*** (2.67)
<b>Constant</b>	-4.112*** (-30.85)	-4.555*** (-30.33)
<b>Observations</b>	61,032	83,134
<b>F-statistic (p-value)</b>	545.44*** (0.000)	842.10*** (0.000)

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 6: Regional/Recent Analysis**

This table presents results of multivariate models with dependent variable AP8 (sum of all 8 categories of arts participation). Independent variables are income (natural log of inflation-adjusted income), highly educated (taking value of “1” for college graduates and those with advanced degrees), age (taking value of “1” for individuals age 55 or greater), ethnic dummy variables (omitted category is “white”), survey year dummies (omitted category is most recent survey year, 2012). T-statistics in parentheses; both columns use negative binomial survey estimation accounting for weighting and survey stratification).

<b>Independent Variable</b>	<b>Coefficient (T-statistic)</b>
<b>Male</b>	-0.323*** (-23.30)
<b>Income</b>	0.327*** (22.08)
<b>Highly Educated</b>	0.820*** (51.31)
<b>Age &gt;55</b>	0.002 (0.009)
<b>Black (only)</b>	-0.298*** (-8.25)
<b>Hispanic</b>	-0.422*** (-12.60)
<b>Native American/Alaskan (only)</b>	-0.160 † (-1.46)
<b>Asian/Hawaiian/Pacific Islander (only)</b>	-0.501*** (-8.38)
<b>Other/multi</b>	-0.009 (-0.10)
<b>Midwest</b>	0.157*** (5.56)
<b>Northeast</b>	0.120*** (4.01)
<b>West</b>	0.314*** (11.68)
<b>SPPA-2002</b>	0.333*** (12.88)
<b>SPPA-2008</b>	0.072*** (3.06)
<b>Constant</b>	-3.902*** (-24.29)
<b>Observations</b>	43,503
<b>F-statistic (p-value)</b>	327.23*** (0.000)

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Table 7: Arts Categories Baseline**

This table presents results of multivariate models with dependent variables AP8 (sum of all 8 categories of arts participation) and AP 7 (as AP8 but excluding craft fairs). Independent variables are income (natural log of inflation-adjusted income), highly educated (taking value of “1” for college graduates and those with advanced degrees), age (taking value of “1” for individuals age 55 or greater), ethnic dummy variables (omitted category is “white”), survey year dummies (omitted category is most recent survey year, 2012). T-statistics in parentheses; all estimations use logit survey technique accounting for weighting and survey stratification).

<b>Dependent Variable→</b>	<b>Art Museum</b>	<b>Ballet</b>	<b>Classical</b>	<b>Craft Fair</b>	<b>Jazz</b>	<b>Musical</b>	<b>Opera</b>	<b>Play</b>
<b>Male</b>	-0.309*** (-18.68)	-0.761*** (-21.45)	-0.382*** (-18.98)	-0.612*** (-31.52)	-0.031 (-1.34)	-0.492*** (-25.48)	-0.383*** (-10.64)	-0.402*** (-18.80)
<b>Income</b>	0.433*** (24.09)	0.391*** (9.52)	0.365*** (16.99)	0.415*** (21.10)	0.294*** (11.42)	0.595*** (24.15)	0.412*** (8.66)	0.450*** (18.30)
<b>Highly Educated</b>	1.358*** (59.07)	1.310*** (25.13)	1.489*** (47.67)	0.723*** (27.01)	1.057*** (34.13)	1.091*** (43.24)	1.509*** (30.37)	1.297*** (44.07)
<b>Age &gt;55</b>	-0.194*** (-7.57)	-0.007 (-0.13)	0.355*** (10.83)	-0.154*** (-6.54)	-0.493*** (-12.86)	0.094*** (3.68)	0.406*** (6.30)	0.111*** (3.48)
<b>Black (only)</b>	-0.510*** (-11.72)	-0.508*** (-5.18)	-0.588*** (-8.86)	-0.720*** (-13.98)	0.625*** (11.88)	-0.314*** (-6.51)	-0.488*** (-4.17)	-0.293*** (-5.92)
<b>Native American/ Alaskan (only)</b>	-0.068 (-0.49)	-1.855*** (-3.44)	-0.151 (-0.65)	0.119 (0.97)	-0.322 (-1.34)	-0.428*** (-2.45)	0.143 (0.36)	-0.158 (-0.68)
<b>Asian/Hawaiian/ Pacific Islander (only)</b>	-0.201*** (-3.13)	-0.530*** (-3.54)	-0.357*** (-3.18)	-0.914*** (-12.60)	-0.647*** (-5.60)	-0.718*** (-7.53)	-0.208 (-1.27)	-0.763*** (-6.71)
<b>Other/multi</b>	-0.105 (-1.02)	0.394 (-1.63)	-0.478*** (-3.11)	0.084 (0.62)	-0.056 (-0.31)	-0.396*** (-3.05)	-0.006 (-0.02)	-0.620*** (-3.63)
<b>SPPA-1982</b>	0.385*** (10.01)	0.796*** (8.39)	0.853*** (15.79)	1.074*** (21.55)	0.382*** (6.88)	0.634*** (13.27)	0.763*** (7.28)	0.764*** (11.97)
<b>SPPA-1985</b>	0.362*** (8.38)	0.822*** (9.76)	0.805*** (14.55)	1.066*** (16.30)	0.355*** (5.23)	0.442*** (8.53)	0.624*** (6.22)	0.687*** (10.48)
<b>SPPA-1992</b>	0.517*** (12.37)	0.775*** (8.44)	0.641*** (9.65)	1.080*** (39.38)	0.383*** (5.90)	0.399*** (8.65)	0.717*** (6.64)	0.750*** (12.04)
<b>SPPA-2002</b>	0.410*** (10.60)	0.477*** (5.03)	0.451*** (8.09)	0.658*** (18.68)	0.324*** (5.27)	0.243*** (4.61)	0.543*** (6.65)	0.523*** (8.80)
<b>SPPA-2008</b>	0.120*** (3.16)	0.099 (1.06)	0.105 (1.53)	0.130*** (3.00)	-0.029 (-0.46)	0.189*** (4.02)	0.033 (0.28)	0.153** (2.36)
<b>Constant</b>	-6.251*** (-30.87)	-8.075*** (-16.97)	-6.863*** (-29.85)	-5.550*** (-26.11)	-5.198*** (-20.63)	-8.375*** (-30.37)	-9.015*** (-16.57)	-7.639*** (-27.11)
<b>Observations</b>	83,408	83,517	83,586	61,249	83,628	83,530	83,557	83,487
<b>F-statistic (p-value)</b>	508.16*** (0.000)	98.58*** (0.000)	286.66*** (0.000)	233.65*** (0.000)	154.71*** (0.000)	325.89*** (0.000)	127.78*** (0.000)	285.62*** (0.000)

Note: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 8: Arts Categories (Regional/Recent Analysis)**

This table presents results of multivariate models with dependent variables AP8 (sum of all 8 categories of arts participation) and AP 7 (as AP8 but excluding craft fairs). Independent variables are income (natural log of inflation-adjusted income), highly educated (taking value of “1” for college graduates and those with advanced degrees), age (taking value of “1” for individuals age 55 or greater), ethnic dummy variables (omitted category is “white”), regional dummies (omitted category is South), survey year dummies (omitted category is most recent survey year, 2012). T-statistics in parentheses; all estimations use logit survey technique accounting for weighting and survey stratification).

<b>Dependent Variable→</b>	<b>Art Museum</b>	<b>Ballet</b>	<b>Classical</b>	<b>Craft Fair</b>	<b>Jazz</b>	<b>Musical</b>	<b>Opera</b>	<b>Play</b>
<b>Male</b>	-0.322*** (-13.24)	-0.670*** (-12.12)	-0.293*** (-9.58)	-0.594*** (-22.97)	-0.093*** (-2.73)	-0.488*** (-17.35)	-0.391*** (-6.46)	-0.403*** (-12.82)
<b>Income</b>	0.436*** (18.10)	0.372*** (7.22)	0.347*** (10.40)	0.362*** (14.35)	0.339*** (8.75)	0.558*** (16.91)	0.329*** (5.40)	0.426*** (13.03)
<b>Highly Educated</b>	1.230*** (39.75)	1.191*** (15.24)	1.365*** (28.34)	0.676 (20.13)	0.980*** (20.76)	1.006*** (27.38)	1.500*** (18.68)	1.141*** (30.18)
<b>Age &gt;55</b>	-0.109*** (-3.23)	0.041 (0.51)	0.480*** (10.44)	-0.082*** (-2.71)	-0.183*** (-3.97)	0.130*** (3.96)	0.426*** (4.56)	0.159*** (3.76)
<b>Black (only)</b>	-0.498*** (-7.34)	-0.519*** (-3.29)	-0.710*** (-6.90)	-0.610*** (-9.33)	0.526*** (5.90)	-0.301*** (-3.95)	-0.545*** (-2.52)	-0.277*** (-3.83)
<b>Hispanic</b>	-0.320*** (-5.86)	-0.411*** (-2.40)	-0.650*** (-8.21)	-0.527*** (-9.04)	-0.431*** (-4.92)	-0.579*** (-6.91)	-0.341*** (-2.27)	-0.544*** (-5.72)
<b>Native American/ Alaskan (only)</b>	-0.256 (-1.40)	-1.974*** (-3.17)	-0.081 (-0.30)	0.107 (0.71)	-0.304 (-1.19)	-0.431* (-1.94)	0.048 (0.10)	-0.376 † (-0.47)
<b>Asian/Hawaiian/ Pacific Islnd. (only)</b>	-0.364*** (-4.43)	-0.902*** (-4.04)	-0.537*** (-3.82)	-0.965*** (-11.62)	-0.769*** (-7.01)	-0.796*** (-7.01)	-0.546*** (-2.57)	-0.875*** (-6.81)
<b>Other/multi</b>	-0.214 (-1.44)	-0.189 (-0.47)	-0.160 (-0.66)	0.185 (1.20)	0.239 (1.15)	-0.016 (-0.09)	0.462 (1.28)	-0.423* (-1.87)
<b>Midwest</b>	0.174*** (3.75)	-0.190 † (-1.65)	0.059 (0.83)	0.232*** (4.89)	0.154** (2.31)	0.282*** (5.76)	0.092 (0.70)	0.251*** (4.53)
<b>Northeast</b>	0.142*** (2.79)	0.002 (0.02)	-0.083 (-1.15)	0.083 † (1.57)	0.067 (-0.85)	0.298*** (5.42)	0.331** (2.61)	0.213*** (3.78)
<b>West</b>	0.542*** (11.93)	0.180* (1.88)	0.273*** (4.13)	0.329*** (7.24)	0.378*** (5.17)	0.314*** (0.32)	0.611*** (6.14)	0.423*** (6.66)
<b>SPPA-2002</b>	0.402*** (10.31)	0.464*** (4.88)	0.444*** (7.89)	0.641*** (18.50)	0.342*** (5.48)	0.227*** (4.28)	0.537*** (6.67)	0.502*** (8.59)
<b>SPPA-2008</b>	0.126*** (3.06)	0.098 (1.05)	0.107 † (1.57)	0.130*** (2.98)	-0.028 (-0.44)	0.188*** (4.05)	0.036 (0.30)	0.150** (2.33)
<b>Constant</b>	-6.438*** (-24.26)	-7.794*** (-13.21)	-6.678*** (-19.29)	-5.070*** (-19.09)	-6.509*** (-14.98)	-8.089*** (-22.62)	-8.303*** (-12.00)	-7.447*** (-20.82)
<b>Observations</b>	43,690	43,796	43,854	43,656	43,929	43,807	43,850	43,778
<b>F-statistic (p-value)</b>	248.83*** (0.000)	43.23*** (0.000)	124.53*** (0.000)	125.00*** (0.000)	66.01*** (0.000)	137.54*** (0.000)	45.13*** (0.000)	122.09*** (0.000)

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Figure 6:** Arts Category Attendance Decline and Participant Age

	<b>Recent rapid decline (2008 vs. 2012)</b>	<b>Little or no recent decline (2008 vs. 2012)</b>
<b>Participants are <i>less</i> likely to be 55 years of age and older</b>	Art museum Craft fair	Jazz Ballet
<b>Participants are <i>more</i> likely to be 55 years of age and older</b>	Musicals Plays	Classical music Opera

**Table 9: Interactive Findings for Income**

This table reports results of re-estimations of models from Tables 7 and 8, but including interactive terms with income.

**Panel A: Temporal Variation (Table 7 re-estimation)**

Interactive Term	A8	A7	Art Museum	Ballet	Classical	Craft Fair	Jazz	Musical	Opera	Play
Income*1982	0.003	0.024	0.020	0.133	0.024	0.128*	-0.194***	0.141**	0.146	0.219***
Income*1985	0.083 †	0.007	0.007	0.182	0.057	0.266***	-0.052	0.092	0.136	0.142*
Income*1992	0.052*	0.080**	0.079*	0.226**	0.117*	0.155***	0.089	0.155**	0.270**	0.108*
Income*2002	0.042	0.066*	0.098*	0.194*	0.013	0.089**	0.120 †	0.108 †	0.090	0.201***
Income*2008	0.076**	0.091***	0.109**	0.235*	0.054	0.048	0.023	0.173***	0.172	0.130*

**Panel B: Regional Variation (Table 8 re-estimation)**

Interactive Term	A8	A7	Art Mueum	Ballet	Classical	Craft Fair	Jazz	Musical	Opera	Play
Income*Midwest	-0.092***	-0.109***	-0.197***	-0.001	-0.073	-0.040	-0.049	-0.111 †	0.023	-0.076
Income*Northeast	-0.150***	-0.140***	-0.176**	-0.129	-0.140 †	-0.235***	-0.131 †	-0.138*	-0.315*	0.026
Income*West	-0.174***	-0.200***	-0.247***	-0.148	-0.111 †	-0.131***	-0.090	-0.236***	-0.288*	-0.088

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Table 10: Average Treatment Effects of DC Residence on Various Arts Categories**

<b>Arts Category</b>	<b>Coefficient (z-statistic)</b>	<b>Observations</b>
Art museum	0.099*** (3.95)	28,364
Ballet	0.006 (0.58)	28,452
Classical music	0.032* (1.77)	28,513
Craft fair	0.013* (0.47)	28,328
Jazz	0.050*** (2.69)	28,588
Musical	0.053** (2.28)	28,467
Opera	0.028** (2.52)	28,503
Play	0.068*** (3.48)	28,438

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Table 11: Average Treatment Effects of DC Residence on Various Arts Categories,  
Including Metro Status**

Arts Category	Coefficient (z-statistic)	Observations
Art museum	0.091*** (3.97)	28,364
Ballet	0.03 (0.41)	28,452
Classical music	0.015 (1.05)	28,513
Craft fair	0.036 (1.43)	28,328
Jazz	0.039** (2.34)	28,588
Musical	0.032* (1.80)	28,467
Opera	0.019** (1.98)	28,503
Play	0.015*** (2.56)	28,438

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

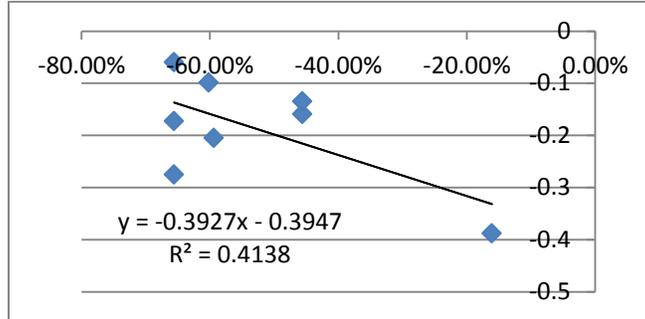
**Table 12. Extent of Budget Cuts and SPPA Participation Categories, 1992 – 2002**

<b>Funding Category</b>	<b>Budget cut</b>	<b>SPPA Category</b>	<b>Change, 92-02</b>
Dance	-65.60%	Ballet	-0.275*** (-3.36)
Folk /Traditional Arts	-16.10%	Craft Fairs	-0.388*** (-12.97)
Museums	-60.20%	Art Museums	-0.099** (-2.54)
Music	-65.60%	Classical	-0.173*** (-3.29)
		Jazz	-0.060 (-1.11)
Opera/Musical Theater	-45.60%	Opera	-0.159* (-1.74)
		Musicals	-0.135*** (-3.38)
Theater	-59.40%	Plays	-0.205*** (-3.86)

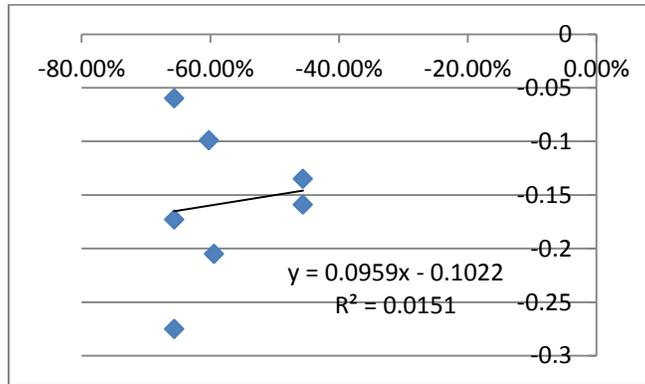
Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Figure 7: Scatterplots of Budget Cut Categories vs. SPPA Participation, 1992 – 2002**

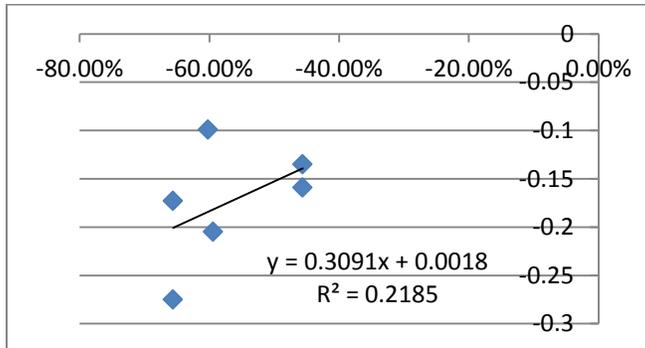
**Panel A:** All Eight Arts Categories (AP8 components)



**Panel B:** Seven Full Arts Categories (AP7 components)



**Panel C:** Six Most Consistent Arts Categories (AP6 components)



**Table 13. Youth Participation in Arts, 1992 vs. 2002**

This table shows logit regression results (coefficient on 1992 dummy) for specifications using AP7, AP8, and individual arts category participation as the dependent variables, as indicated. Control variables include log of real income, highly educated status, age dummy (taking the value of “1” for anyone age 55 or older), ethnic dummy variables (black only, American indian/Alaskan native only, asian/Pacific islander only, Hispanic), and survey year dummies (for 1992, 2008, and 2012 meaning 2002 is the omitted category). Note use of survey is not allowed for split sample estimation so these results do not control for weighting or stratification or clustering;  $\chi^2$ -statistics in parentheses.

Dependent Variable	Coefficient on 1992 Dummy when sample is 18-24 years old only	Coefficient on 1992 Dummy when sample is all other age groups (25+)
Art Museum	0.137 † (1.52)	0.031 † (1.62)
Ballet	0.464** (2.37)	0.303** (4.66)
Classical Music	0.080 (0.60)	0.209*** (5.08)
Craft Fairs	0.263*** (3.19)	0.367*** (13.13)
Jazz	0.121 (0.99)	0.035 (0.78)
Musicals	-0.046 (-0.42)	0.184*** (5.14)
Opera	0.120 (0.49)	0.280*** (3.75)
Plays	0.072 (0.61)	0.204*** (5.07)
AP8	0.116** (2.10)	0.158*** (9.46)
AP7 (AP8 – craft fairs)	0.096 † (1.50)	0.123 *** (6.18)
AP6 (AP7 – jazz)	0.090 (1.40)	0.135*** (6.80)

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Table 14: Treatment Effects Results for Age Cohorts (before/after 1982 birth year)**

This table contains estimated treatment effects with treatment dummy variable taking the value of “1” for anyone born after 1982. Treated observations were matched with control observations on region, gender, natural log of real income, highly educated status, urban location, ethnic dummy variables (black only, American indian/Alaskan native only, asian/Pacific islander only, Hispanic), and two survey year dummies (2008 and 2012).

<b>Dependent Variable</b>	<b>Estimated Treatment Effect (z-statistic)</b>
Art Museum	-0.074** (-2.63)
Ballet	-0.083*** (-2.60)
Classical Music	-0.028*** (-3.59)
Craft Fairs	0.007 (0.39)
Jazz	0.033** (2.17)
Musicals	0.020 (1.10)
Opera	0.004 (0.75)
Plays	0.012 (0.86)
AP8	0.142** (2.07)
AP7 (AP8 – craft fairs)	0.136** (2.11)
AP6 (AP7 – jazz)	0.101* (1.86)

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.

**Table 15: State-Level Political Results**

This table presents results of survey logit regression analysis replicating Table 8 (for the individual arts categories), but with additional variable “Margin” which is the margin of voting (higher numbers mean more heavily democratic margin). In addition, negative binomial regression is used for variables AP8, AP7, and AP6. In all models, controls include male gender, natural log of real family income, higher education dummy, age dummy (55 or older), ethnic dummies (including Hispanic), regional dummies (omitting South), and year dummies for 2002 and 2008 (so that 2012 is the reference category).

<b>Dependent Variable</b>	<b>Coefficient on Presidential Margin (<i>t</i>-statistic)</b>
Art Museum	0.210*** (3.36)
Ballet	0.126 (0.90)
Classical Music	-0.004 (-0.04)
Craft Fairs	0.112 † (1.62)
Jazz	0.239*** (2.88)
Musicals	0.014 (0.18)
Opera	0.098 (0.61)
Plays	0.180* (1.83)
AP8	0.109*** (2.94)
AP7 (AP8 – craft fairs)	0.122*** (2.68)
AP6 (AP7 – jazz)	0.100** (2.15)

Note: \*\*\*, \*\*, \* and † indicate significance at the 1%, 5%, 10%, and 15% levels, respectively.