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A Quantitative Analysis of Entertainment Consumption: 1984-2009

Stuart J. Fowler

Middle Tennessee State University

Jennifer J. Fowler

Belmont University

Introduction

Entertainment, as defined by Merriam Webster (1967), is “the act of diverting, amusing, or causing someone’s time to pass agreeably.” In its simplest form, entertainment relates to leisure. If American consumers spend about twenty-five percent of their time working, then seventy-five percent of the time is spent in leisure—sleeping, watching television, participating in sports—suggesting their consumption on entertainment is nontrivial. Indeed, government data indicate that it is a large sector of our economy. According to the Bureau of Economic Analysis (2011), real personal consumption expenditures on recreational goods and services¹ in 2009 totaled \$711.1 billion or 5.5 percent of U.S. real gross domestic product. Unfortunately, there is a dearth of information on the quantitative nature of entertainment consumption. Previous research tends to focus on firm rather than consumer behavior with regard to the entertainment sector (Fort 2010, Vogel 2011). Additionally, while a large amount of research has been undertaken with respect to household resource allocation in general (e.g., Attanasio and Borella 2006, Bonke and Browning 2009, Charles and Stephens 2006, Gowrisankaran and Rysman 2009) little is known about how U.S. households allocate resources to the differing components of entertainment consumption. Therefore, the purpose of this paper is to quantitatively document the structure of entertainment consumption in the United States over time. Naturally, entertainment industry practitioners will find the results useful, and because entertainment courses are being offered at greater frequencies across universities in the United States and abroad, educators will find the results of this research applicable to the classroom.

To fulfill the paper’s purpose, the quantitative structure of entertainment consumption is decomposed along three dimensions. First, the data are analyzed to extract their trending components. Presumably, trends in entertainment consumption are important since households have signifi-

cantly changed the choice of mediums to receive the consumption over time.² Specifically, to analyze the trends and identify the areas of most change, regression analysis of trends in entertainment consumption will be utilized. Next, we extract the cyclical properties of the data. The cyclical component of entertainment consumption illustrates how consumer spending fluctuates over the business cycle. The cyclical patterns of total entertainment spending and its components will be analyzed using correlation analysis relative to total household income and unemployment in order to determine the volatility and direction of entertainment consumption. Finally, the data are analyzed in order to describe the impact of demographics on entertainment demand. This enables a better understanding of the underlying determinants of household demand. More formally, a cross-sectional demand model will be used to analyze the impact of demographics on entertainment demand.

In this study, the authors use the Bureau of Labor Statistics' (BLS) Consumer Expenditure Survey (CES) data set for the period 1984-2009. This unique survey extends across a time period that enables estimation of long run and cyclical trends and is detailed enough to provide demographic properties. Additionally, the comprehensive nature of the CES allows us to categorize entertainment consumption as spending on (1) home video, (2) home audio, (3) publishing, (4) toys and games, (5) sports and recreation, (6) film, performing arts, and culture tickets, (7) gaming and wagering, and (8) photography. The data set is also augmented with the BLS average U.S. regional unemployment rates and the BLS regional Consumer Price Indices—used to proxy business cycle effects³ and correct for inflation, respectively.

The remainder of the paper is organized into the following sections. The second section describes the data employed in the paper followed by section three that provides an analysis of the trends in entertainment consumption. The cyclical properties are discussed in the fourth section, followed by the cross-sectional analysis in the fifth. The final section offers our conclusions.

The Data

To develop and estimate entertainment consumption, its components, and subsequent changes over time, a variety of data sources are utilized. First, and foremost, the Consumer Expenditure Survey is utilized to gather spending and demographic data on households. The CES has the best

available data on household consumption. Approximately 5,500 households are interviewed quarterly across the United States. Each household remains in the survey for four consecutive quarters after which they are rotated out and replaced by a new household—referred to as a rotating panel. The data used span a 26-year time frame covering the periods 1984:1-2009:4. After adjusting the data set for households that did not participate for one full year and accounting for discrepancies in household identification numbers, the total number of quarterly observations used in this study is 423,284 implying that 105,821 households participated over the 26-year period or approximately 4,100 households per quarter. To augment the CES data, the BLS average U.S. regional unemployment rates are used to proxy business cycle effects. Finally, the BLS's regional Consumer Price Index (CPI)—All Urban Consumers 1982-1984 base year—is used to deflate all dollar denominated data. Because the CPI is an index based upon a set time period (base year), we are able to compare dollar amounts over time once we divide dollar denominated spending by the CPI in each period. This is known as deflating because it takes out the effects of inflation and is labeled as “real” spending or income.

For purposes of the CES, the BLS separates entertainment into the following four major categories based upon universal classification codes (UCCs): (1) fees and admissions, (2) television, radio, and sound equipment, (3) pets, toys, hobbies, and playground equipment, and (4) other entertainment equipment and services. Additionally, they include reading under the main heading of other expenditures. For purposes of this research, we categorize entertainment consumption and its components using the UCCs to include: (1) home video, (2) home audio, (3) publishing, (4) toys and games, (5) sports and recreation, (6) film, performing arts, and culture tickets, (7) gaming and wagering, and (8) photography. These categories closely follow the major areas of previous entertainment research (Vogel 2011). As such, the BLS measure of total entertainment spending will necessarily be different from our measure of total entertainment spending since we do not use all of the underlying components such as pets, veterinarian services, and recreational vehicles. Entertainment spending components are further broken down, where able, into sub-components. For example, home video consists of home video equipment, home video movies, DVDs, and home video online. The online sub-components and the gaming and wagering component are new⁴ relative to the entire data set and as such will provide only limited information at this time. Table 1

provides selected household summary statistics of the data.

The Key Demographic Data section of Table 1 indicates that the average reference person in the CES (i.e., head of the household) is typically a white male who is 50 years old, married, and has at least some college education. While he typically resides in the East (29.7%), the regions are nearly equally distributed with the South region interviewing 27.6 percent, the Midwest region 22.5 percent, and the West region following with 21.2 percent. The average household size is 2.6 people and the annual nominal household income is nearly \$40,000. With respect to real spending, Figure 1 identifies how the typical household in the CES allocates its quarterly entertainment consumption. The two largest components make up approximately 60 percent of the total mean spending of \$255.94 per quarter. Specifically, the largest component, home video, makes up 30.6 percent of the real entertainment spending or \$78 per quarter.

When we further divide the home video category into subcomponents—returning to Table 1, it can be seen that the majority of the real spending is occurring in home video equipment with \$69 of the \$78 going to this subcomponent. Sports and recreation is the second largest component accounting for 27 percent of the real spending or \$69. Participation fees are the largest subcomponent of sports and recreation accounting for \$29 followed by memberships with nearly \$17 of the \$69 going towards this subcomponent. Table 1 also shows that real consumption on magazines and newspapers is the largest component of publishing accounting for \$16 of the \$26 spent. Finally, note that film, performing arts, and culture tickets, gaming and wagering, and photography do not have any subcomponents.

Trends in Entertainment Consumption

Given that spending on entertainment makes up a large part of our economy, 5.5 percent of real GDP or \$711 billion (BEA 2011), it is important to consider the trends that are taking place over time. The growth of entertainment to total spending is one way to evaluate the trends of this sector of our economy. Figure 2 illustrates the percentage of entertainment consumption to total consumption and its corresponding trend line. The trend line is the predicted value of a regression analysis of time on the variable plotted. The estimated regression coefficient of time represents the quarterly growth of the variable. Note that the data for this section are seasonalized using the U.S. Bureau of the Census X-11 adjustment

method. The purpose of this adjustment is to eliminate the quarterly season fluctuations that might obscure any trends.

As a percentage of total consumption, quarterly entertainment consumption has fallen by roughly one basis point over time as indicated by

Key Demographic Data:	Mean		
Reference Person Average Age	50.6 years		
Average Size of Household	2.6 members		
Reference Person Male	57.3%		
Reference Person Married	58.9%		
Reference Person Some College	25.6%		
Reference Person College Grad	26.5%		
Reference Person White	84.8%		
Midwest Region	22.5%		
South Region	27.6%		
West Region	21.2%		
Quarterly Income & Consumption	Nominal	Real	Percent
Income	9,887.78	5,868.05	
Total Consumption	3,115.91	1,905.45	
Total Entertainment Consumption	416.17	255.94	100.0%
Home Video	131.08	78.39	30.6%
Equipment	116.24	69.36	27.1
Movies, DVDs,	14.79	9.01	3.5
Online	0.05	0.02	0.0
Home Audio	20.35	13.12	5.1%
Equipment	10.64	7.01	2.7
Music	9.50	6.01	2.4
Online	0.21	0.10	0.0
Publishing	40.31	26.13	10.2%
Books	15.08	9.52	3.7
Magazines & Newspapers	25.23	16.61	6.5
Toys & Games	51.80	32.63	12.7%
Equipment	51.71	32.59	12.7
Online	0.09	0.04	0.0
Sports & Recreation	113.07	69.64	27.2%
Equipment	12.08	7.66	3.0
Memberships	27.13	16.78	6.6
Participation Fees	47.88	29.09	11.4
Tickets	13.29	8.28	3.2
Other Sports & Recreation	12.69	7.83	3.0
Film, Performing Arts & Culture Tickets	33.42	20.31	8.0%
Gaming & Wagering	6.22	3.20	1.3%
Photography	19.93	12.52	4.9%

Table 1. Household summary statistics of the CES.

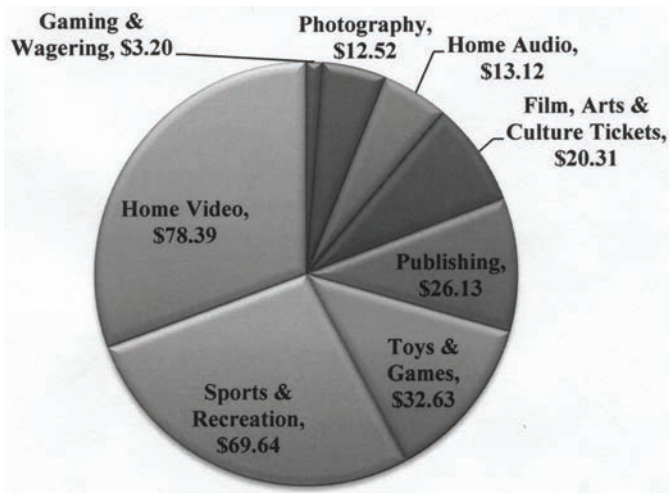


Figure 1. Quarterly real family entertainment consumption: 1984-2009

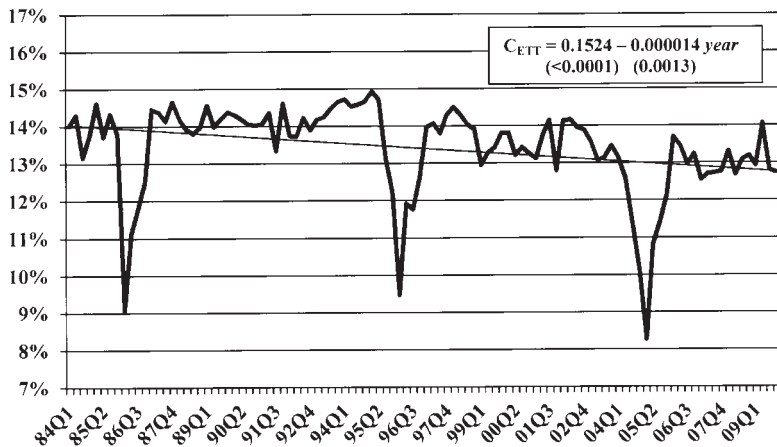


Figure 2. Entertainment consumption to total expenditures 1984Q1-2009Q4 (seasonally adjusted).

the downward sloping trend line in Figure 2. Statistically, the regression estimate is significant at the 1 percent level as indicated by the p-value of 0.0013 that is in parenthesis below the variable estimate. This should not be surprising given that total consumption includes such things as health

care which has increasingly taken up more of the household budget over time.

While the proportion of total consumption that goes to entertainment has been declining, this does not mean that entertainment consumption itself is declining. In fact, Figure 3 illustrates that quarterly real entertainment consumption is rising over time, albeit slowly. The regression coefficient of 0.001 implies household's entertainment consumption grows about \$0.001 each quarter; over the 26 year period that's only about \$0.104. Though the growth is small, the regression estimate is significant at the 1 percent level as indicated by the p-value of 0.0026 that is in parenthesis below the variable estimate.

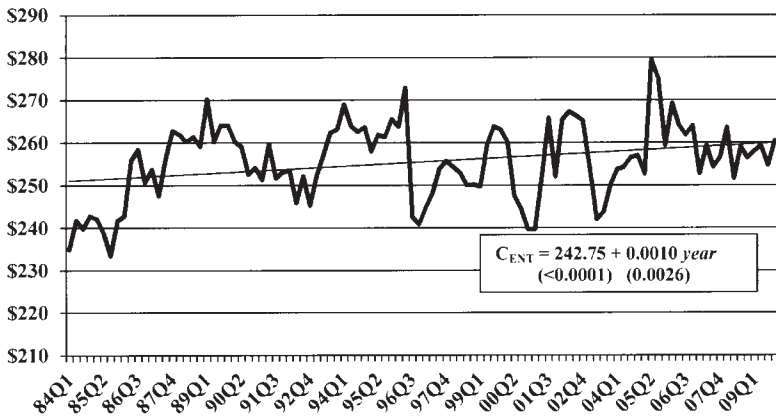


Figure 3. Mean real entertainment consumption 1984Q1-2009Q4 (seasonally adjusted).

In order to determine the drivers behind the increasing trend, it is important to look at the major components of entertainment consumption. As indicated in Figure 4, it is apparent that the home video component (Video) is driving the increasing trend with a little help from film, performing arts, and culture ticket sales (Tickets). In fact, home video's increasing trend over time grows 100 percent in real terms from \$50 in 1984 to \$100 in 2009. This should not come as a surprise given that improved technology has significantly decreased the cost of home entertainment equipment over time. Spending on the remaining components remains relatively constant or slightly decreases over time. Additionally, the graph illustrates the

onset of the gaming and wagering (Wagering) component in early 2000.

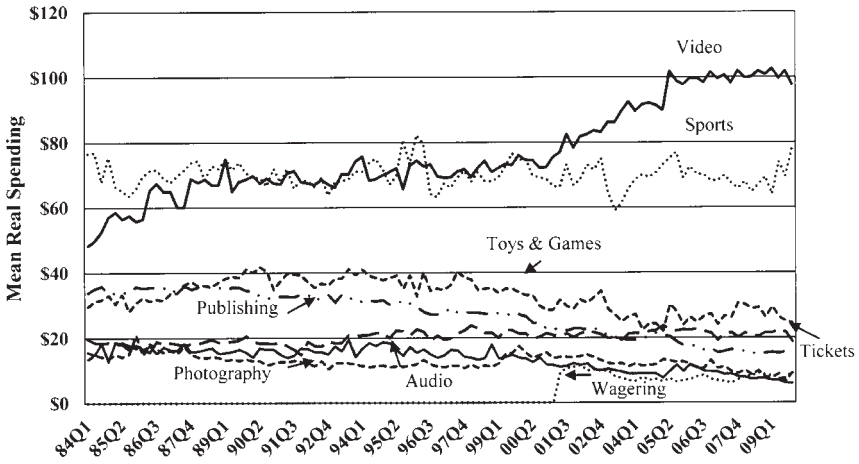


Figure 4. Mean real entertainment consumption by component, 1984Q1-2009Q4 (seasonally adjusted).

With respect to winners and losers, the home video component is definitely a winner in two regards: in terms of a positive trend and in terms of real dollars spent. Although sports and recreation (Sports) remains relatively constant in its trend, it may also be considered a winner with respect to real spending steadily accounting for \$60-\$80 over time. Another component that appears to have a positive trend is real consumption spending on film, performing arts, and culture tickets (Tickets) growing slightly from \$18 in 1984 to just over \$20 in 2009. While the gaming and wagering component (Wagering) grew quickly initially (2001:2), it has leveled off in the past few years.

In terms of components that have lost consumption spending over time, four categories stand out: toys and games, publishing, home audio (Audio), and photography. Each could be declining in consumption as a result of changes in the composition of consumption. Specifically, technology has made online consumption of goods quite easy. Because online consumption first appeared in the CES in 2005:2, the overall results should tend to show a downward trend as online consumption was taking place prior to being included in the CES. For example, we know that physical unit music sales have been declining since 2000 while digital music sales

have typically increased. However, the CES data does not completely reflect these changes and as such for this research shows a downward trend in home audio. The same would hold for online toys and games as well as publishing. With regards to photography the shift to digital photography has reallocated the consumption of photo services from brick and mortar stores to the home and may be an explanation for the slight downward trend in photography spending over time.

The trend analysis confirms anecdotal evidence and previous research with respect to the entertainment industry. First, the subcomponent of home audio in Figure 4 illustrates annual spending peaking in the 1990s and then steadily declining thereafter coinciding with results found in Al-hadeff and McChrystal (2011) where royalty data follow the same trend. Additionally, the results support the RIAA's (2010) report of overall shipments of recorded music falling.

Cyclical Structure of Entertainment

According to Ward (2005), "the cyclical component of a time series refers to regular or periodic fluctuations around the trend, excluding the irregular [seasonal] component, revealing a succession of phases of expansion and contraction." The cyclical component therefore measures the temporary changes of a time series from some long-run trend. To extract the cyclical component of a time series, the HP-filter (Hodrick and Prescott 1997) is employed. Mechanically, the seasonally adjusted (using the X-11 method) data is logged and then HP-filtered using a smoothing value of 1600 (for quarterly data). The filter removes the trending components of the data thus leaving the cyclical component. With respect to this research, we measure the cyclical structure of entertainment along two margins: cyclical volatility and cyclical correlation.

The *cyclical volatility* of the data refers to the variability of entertainment consumption and its components as compared to total spending and is computed as the standard deviation of the variable as a fraction of the standard deviation of total expenditures. The *cyclical correlation* of household entertainment consumption refers to how entertainment consumption and its components correlate to various measures of the cycle and is computed by applying a correlation analysis to the filtered data. The results of the analysis are presented in Table 2.

With respect to cyclical volatility, total entertainment consumption and most of its components are less volatile in comparison to total con-

Variable Description (HP filtered)	Std Deviation as a fraction of Total Consumption	Correlation with Household Income	Correlation with Unemployment
Total Consumption	1(8.92%)	0.484**	0.039
Total Entertainment	0.314	0.321**	-0.117
Home Video	0.396	0.177	-0.084
Home Audio	0.989	-0.0487	-0.262**
Publishing	0.405	0.503**	0.182
Toys & Games	0.753	-0.117	-0.247*
Sports & Recreation	0.618	0.302*	-0.182
Film, A&C Tickets	0.630	0.278**	-0.062
Photography	0.978	0.0503	-0.103
Gaming & Wagering	1.259	-0.210	0.118

Note: * significant at the .05 level, ** significant at the .01 level

Table 2. Cyclical analysis of quarterly real entertainment consumption (seasonally adjusted and HP filtered).

sumption. This is indicated by variable estimates ranging, for the most part, between 0.31-0.98. For example, photography and home audio are about 98 percent as volatile as total consumption. On the lower end, home video is only 39 percent as volatile as total consumption. On the higher end, gaming and wagering are more volatile than consumption—roughly 1.26 times the volatility of total consumption.

In terms of economic theory, a measure of cyclical volatility greater than one implies households are quick to adjust, over the business cycle, their allocation in these goods. Typically one thinks of these types of goods as luxuries. On the other hand, a cyclical volatility less than one implies households like to smooth their allocations in these goods. Presumably, these goods are more of necessity. The fact that total entertainment consumption is smoother than its subcomponents suggests that households alter their allocations in these subcomponents in an effort to make the total more smooth.

With respect to cyclical correlation, the data are analyzed with two measures of the cycle: household income and unemployment. A positive correlation coefficient implies that the variables move together while a negative correlation coefficient implies that the variables move in opposite directions. Additionally, p-values are utilized to determine the significance level of the variable. The correlation of entertainment consumption and its components with income enables us to determine what is known as

normal and inferior goods over the cycle. Normal goods are those that we buy more of when our income rises and inferior goods are those that we buy less of when our income rises. Total consumption and entertainment consumption are positively and significantly related to deviations in income (significant at the 0.01 level). Similarly, three of the entertainment components are positively and statistically significant: publishing (at the 0.01 level), sports and recreation (at the 0.05 level), and film, performing arts, and culture tickets (at the 0.01 level). The positive correlations indicate that they are cyclically normal goods. As such, we would expect consumption in these components to rise with temporary increases in income.

The remaining components (home video, home audio, toys and games, gaming and wagering, and photography) are insignificant indicating that temporary fluctuations in household income are an unimportant determinant. This, however, does not mean that those entertainment components are unrelated to income. Rather, it is important to note that this analysis is with respect to cyclical or temporary changes. The trend analysis in this paper's third section indicates that the growth in these components is important and may well be determined by long-run changes in income.

The final cyclical measure we considered was unemployment. The correlation of entertainment consumption and its components with unemployment enables us to determine what is known as procyclical, countercyclical, or acyclical relationships. Given that unemployment moves inversely with the economy, a component that is negatively correlated with unemployment is defined as procyclical. Alternatively, a positive correlation is defined as countercyclical while an insignificant correlation is known as an acyclical relationship. Given these definitions, Table 2 shows that total household consumption and entertainment consumption are both acyclical and thus not related to temporary changes in unemployment. The reason this may occur is that these aggregated consumptions are very smooth over the cycle and are more likely impacted by long-run changes in the unemployment rate that are not considered here. Regarding entertainment consumption's components, only two of the eight components are statistically significant. The significant components (home audio and toys and games) are negatively correlated to cyclical unemployment and thus procyclical; as the economy improves, so does spending on these categories.

An important conclusion can be drawn from our cyclical analysis.

Specifically, household's cyclical health, as opposed to the economy's cyclical health, is the key determining factor in how much households spend on entertainment consumption over the cycle. For example, a temporary change in income would include a one-time bonus increasing the household's cyclical health. Evidently, households would respond by increasing entertainment consumption. The rise in entertainment consumption is from increases in publishing, sports and recreation, and film, performing arts, and culture tickets. Whereas a temporary rise in the economy's unemployment rate, representing a decrease in the economy's cyclical health, appears to cause a decrease in spending on home audio and toys and games, but this reduction is not enough to reduce total entertainment consumption.

Determinants of Household Entertainment Consumption

This section develops a complete description of household entertainment demand in an analysis that expands upon the previous sections. Specifically, the effects of household demographics, seasonal trends, time trends, and macroeconomic performance are quantified on the probability to consume (using the Probit estimation technique) and on the amount of per person entertainment consumption demand. By combining the Probit and demand estimations, one is able to determine whether household spending increases because of an increase in the number of households that spend or an increase in per person spending within the household.

The household demographics include variables such as age, gender, education, children, race, and income. Seasonal and time trends are controlled by quarterly and annual discrete variables (i.e., dummy variables). Macroeconomic performance indicators include regional unemployment rates and household region (i.e., East, Midwest, South, and West).

Probit Estimation

To estimate the probability of household spending, a Probit model is applied to the CES dataset. The Probit is defined in a way so that the explanatory variables affect the probability that an event occurs ($y_{i,t} = I$). The event occurrence is equal to one when household i at time t chooses to consume an entertainment component. The event occurrence is equal to zero when household i at time t chooses not to consume an entertainment component. The explanatory variables for the Probit are defined as age of head of household (Age), number of individuals in the family (Family

Size), number of children in the household (Kids), and the regional unemployment rate (Unemp). Discrete explanatory variables are equal to one if: the head of household is female (Woman), not married (Not Married), has no college education (No College), race other than white (Not White), lives in the Midwest (Midwest), lives in the South (South), lives in the West (West), lives in rural areas (Rural), is in the second quarter (Quarter 2), is in the third quarter (Quarter 3), is in the fourth quarter (Quarter 4), is in the years 1990-1994 (1990-1994), is in the years 1995-1999 (1995-1999), is in the years 2000-2004 (2000-2004), and is in the years 2005-2009 (2005-2009). Two more discrete variables are defined to capture the income status of the family. These income discrete explanatory variables are equal to one if: the family's income is below \$5,000 real 1982-84 dollars per quarter (Poverty) and the family's income is above \$50,000 real 1982-84 dollars per quarter (Top 1%). As such, the normalized household is a white, married male who lives in the East, is college educated, has no children, lives above the poverty level but not in the top one percent of income, and is in the first quarter of each year from 1984 to 1989.

Table 3 displays the Probit estimates for the marginal effects of the explanatory variables on the probability of positive entertainment consumption. For example, the marginal effect of age on the probability of home video consumption is -0.006 (significant at the 0.01 level) implying that as age increases the probability of spending on home video significantly decreases. Note that the size of the estimate is irrelevant while the sign and significance of the estimate are important in Probit analysis.

A conclusion from Table 3 that can be drawn is that the demographics of the household are important in terms of the probability of entertainment consumption. Specifically, head of households that are not married or not college educated or not white are less probable to expend resources on the selected entertainment components (with the exception of not college educated and gaming and wagering). On the other hand if the head of the household has children or the family size is large, they are more likely to expend resources on all components of entertainment except publishing and gaming and wagering. With respect to age, the results are mixed. Younger households are more likely to spend on all components except for publishing and gaming. Older households tend to expend their resources on publishing.

Regionally, the results are mixed. Southern and rural area households are less likely to spend on entertainment compared to the normal-

	Home Video	Home Audio	Publish	Toys & Games	Sports & Rec.	Film, Art Tickets	Photo	Gaming Wager
Age	-0.006**	-0.013**	0.006**	-0.011**	-0.005**	-0.011**	-0.007**	5.58E-05
Woman	0.003	-0.064**	0.012**	0.012*	-0.098**	-0.024**	0.028**	-0.163**
Not Married	-0.314**	-0.051**	-0.341**	-0.257**	-0.279**	-0.092**	-0.429**	-0.065**
Family Size	0.064**	0.077**	0.025**	0.050**	0.048**	0.073**	0.060**	0.033**
Kids	0.087**	0.035**	-0.018**	0.486**	0.146**	0.045**	0.195**	-0.184**
No College	-0.248**	-0.351**	-0.484**	-0.275**	-0.564**	-0.552**	-0.398**	0.006
Not White	-0.261**	-0.215**	-0.328**	-0.340**	-0.465**	-0.297**	-0.424**	-0.063**
Midwest	-0.115**	0.072**	0.018**	0.095**	0.121**	0.041**	0.124**	-0.039**
South	-0.134**	-0.064**	-0.287**	-0.060**	-0.068**	-0.129**	-0.094**	-0.200**
West	-0.126**	0.137**	-0.077**	0.085**	0.154**	0.091**	0.132**	-0.161**
Rural	-0.333**	-0.058**	-0.287**	-0.025**	-0.044**	-0.274**	0.016	-0.374**
Poverty	-0.404**	-0.358**	-0.461**	-0.306**	-0.520**	-0.406**	-0.407**	-0.270**
Top 1%	0.185**	0.193**	0.162**	0.042*	0.422**	0.347**	0.084**	-0.230**
Unemp	-2.230**	-2.391**	-2.555**	0.323	-0.635**	-0.669**	-4.040**	-1.626**
Quarter 2	-0.043**	-0.295**	-0.087**	-0.534**	0.002	-0.030**	-0.166**	-0.062**
Quarter 3	-0.060**	-0.316**	-0.106**	-0.525**	0.107**	0.117**	-0.047**	-0.050**
Quarter 4	-0.045**	-0.284**	-0.096**	-0.504**	0.089**	0.008	-0.116**	-0.059**
1990-1994	0.471**	0.037**	-0.152**	0.010	-0.064**	0.011	0.010	.
1995-1999	0.656**	0.049**	-0.462**	-0.043**	-0.139**	0.015*	-0.107**	.
2000-2004	0.724**	-0.088**	-0.805**	-0.236**	-0.306**	-0.136**	-0.277**	.
2005-2009	0.764**	-0.223**	-1.187**	-0.280**	-0.434**	-0.295**	-0.756**	-0.197**
Intercept	1.072**	0.431**	1.506**	0.533**	0.757**	0.712**	0.647**	-0.511**

Note: * significant at the .05 level, ** significant at the .01 level

Table 3. Estimated Probit model for entertainment spending (probability of spending).

ized household (except for rural photography spending). Those that live in the West are more likely to spend on home audio, toys and games as well as sports and recreation, film, performing arts, and culture tickets, and photography. Additionally, those from the Midwest are more likely to spend on entertainment consumption than a normalized household on all components except home video and gaming and wagering.

The income status of the family is an important determinant in whether the household expends on entertainment. Households that are living below the poverty level are less likely to spend on all forms of entertainment consumption. With the exception of gaming and wagering, the top one percent of income earners are more likely to spend. The negative estimates for Unemp show that higher unemployment rates reduce the probability that a household will spend on entertainment consumption, excluding toys and games. It appears that families with children continue to spend on toys and games even as the unemployment rate rises.

With respect to cycles and trends, we see that all categories except home video have, for the most part, been significantly declining over time confirming the results of Section 3 (Trends). In terms of quarterly cycles,

the results indicate that households are more likely to spend on sports and recreation in the third and fourth quarters. Apparently, July through December are preferred times for film, performing arts, and culture tickets, and sports and recreation. Relative to January through March, however, household consumption on all other entertainment categories is less likely to occur.

The time trends provide some interesting results. First, the probability of spending by households on home video has positively and significantly increased over time. Anecdotally this makes sense given that technology has provided improved and lower cost forms of home video entertainment. Second, the rise of internet downloading can be seen in home audio and film, performing arts, and culture tickets. Both categories are positive and significant prior to 2000 and then negative and significant thereafter. Finally, while many blame internet downloading as the cause of the decline in publishing spending, the results indicate that the decline in the probability of spending by households had already begun by the 1990-1995 time period.

Demand Estimation

To estimate the demand models, regressions are run where the entertainment consumptions are the dependent variables and the explanatory variables include the estimated inverse mills ratio (INVM) from the Probit model. The INVM corrects for any sample selection problems that might arise.⁵ A second problem arises from the presence of fixed effects.⁶ For remedial action, both household dependent and explanatory variables are averaged by time and age. Then, a cohort number is assigned to each observation based on the year of birth. Finally, the classical fixed effects estimator is applied using the cohort number in place of age as the fixed effect. The remaining explanatory variables for the demands are, for the most part, the same as in the Probit analysis. However, family size is dropped from the regression since household entertainment consumption is divided by family size and per person income (real household income divided by family size) is included while the Poverty and Top 1% variables are dropped.

Table 4 displays the fixed effects and sample selection corrected estimates for the entertainment demands. With the exception of home audio and sports and recreation, being a woman head of household generally affects entertainment demand, both positively and negatively. Interestingly,

the number of children reduces family spending per person on most of the spending categories (home video, home audio, publishing, toys and games, film, performing arts, and culture tickets, and photography). This does not imply that households with children spend less on these categories. Combined with the Probit analysis in Table 3, the estimation results indicate that larger households with children are more likely to spend, but at a lower rate. This result is intuitive as economies of scale on consumption can be obtained with a large family; one video, CD, or game can be enjoyed by more than one individual. Therefore, families with children are more likely to spend, but per person, spending is lower. The reasoning is similar for head of households that are not married but in the opposite direction. The Probit analysis (Table 3) tells us that non-married households are less likely to spend on entertainment. However, Table 4 shows that, when they do spend, non-married households spend more per person on most entertainment consumption categories.

Again, regionally the results are mixed. For example, Southern and rural area households spend less on publishing while those from the Midwest, West, and South spend more on home video. Although race negatively affects the probability of all spending categories in the Probit analysis (Table 3), the results are mixed for per person spending in Table 4. For example, race negatively affects per person spending on home video, publishing, sports and recreation, film, performing arts, and culture tickets, and photography but positively affects per person spending on gaming and wagering. Thus, non-white households are less likely to spend and spend less on most of the consumption categories and while they are less likely to spend on gaming and wagering, when they do spend, they spend more.

Table 4 shows that household per person income is an important determinant for entertainment consumption. The higher the income, the more per person household demand is in all categories. This exactly coincides with the Probit analysis of Table 3 where the Top 1% households are more likely to spend on most categories. Therefore, higher income households are more likely to spend and spend more per person.

The Probit analysis in Table 3 indicates that higher unemployment leads to a reduction in the probability of entertainment spending in most categories. However, Table 4 shows that, when they do spend, households spend more per person on home video at the expense of toys and games, film, performing arts, and culture tickets, and photography.

According to Table 4, per person spending has declined over time

	Home Video	Home Audio	Publish	Toys & Games	Sports & Rec	Film, Art Tickets	Photo	Gaming Wager
Woman	24.106**	-5.170	2.329**	-9.565**	-6.805	-5.313**	-4.567**	-12.993*
Not Married	25.178**	13.212**	1.919*	20.917**	5.257	9.775**	-0.007	28.450**
Kids	-20.435**	-21.364**	-5.889**	-15.111**	-2.706	-4.560**	-4.086*	-3.969
No College	-18.902**	1.071	-9.182**	-4.632	-29.667**	-18.240**	-10.084**	10.192
Not White	-3.3973	2.170	-7.156**	0.031	-40.634**	-12.790**	-8.238**	14.380*
Midwest	37.671**	13.464**	1.200	0.220	6.226	3.808	3.093	-7.639
South	17.305**	12.520**	-3.650**	-1.210	-0.249	-3.579	0.014	-11.419
West	22.729**	8.645	-0.098	3.218	14.829*	7.865**	7.501**	-5.029
Rural	12.275	1.195	-3.658*	3.077	-0.694	-3.726	1.174	2.694
Income	0.0005**	0.0004**	0.0002**	0.0008**	0.002**	0.0007**	0.0008**	0.0008**
Unemp	83.565*	-53.640	-11.546	-99.219**	-70.902	-65.482**	-72.683**	136.564
Quarter 2	-6.908**	-6.232*	-2.923**	-11.138**	0.745	0.341	-4.334**	0.755
Quarter 3	-7.303**	-6.237*	-3.079**	-11.985**	6.374**	5.320**	-1.739*	0.134
Quarter 4	-4.564**	-5.815*	-2.504**	-10.745**	1.964	1.665**	-1.564*	0.647
1990-1994	-15.995**	-6.983**	-1.320**	7.458**	-3.883*	-0.577	-4.729**	
1995-1999	-19.621**	-13.528**	-2.841**	6.733**	-1.473	0.254	-6.966**	
2000-2004	-18.901**	-18.671**	-6.409**	7.172*	-5.431	-2.073	-6.760**	
2005-2009	-12.398	-21.134**	-10.086**	3.799	-9.629	-3.326	-9.594**	-0.983
Inv	-23.016	-2.403	11.359**	-14.475	60.519**	32.741**	18.961**	29.656
Intercept	45.695**	30.649*	26.234**	63.374**	14.345	-6.379	-0.545	-30.398

Note: * significant at the .05 level, ** significant at the .01 level

Table 4. Estimated demand equations (fixed effects and sample selection corrected).

in most entertainment components. This follows anecdotal evidence that technology has changed the way people consume these products and services over time. For example, Tables 3 and 4 together indicate that the probability of spending by households and per person spending on home audio, publishing, and photography have each significantly declined since the initial 1984-1989 time period. This correlates with the results in Figure 4 and suggests that consumers are shifting their entertainment dollars to other areas. On the other hand, while the probability of spending by households has increased with respect to home video over time, the per person spending has fallen suggesting that technology has made it easier for households to buy at lower costs. The combined results help to explain the upward sloping curve of home video spending in Figure 4. Finally, while the probability of spending on toys and games has fallen over time (Table 3), the per person spending on this category has risen (Table 4); however, so has the level of significance. Thus, it appears that the probability of spending over time is the driving force behind the shape of the toys and games curve in Figure 4.

Conclusions

The purpose of this paper was to quantitatively document the struc-

ture of entertainment consumption in the United States over time. It has been shown that spending has significantly changed within and across the eight entertainment categories. That is, as a percentage of total entertainment consumption, there have been winners and losers. Home video, a winner, has increased due to the fact that there are more households spending. In terms of components that have lost consumption spending over time, three categories stand out: publishing, home audio, and photography. Since 2000, these categories have seen a decline in the number of households that spend and on the amount of spending per person.

The results show that many obvious demographic determinants such as family income, region, and education significantly influence entertainment consumption. Even when controlling for income and education, race of the head of household significantly affects the probability and amount of entertainment consumption. With respect to cyclical volatility, total entertainment consumption and most of its components are less volatile in comparison to total consumption. This suggests that households like to smooth their allocations in entertainment goods. Finally, the household's cyclical health, as opposed to the economy's cyclical health, is the key determining factor in how much households spend on entertainment consumption over the cycle.

A conclusion to be drawn from the results is that the documented shifts in entertainment consumption have come about slowly rather than quickly. Cyclically, entertainment consumption doesn't vary enough to be a viable explanation (entertainment is only 31 percent as volatile as total consumption). Two likely reasons for the changing entertainment demand are technological change and demographics. Technology, that evolves slowly, may have enabled more households to purchase these products and services at lower costs over time. Technology, in the form of the internet, may also have played a negative role in the way households consume these goods. Finally, if the demographics of the population shifts—as it has for race, age, and location in the U.S.—our results suggests that the probability and amount of household entertainment consumption is affected.

In all, entertainment industry practitioners will find the results and conclusions useful because they verify anecdotal industry evidence and present new support for existing theories of why spending has changed. Educators will find the results applicable to classroom discussions and applications as more entertainment courses are being offered at greater frequencies across universities in the United States and abroad.

Endnotes

1. Recreational goods and services as identified by the Bureau of Economic Analysis incorporates all components that the authors define as “entertainment.”
2. For example, since 2001 households have been shifting their consumption of music from physical units to digital downloads. We document this later.
3. Gourinchas and Parker (2002) also use unemployment rates instead of time dummies to capture time effects.
4. Home video online streaming or download video files, home audio online streaming or download audio files, toys and games online were all added to the CES in 2005:2 and Gaming and wagering – lotteries and pari-mutuel losses was added in 2001:2.
5. As an example of sample selection, suppose that a consumer demands to purchase \$8 in music each quarter. However, at a minimum, an album costs \$12. As a result, the consumer delays consumption and purchases a CD every other quarter. The quarterly demand estimated from the sample selected data is biased below at \$6.
6. The fixed effects problem might arise if, for example, each household has idiosyncratic preferences and these preferences are correlated with any explanatory variable.

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STUART J. FOWLER is an Associate Professor of Economics at Middle Tennessee State University. Stuart earned his Doctor of Philosophy in 1999 in the field of economics from Southern Methodist University in Dallas, Texas. Professor Fowler's teaching and research interests include entertainment industry consumption, household consumption, monetary and macroeconomic theory. He is currently undertaking research with respect to the dynamic choice of new album issues. Dr. Fowler is a member of the American Economic Association and the Southern Economics Association.

JENNIFER FOWLER is an Assistant Professor of Economics and Music Business at Belmont University. She teaches courses for both the College of Business Administration and the Curb College of Entertainment and Music Business. A native Tennessean, Jennifer earned her Doctor of Philosophy in 2005 in the field of economics from Middle Tennessee State University in Murfreesboro, Tennessee. Professor Fowler's teaching and research interest include entertainment industry consumption, household consumption, labor market analysis, and macroeconomic theory. She is currently undertaking research with respect to entertainment consumption over the life cycle, entertainment mergers, and case studies in the entertainment industry. Dr. Fowler is a member of the Music & Entertainment Industry Educators Association, American Economic Association, the Southern Economics Association, the Midwest Economic Association, the Allied Academy of Economics and Economic Education, Beta Gamma Sigma honorary society, and Phi Kappa Phi honorary society.

