2014

From Adele to Zedd: The Consumption of Popular Music in the United State, 2006-2013

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FROM ADELE TO ZEDD: THE CONSUMPTION OF POPULAR MUSIC IN THE UNITED STATES, 2006-2013

by
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SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FUFILLMENT
OF THE DEGREE OF BACHELOR OF ARTS

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APRIL 25, 2014

Abstract

The entertainment industry is an impactful part of the U.S. economy. My thesis explores the way Americans consume popular music and how the U.S. economic environment affects the permeability of the music industry to new artists. I use discrete-choice probit models to examine the top 10 weekly singles from the *Billboard* Hot 100 between 2006 and 2013. I analyze the economic factors and artist characteristics that affect an unestablished artist's entry into the top 10 of the chart and achievement of the number one chart spot. I also use a Cox proportional hazard model to examine the effects of economic factors and artist characteristics on the number of weeks an artist's single stays in the top 10 of the Hot 100 chart. I find that having a previous single in the top 100 decreases the predicted probability of a new artist's song being in the top 10, and having previous singles in the top 10 or top 100 decreases number of weeks an artist's subsequent single spends in the top 10 of the chart. Additionally, level of GDP per capita increases the number of weeks an artist's single stays in the top 10 of the chart.

Economic well-being perpetuates stability in the consumption of music, and modern culture consumers demonstrate a preference for newness in their endorsement of unestablished artists. As demonstrated by the use of singles between 2006 and 2013, new technologies decrease the costs of engaging with new artists for consumers and allow an artist to achieve success regardless of the artist's previous success.

Acknowledgements

Thank you to my primary thesis reader, Professor Pedace, for your steadfast guidance, patience, and positivity throughout my thesis process.

Thank you to my secondary thesis reader and academic advisor, Professor Flynn, for your encouragement of my ideas and valuable feedback on my thesis, and for your wisdom from the beginning of my academic career at Scripps College.

Thank you to my mom and dad for allowing me to attend Scripps College. I would not be where I am or who I am without your unconditional love and support. The completion of my thesis honors the work ethic, responsibility, and passion for music that you have instilled in me.

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1. Introduction

The entertainment industry is an impactful part of the U.S. economy. In 2013 the U.S. Bureau of Economic Analysis revised its gross domestic product calculation methodology to include the "knowledge economy," incorporating research and development investments for creative work in entertainment and the arts into the calculation of U.S. aggregate goods and services. To account for these changes in historic GDP figures, the Bureau of Economic Analysis increased historic GDP data an average of 3% per year retroactively. The entertainment industry's impact on the economy had previously been represented only by revenue generated by product sales, not by the industry's constant new investment (formerly considered to be pure business costs). The entertainment industry provides significant stamina to the U.S. economy. As Crain and Tollison (1997) argue, the U.S. culture is the country's strongest export.

Cultural products can be seen as economic assets, and consumer demand for entertainment goods can be representative of cultural values. As economist Wilfred Dolfsma (1999) argues, popular music is an expression of cultural identity and can convey social values. Culture economists Mark Casson and Andrew Godley (2000) affirm that culture can be thought of as the production and distribution of values: cultural products serve as a representation of social values and beliefs. The music industry both reproduces and generates the ideals, values, and identity endorsed by consumers.

Anderson, Denisoff, Etzkorn and Hesbacher (1980) observe that the popular music industry can serve as a monitor for public consumption. Cowen and Tabbarrok (2000) argue that short-term changes in wages, lump-sum income, and capital-labor

ratios affect an artist's pursuit of self-satisfaction in their art versus the pursuit of market sales and profit. The authors note that high and avant-garde art have flourished in wealthy, capitalist countries. As income rises the quantity and quality of art increase by market factors of both supply and demand. An increased demand for art causes increases in the returns to artists, increasing the quantity of art and the artist's freedom to pursue self-satisfaction through art. On the supply side, the authors argue that economic growth causes artists to become more willing to devote time to the art market. Greater wealth increases the demand for art, and if the demand for art rises faster than artistic costs, the art remain constant or expand as a fraction of national income. A high stock of wealth serves as a buffer against initial commercial rejection in industries where the producer, the artist, must educate or persuade his or her audience. To the consumer, an effective increase in income can be used to purchase leisure time. As the aggregate wealth of a society increases, the number of market sales required to support an artist decreases. The wealthier the society, the more liberated the artist.

Cowen and Grier (1996) explore whether artists suffer from Baumol and Bowen's proposed cost-disease, in which a rising real wages increases the opportunity cost of artistic production. One may assume that wages do not rise proportionally in the performing arts because technological progress supposedly favors capital-intensive economic sectors. Yet, Cowen and Grier argue that creative labor creates productivity gains through the generation of new ideas and the creation of human capital. Short-term economic growth has favorable effects on artistic production, and the growing diversity of musical composition and performance represents a productivity increase.

Research by Seabrook (2003) finds that "only a tiny fraction of the albums released are profitable and achieve the success indicated by appearing in the top 100 charts". However, new artists may offer a broader range of cultural perspectives, ultimately expanding U.S. cultural development and broadening views and legacies of U.S. culture internationally. In this thesis I examine singles that reach the top 10 of the *Billboard* Hot 100 chart to explore the dynamics of new artist entry[1]. I investigate how music industry permeability changes from changing economic environments. I analyze how the economic environment affects the permeability of the music industry to new artists and the openness of consumers to expanding their music horizon. Do consumers indeed value artist familiarity as the most important variable in music preference, and how do wealth levels in the economy affect willingness to consume new art goods? How does the demand for new music change based on economic conditions? With these answers, how can up-and-coming artists and their music producers maximize success within a given economic environment?

As Crain and Tollison argue, consumers face switching costs in accepting new music and unfamiliar artists, creating a demand-side barrier to an artist's entry into cultural relevance. Information on how consumers endorse music given economic conditions brings value to culture creators including musicians, producers, and managers. The answers to these questions shed light on how the consumption of music changes based on economic conditions. This research also provides a unique test to the

[1] *Billboard* magazine is "the world's premier music publication". *Billboard* and its popular music charts are "the primary source of information on trends and innovation in music" (Billboard *About Us*, n.d.). *Billboard*'s Hot 100 chart represents the "most popular current songs across all genres, ranked by radio airplay audience impressions as measured by Nielsen BDS, sales data as compiled by Nielsen SoundScan and streaming activity data from online music sources tracked by Nielsen BDS. Songs are defined as current if they are newly-released titles, or songs receiving widespread airplay and/or sales activity for the first time" (Billboard *The Hot 100*, n.d.). Billboard updates and releases the Hot 100 chart weekly.

superstar theory and the perpetuation of current artist popularity addressed in the literature.

2. Literature Review

2a. The Superstar Phenomenon and Skewness in Artist Popularity

When economists examine the music industry, their research often brings in Rosen's theory of the superstar (1981). Rosen's "superstar phenomenon" theory speaks to artist success and the skewness of artist popularity, "wherein relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage". Rosen writes that artists with only slightly greater talent earn much higher incomes than those with slightly less talent, and that artist success and earnings are highly concentrated among a few top performers. In recent research, Bhattacharjee, Gopal, Lertwachara, Marsden, and Telang (2007) cite that Rosen's theory still has relevance in today's markets: "The superstar effect appeared to be alive and well, with albums by such performers surviving approximately 35% longer even after controlling for other variables".

Elaborating from Rosen's superstar phenomenon, Strobl and Tucker (2000) graph artist chart popularity and find high skewness in the distributions of the number of charted albums and the amount of time on the chart. In the authors' empirical research Pearsonian measures of skewness confirm that many highly successful albums are created by a small number of established artists. Additionally, if successful, an artist's past albums increase the likelihood that their subsequent albums will be successful. The authors also plot the frequency of success in number of charted albums and the amount of time on the chart, creating a plot of number of weeks on the charts

over the entire time period, and continue to observe notable, "unusual" skewness of artist success.

Crain and Tollison (1997) find that once an artist has market share the artist is able to exercise a scheme of limit pricing: an artist's previous success has a significant effect on the length (time duration) of the successful singles they subsequently produce. By being longer than the average hit, singles by superstars take up more audience listening time and radio air time, crowding out singles by new and non-superstar artists. The superstar's future hit songs provide barriers to entry for new incoming artists.

Research finds that an artist's past success helps establish their future success in the music industry, and Hendricks and Sorensen (2009) find that the artist's success also supports their past art. In their empirical research Hendricks and Sorensen demonstrate that the release of an artist's new album increases the sales of the artist's past albums. These findings contribute to Rosen's original notion that established superstars experience the benefits of the skewed music market.

Bradlow and Fader (2001) create a probability model for a time series of ranked data based on a Bayesian latent lifetime "worth" model. The authors chose a latent worth function curve to account for the fact that some songs rise and fall very quickly in the charts while others rise and fall more slowly. The authors use the number of previous *Billboard* Hot 100 songs by the same artist and whether the song appeared on a movie soundtrack as covariates to explain heterogeneity in the movements of songs up and down the Hot 100 chart over time. The authors find that the shape and scale parameters of the model are substantially and positively affected by the number of previous chart hits.

Research of specific "superstars" also confirms Rosen's original model of popularity skewness. Giles (2007) finds evidence of an "Elvis effect" in his empirical research examining the *Billboard* Hot 100. In Giles' research the marginal effect of being Elvis adds almost two weeks to the life of a number one hit on the *Billboard* charts. As an artist, Elvis demonstrates a form of market dominance and exemplifies the superstar's ability to perpetuate their success by capitalizing on past popularity.

2b. Consumption Capital and Switching Costs

Crain and Tollison (1997) test the predicted skewness of returns given artist quality that the superstar theory discusses. Within these tests the authors argue that art is a composite good in which value to consumers is derived from both contact with art and the discussion of art with others. The superstar theory applies to the consumption of art because "stardom is a market device that economizes on learning costs". Discussion and connection with others through art is facilitated by common prior knowledge. Stardom offers the customers efficiency to consume art.

In his analysis of Rosen's statements, Alder (1985) notes that the superstar phenomenon "exists where consumption requires knowledge". Consumers acquire consumption capital through listening and discussion with others. Regarding music preferences, the consumer appreciates the song or artist more when the consumer has a base of knowledge already surrounding the good. Alder establishes that the learning process dictates the consumption of music and supports the superstar phenomenon. Knowledge increases utility, and previous consumption dictates a consumer's future propensity to consume. Once a consumer chooses a field of knowledge the consumer selects a limited number of musical interests, a smaller number of artist interests and,

ultimately, a limited number of stars to consume. An individual is better off patronizing an artist that many others already patronize. Alder also asserts that the more time a consumer devotes to art, the larger his or her set of stars will be.

Klemperer (1995) argues that switching costs effectively grant firms market power over their existing customers, creating the potential for monopoly profits by the firms with the customer base. Music carries high time costs, learning costs, personal relationship loss costs, and brand relationship loss costs to the consumer. The superstar theory supports the claim that popular music artists may benefit from high costs to consuming new artists, and that "superstar" artists gain market power and may act monopolistically.

Nelson (1970) delineates market products between "search goods" and "experience goods". By Nelson's original definition, the quality of search goods can be experienced before purchase while the quality of experience goods can only be observed after consumption. The quality of an experience good often depends on what others think, generating a bandwagon effect of information between consumers as they attempt to reduce the good's quality uncertainty. Culture goods serve as an example of an "experience good" in which the quality and benefit to consumers is uncertain before consumption. With goods like music, consumers rely on their peers for recommendations of quality and benefit from the social experience aligned with the consumption of music.

With music, if the only cost to consumption is time, Crain and Tollison (1997) outline two specific costs: the cost of time listening to and discussing music, and the cost of time to find individuals with common music consumption to discuss the music

with. This argument relates to larger discussions of switching costs. Originally proposed by Michael Porter in 1980, switching costs refer to "the onetime costs that consumers associate with the process of switching from one provider to another" (Burnham, Frels and Mahajan 2003). In the consumption of music, for example, consumers must spend time and energy switching from engaging with the work of one artist (here, "provider") to another. Burnham, Frels, and Mahajan define eight facets of switching costs, and when consuming songs by a new artist versus a known artist the consumer may face exposure to three specific types of costs: learning costs, "the time and effort costs of acquiring new know-how in order to use a new product or service effectively"; personal relationship loss costs, "losses associated with breaking the bonds of identification that have been formed with the people with whom the consumer may interact"; and brand relationship loss costs, "losses associated with breaking the bonds of identification that have been formed with the brand with which a consumer has associated… [Consumers] form associations that become part of their sense of identity". Beyond the artist level of switching costs, consumers may face costs in switching genres of interest because "expertise in a product domain allows consumers to more rapidly and accurately evaluate options… consumers gain domain expertise when they increase their product-related experiences". A consumer may face costs in: time to gain the know-how to contextualize the song within an artist's framework, time to build relationships with others that engage with the same artist, and time to reposition the consumer's identity as a listener of the new song or artist. Additionally, the consumer has a greater incentive to listen to songs from a genre with which the consumer already has familiarity. Though a consumer may not be familiar with the song's artist, the consumer's knowledge of the

song's larger "product domain" reduces switching costs and the time a consumer must give to make associations with the song, artist, and other consumers of the artist's music.

Consumers have a fixed amount of leisure time to listen to new songs. Songs by artists consumers are familiar with may be more desirable to consume, because the consumer already has a basis of knowledge capital to build an understanding and enjoyment of the song. Towse (1992) references Leibenstein's theory of bandwagon effects as applied to music artists: skewness in the earnings distribution of artists can be attributed to the "consumption capital" properties of music that perpetuate a cycle of demand. The "interdependence of customers' utility functions" observed by Towse brings about an interdependency of individual and market demand: "when market demand increases, the individual's demand for the good or service in question will also increase. Similarly, if market demand decreases, the effect is to induce individual consumers to reduce their demand".

Theoretical models from authors Bhattacharjee, Gopal, and Sanders (2006) demonstrate that reduced search costs for consumers lead to increased industry permeability. Increasing technological capabilities provide new ways to access and engage with artists, reducing the uncertainty, risk, and costs associated with pursuing a new artist. Stardom of artists is "a market device used by consumers to economize on the learning and information acquisition costs". The internet and the information-sharing platforms it provides allow users to reduce the information uncertainty of new artists and reduce the variability of consumer expectations of their music.

Bhattacharjee, Gopal, and Sanders' research supports the superstar phenomenon and the perception that consumer knowledge perpetuates artist success, creating skewed returns in the industry. As search costs for artists fall, consumers have more incentives to pursue new, up-and-coming artists. As an experience good, decreasing sampling costs through increased information accessibility on the internet lead to more potential customers sampling unknown music.

2c. Factors of Single and Album Popularity

Alpert (1983) analyzes musical consumer preferences across musical styles, demonstrating that a successful single, the previous record's success, exposure, higher number of years since the last record all have significant positive affects the album rank on the charts. Having a previously successful single is the most economically and statistically significant variable in Alpert's model. Alpert's findings support the skewness of the music industry modeled by Rosen in his theory of superstardom.

In his empirical model Hamlen (1991) estimates a demand function for record sales and finds the explanatory variables career longevity, being female, and voice quality to be the most powerful predictors of an artist's success. Hamlen uses spectral harmony analysis to describe voice quality, the "richness" and "depth" of the artist's voice. Hamlen compares this to a Ricardian rent, a God-given talent unique to the artist himself. Though Hameln finds artist talent to be a relevant contributor to a hit's success, he does not explicitly detail the harmonic analysis procedure he uses to evaluate talent quality; this lack of transparency impedes my ability to test the "talent" variable in my research.

Giles (2007) models the determinants of a hit song's duration in the number one chart spot. Giles' model finds that a hit's duration at the number one chart spot is significantly enhanced if the song "was recorded by a female solo artist." Similarly, the 2007 research of Battacharjee, Gopal, Lertwachara, Marsden, and Telang find that "superstars and females exhibit enhanced survival" of their albums' popularity on the charts.

Strobl and Tucker (2000) explore the characteristics that contribute to an album's success on the charts to apply to the success of future listings. In their empirical model the authors find that soundtracks and greatest hits albums have an increased survival time on the charts. Strobl and Tucker affirm the bandwagon and snowballing effects contributing to the individual and market demand for music.

The music business is risky, and Asai (2008) completes an empirical analysis exploring the determinants of music hits (using both singles and albums) in the Japanese music market. Asai finds music genre, previous success in record sales, tie-ins with other media, and time on the chart to be significant factors improving the success of music singles and albums in Japan. From his results Asai deduces that record companies "can reduce their management risks by using established popular artists". As star power is a significant factor to success for both singles and albums, Asai's research affirms the superstar phenomenon in the Japanese music market.

2d. Economic Influencers to the Music Industry

Cowen and Tabbarrok (2000) argue that changes in wages, income, and capital-labor ratios affect the artist's pursuit of self-satisfaction in their art versus market sales. Using a model of labor supply the authors examine economic forces behind the high-

and low-culture split in society. High and avant-garde art flourish in wealthy capitalist countries: as income rises, the quantity and quality of art increase. Both demand- and supply-side factors affect a nation's art industry. An increased demand for art causes increases in the return to art, increasing the quantity of art and the artist's pursuit of self-satisfaction in art creation. On the supply side, economic growth causes artists to become more willing to devote time to the art market. An effective increase in income can be used to purchase leisure time, and as the wealth of society increases the number of market sales required to support decreases. Cowen and Tabbarrok conclude that the wealthier the society, the more liberated the artist.

Cowen and Grier (1996) explore whether artists suffer from a cost-disease. The cost-disease argument asserts that rising real wages increase the opportunity cost of artistic production, and that wages do not rise proportionally in the performing arts because technological progress supposedly favors capital-intensive economic sectors. Baumol and Bowen argue in *Performing Arts: The Economic Dilemma* (1966) that performing arts is a labor-intensive activity doomed to decline. Baumol and Bowen see no increase in productivity for artists as the general economy advances: as the pace of technological advances increases the overall wage level will increase, in turn putting pressure on the arts industry (an industry that's seen as one that doesn't enjoy the same increase in productivity). The string quartet indeed demonstrates the principles of the cost disease because today's string quartets are not much more productive than the string quartets of the 18th century and the opportunity cost for quartet members increases as the economy grows. Popular music, however, does not fall into the trap of the cost disease: creative labor and development creates productivity gains. Labor

generates human capital through the generation of new ideas. The growing diversity of musical composition and performance represents a productivity increase. Economic growth has favorable effects on artistic production.

Cowan and Grier (1996) analyze the cost-disease argument from the demand side, from the artist's perspective. Greater wealth increases the demand for art, and if the demand for art rises faster than artistic costs, the art will expand or remain constant as a fraction of national income. A high stock of wealth serves as a buffer against initial commercial rejection in professions where the producer must educate or persuade his or her audience. Cowan and Grier refer to author Samuel Johnson, who argues that artistic freedom increased with the number of buyers in the market. Incentives to create art increase in a growing economy: rising wealth supports a growing number of profitable artistic niches. Richer societies, by affording more extensive specialization, support greater artistic diversity. The authors conclude that "Baumol and Bowen have produced a stimulating and provocative hypothesis, but we have no particular reason to fear for the future of the arts in a growing economy".

Using data from the 2006-2010 American Time Use Survey, researchers from the National Endowment of the Arts (NEA) find links between performing arts attendance and poverty rates (2012). Though the NEA's "performing arts attendance" refers to a broad range of arts, including attending "concerts, opera, musicals, ballet, theater, dance troupe performances, jazz bar, comedy club, or plays," music concerts serve as the primary arts activity represented in the data. Researchers find that the correlation between poverty rates and arts attendance is -0.60; poverty levels have a

strong inverse relationship to attendance rates on a per-state basis, demonstrating that economic access to the arts has a strong inverse relationship to attendance.

Pettijohn, Eastman, and Richard (2012) demonstrate that economic and social conditions indeed affect the popular music consumers choose to endorse. In a study of *Billboard* singles from 1955 to 2008 the authors argue that, based on correlational outcomes between economic factors like U.S. unemployment, disposable income, and inflation and music qualities like tempo (measured in beats per minute) and key signature, economic environment informs the characteristics of popular music. The correlations between factors describing the economy and factors describing popular music demonstrate that more upbeat songs in common key signatures are successful in times of economic improvement and prosperity, and slow songs in unusual keys are more popular in economically "bad times".

Crain and Tollison (1997) also create models to demonstrate the characteristics of successful songs using variables addressing the social well-being: time preference proxies (i.e. growth rate in battle deaths of U.S. military personnel and the misery index) positively affect song beats per minute, negatively affect song length, and negatively affect the average number of weeks at number one.

Anderson, Denisoff, Etzkorn, and Hesbacher (1980) observe that the popular music industry can serve as a monitor for public consumption. The authors analyze stability and change of pop and rock music characteristics. Anderson, Denisoff, Etzkorn, and Hesbacher establish long-term industry trends between 1940 through 1977 with four descriptors: manufacturer (the concentration of suppliers in the market), song type (musical genre), artist type (performance mode) and lyric content (vocal message).

The researchers examine the interplay between artistic traditions and a fluid culture. Audience income and age demographics affect the structure of the industry, and a rise in teen population facilitates market deconcentration.

Crain and Tollison (1997) argue that changes in the structure and qualities of successful songs are tied to market forces. Like Anderson, Denisoff, Etzkorn, and Hesbacher, Crain and Tollison define epochs of music based on a time-series analysis of the changes in the structure of songs, finding a song's length and beats per minute as the main differentiators across epochs. In empirical testing the growth rate of the teenage population share negatively influences market concentration; as the teenage share of the population grows, new performers are able to enter and find success.

Recent work by Hong (2012) elaborates on Giles' original "Survival of the hippest: life at the top of the hot 100". Hong completes survival analysis using data from *Billboard*'s Hot 100 chart songs between 1955 and 2003 and finds that a number one hit's life at the top positively increases as the GDP growth rate increases. Hong concludes that economic stability and growth enhances that stability of songs on the pop music chart.

3. Empirical Methods

To analyze economic effects of artist concentration in the music industry I examine a variety of economic and social indicators, including:

- monthly unemployment
- annual GDP per capita
- year-over-year change in GDP per capita
- annual S&P 500 index returns ("S&P 500")
- annual death rate
- annual youth population
- annual inflation

In the empirical models I also control for factors based on artist characteristics that could affect artist success, including: artist gender ("Female" and "Male"), the artist's musical genre, the number of previous hits an artist has achieved in the top 10 of the Hot 100 *Billboard* chart ("Prev Top 10"), and the number of previous hits an artist has achieved in the top 100 of the Hot 100 *Billboard* chart ("Prev Top 100"). The artist's gender is defined as either "Female" for a female solo artist or for an all-female group, "Male" for a male solo artist or for an all-male group, and "Combination" for a group of males and females. The variable addressing genre is divided into (a) pop and rock, (b) hip-hop, rap and soul, and (c) alternative, country, dance, electronic, soundtrack, and comedy.

I use three separate dependent variables and explore how the independent factors above affect: if the singles in the top 10 of the chart are by a new artist to the top 10, if the single at the number one chart spot is by a new artist to the top 10, and the number of weeks the single of an artist (new or established) stays in the top 10 of the chart. The sample contains the 476 songs that reach the top 10 of the *Billboard* Hot 100 chart in the U.S. each week between 2006 and 2013. Of the 476 songs, 159 are by artists new to the top 10 of the chart.

When considering multiple economic and social factors there is some concern for collinearity between variables. I test for collinearity by finding the variance inflation factors (VIF's) between the seven economic and social indicators listed above when regressed separately on "first no. 1" "first top 10," and "weeks" (see Table 3.1). In the first iteration of VIF testing, "death" has an extremely high VIF of 238.86. After eliminating "death," in the second iteration of testing "youth" has a VIF of 66.80. After

eliminating "youth" in addition to "death," in the third and final iteration of VIF testing yields a VIF for inflation of 8.50. Though this is not above ten, a common VIF threshold to mark high-collinearity variables, the VIF for inflation is above five (another, stricter VIF threshold) and is eliminated to simplify future models. In examining the remaining four economic indicator variables and the four artist characteristic variables, none yield problematic VIF's, and the mean VIF between the eight factors is 2.04.

Table 3.1 Variance Inflation Factors

Variable	VIF
Prev Top 100	3.29
Prev Top 10	3.27
Pop/Rock	2.36
Hip-Hop/Rap/Soul	2.30
Female	2.02
Male	1.88
Unemployment	1.60
GDP/Capita Change	1.27
GDP/Capita	1.23
S&P 500	1.15
Mean VIF	2.04

To examine economic condition and its influence on a new artist's success in the music industry I explore two discrete-choice probit regression models and one Cox proportional hazard duration model. I examine the effects of unemployment, GDP per capita, the year-over-year change in GDP per capita, S&P 500 index returns, artist gender, the artist's musical genre, the number of previous hits an artist has achieved in the top 10 of the Hot 100 *Billboard* chart, and the number of previous hits an artist has achieved in the top 100 of the Hot 100 *Billboard* chart on the respective dependent variables "first number one," "first top ten," and "weeks on the chart". To accurately

analyze and better perceive the effects of the level of GDP per capita, I take the log of each year's GDP per capita level and use these figures in data analysis.

I test all models using STATA software. I choose the discrete-choice probit model to analyze the two discrete 1 or 0 dummy dependent variables exploring (a) if the singles in the top 10 of the chart are by a new artist to the top 10 and (b) if the single at the number one chart spot is by a new artist to the top 10. The artist's hit single is assigned "1" if it is the artist's first song in the number one chart spot or in the top ten of the chart, and assigned "0" if the hit single is not the artist's first. The Cox proportional hazard model is used to estimate the hazard ratios and the effects of economic and artist characteristic variables on the number of weeks an artist's single stays in the top 10 of the chart.

4. Data

I use historic *Billboard* Hot 100 charts to find the number one single and top 10 singles between 2006 and 2013, as well as the number of weeks an artist's single stays in the top 10. I also use historic *Billboard* Hot 100 charts for the independent variables addressing the number of an artist's previous singles in the top 100 chart, the number of an artist's previous singles in the top 10 chart.

Using *Billboard* website Billboard.com I collect information on artist gender. Neither *Billboard*'s Hot 100 chart nor Billboard.com's artist profiles include information on an artist's genre; I instead use iTunes, the most prominent digital media player and the world's number one music store, to classify artists by genre (*Apple iTunes* n.d.).

I choose to examine artist singles rather than artist albums because singles offer a better representation of industry movement and fluidity, as "cost of entry into the singles market is much less than that of entry into the album market, since the cost of producing an album is several times the cost of producing a single" (Belinfante and Johnson 1982). I choose the time period between 2006 and 2013 because current literature only extends through 2002 and includes periods in the 20th century in which consumers accessed culture goods in dramatically different ways. My time period captures the technological innovation that facilitates culture and information access for the modern consumer. Across these eight years technological and software development and the number of radio stations in the U.S. remained largely unchanged, minimizing the risk for supply-side concerns when exploring and endorsing new artists. Additionally, using a time frame of eight years permits the use of *Billboard* Hot 100 charts data without the worry that *Billboard*'s algorithm to calculate single popularity has changed during the time span under analysis.

The metrics to represent the U.S. economic environment, including GDP per capita (in U.S. dollars) and year-over-year change in GDP per capita (percent, in U.S. dollars) are taken from The World Bank. Because the data for 2013 was unavailable at the time of study, regression projections were made on the GDP per capita for the final year of study. The U.S. Department of Labor's Bureau of Labor Statistics provided the labor force statistics for unemployment in the U.S. "Unemployment" is from monthly current population surveys of persons over 16. Unemployment is represented as a percent of the total labor force. Annual returns on the S&P 500, a proxy for U.S. stock market performance, are from Google Finance and expressed as an annual percent.

Though the variable "death" is not in the final empirical models, it represents the death rate per 100,000 people in the US. The data for "death," used in VIF testing, comes from the National Vital Statistics Report, 2006-2013. The variables "inflation" and "youth" also are not included in the final model, but the data for the VIF tests conducted on those variables comes from The World Bank. "Inflation" represents the annual percent change in consumer prices in the US, and "youth" represents the percentage of the US population ages 0-17.

In looking to summary statistics of dependent variables (see Table 4.1) and independent variables (see Tables 4.2 and 4.3), notable observations can be made about the means of the dummy variables "Male," "Female," "Pop/Rock," "HipHop/Rap/Soul," "First no.1" and "First top 10" and the skewness and kurtosis of "Previous top 10" and "Previous top 100". The means of "Male" and "Female" demonstrate that the majority of songs in sample, at 51.68%, are by either solo male or all-male group artists, while songs by solo female and all-female group artists account for 28.78% of the sample and songs by mixed-gender group artists account for 19.54% of the sample. The largest share of songs in sample, at 45.38%, belong in either the pop or rock genres, while 37.82% of songs are classified as hip-hop, rap, or soul, and 16.80% of songs fall into alternative, country, dance, electronic, soundtrack, or comedy genres. The dependent variables "First no.1" and "First top 10" demonstrate that new artists are fairly rare: only 6.72% of songs in sample are by new artists to the number one chart spot, while 33.40% of songs are by new artists to the top 10 chart. Established artists with a record of previous success created the vast majority of popular songs between 2006 and 2013.

The skewness and kurtosis figures of the "Previous top 10" and "Previous top 100" variables demonstrate divergence from a normal distribution. The high kurtosis of 17.9931 for "Previous top 10" shows fat tails in the distribution of singles: both very established artists and new, unestablished artists achieved successful songs on the top 10 chart. Additionally, "Previous top 10" has a high positive skewness of 2.9956, showing that a few of the popular songs between 2006 and 2013 were created by extremely established artists with an extensive collection of previous hit songs. "Previous top 100" also displays some positive skewness and heavy tails, but its values for skewness and kurtosis are less dramatic than those for "Previous top 10" (1.9405 and 7.4398, respectively). The variable "Previous top 100" more closely fits a normal distribution with a mean of approximately eight previous singles in *Billboard*'s Hot 100 chart before achieving a top 100 single between 2006 and 2013.

Table 4.1 Dependent Variables

	First no.1	*First top 10*	*Weeks*
Mean	0.0672	0.3340	8.9139
Std. Dev.	0.2507	0.4721	6.4042
Variance	0.0628	0.2229	41.0136
Skewness	3.4565	0.7038	0.3670
Kurtosis	12.9470	1.4953	2.1331
Min.			1
Max.			29

Table 4.2 Independent Variables: Economic Factors

	Unemployment	*Log GDP/Capita*	*GDP/Capita Change*	*S&P 500*
Mean	7.1288	10.7942	1.8834	7.0322
Std. Dev.	1.9930	0.0360	2.4687	20.9381
Variance	3.9720	0.0013	6.0947	438.4018
Skewness	-0.1357	0.3813	-0.7340	-1.2820
Kurtosis	1.4447	1.9258	2.2972	3.9332
Min.	4.4	10.7460	-2.91	-40.97
Max.	10.0	10.8542	4.81	31.80

Table 4.3 Independent Variables: Artist Characteristics

	Female	*Male*	*Pop/Rock*	*HipHop/Rap/Soul*	*Prev top 10*	*Prev top 100*
Mean	0.2878	0.5168	0.4538	0.3782	3.2122	8.3824
Std. Dev.	0.0453	0.5002	0.4984	0.4854	4.4114	9.9201
Variance	0.2054	0.2502	0.2484	0.2356	19.4602	98.4472
Skewness	0.9373	-0.0673	0.1857	0.5025	2.9956	1.9405
Kurtosis	1.8786	1.0045	1.0345	1.2526	17.9931	7.4398
Min.					0	0
Max.					37	55

In examining measures of industry concentration, between 2006 and 2013 a clear pattern of permeability for new artists emerges. Figure 4.1 demonstrates three ratios describing new artist entry on the *Billboard* Hot 100 charts. Figure 1 displays the dependent variables: number of new artists that reach number one divided by the total number of artists that reach number one; the number of new artists that enter the top ten chart divided by the total number of artists that enter the top ten chart; and the number of new artists that enter the top 100 chart divided by the total number of artists that enter the top 100 chart. The number of new artists in the top 100, the number of new artists in the top 10, and the number of new artists that place number one as compared to the total number of artists in these respective positions decreases from 2006 to 2011, then increases in 2012 and 2013. The number of new artists in the top 100 versus the total number of artists in the top 100 falls 83% by 2011 then rises 273% between 2011 and 2013. The number of new artists in the top 10 versus the total number of artists in the top 10 falls 59% by 2011 then rises 113% between 2011 and 2013. The number of new artists that reach the number one spot versus the total number of artists that reach number one falls 68% by 2010 then rises 264% between 2010 and 2013. Though “new in top 10” and “new in top 100” reach their troughs in 2011 while “new at number one” reaches its trough a year earlier, these patterns show that over the selected time period,

the popular music industry becomes less permeable to new artist entry but by 2012, sees more new artists achieving success.

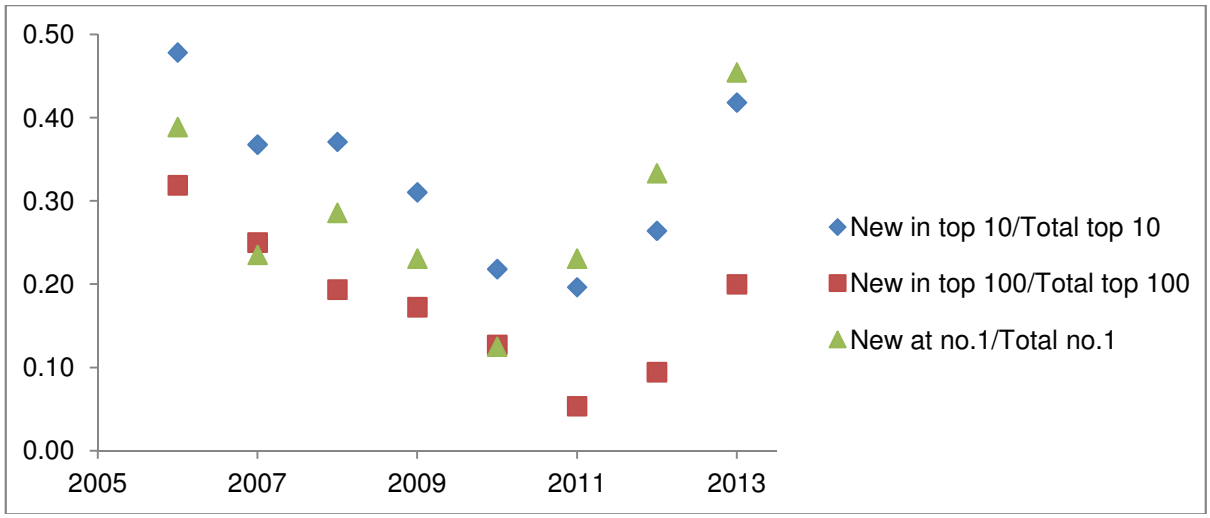

Figure 4.1 New Artist Entry Ratios, 2006-2013

I also correlate each of the above ratios with economic variables denoting economic condition and change, including: unemployment, log(GDP per capita), change in GDP per capita, and S&P 500 returns. The "new 10" ratios are highly correlate d to both the "new 100" and the "new number 1" ratios. The "new 100" and the "new number 1" ratios display a weak positive correlation. In relation to the economic variables used in my regression analysis, the unemployment rate has the strongest correlation to any of the ratios of industry concentration. The unemployment rate is negatively correlated to both the "new 10" and "new 100" ratios and, to a lesser extent, the "new number 1" ratio. Unemployment has a correlation of -0.47 to the "new number 1" ratio, a correlation of -0.77 to the "new 10" ratio, and a correlation of -0.78 to the "new 100" ratio. Other factors contributing to artist popularity and changing industry concentration must be put into place and the above correlations do not establish

causality, but the correlation between falling unemployment and a rising number of new artists achieving success may give insight to the relationship between economic improvement and music industry deconcentration.

5. Results

In my empirical analysis I examine factors based on previous empirical work that inform an artist's popularity. I explore how economic conditions, as expressed by unemployment, GDP per capita levels, changes in GDP per capita, and returns on the S&P 500 affect the consumption of new and established artists (while controlling for artist gender, genre, and the artist's previous success). Probit models examining economic and artist quality factors on the consumption of new music artists offer some insight into the factors of popularity that establish new artists (see Table 5.1).

Table 5.1 Probit Model, "First Number 1"

	Marginal Effect		Standard Error	
Variable	Base	Model	Base	Model
Female	0.0046	0.0044	0.0087	0.0083
Male	0.0047	0.0042	0.0065	0.0059
Pop/Rock	0.0006	0.0015	0.0050	0.0049
Hip-Hop/Rap/Soul	0.0018	0.0038	0.0055	0.0063
Prev Top 100	-0.0033*	-0.0031	0.0020	0.0020
Log GDP/Capita		0.0695		0.0739
GDP/Capita Change		0.0001		0.0008
S&P 500		0.0019		0.0001
Unemployment		0.0001		0.0011

The probit model using the dependent dummy variable "first number 1" has no statistically significant factors to inform a new artist's song placement in the number one chart spot. Though the variable "previous top 100" singles is statistically significant at the 10% level in the base control probit model examining only artist characteristics,

the variable is not significant in the probit model including economic variables. When considering both economic and artist characteristic factors in the model of "first no. 1," there are no strong predictors of contributing factors to new artist success, economic or otherwise.

The probit model using the dependent dummy variable "first in top 10" has four statistically significant factors informing the success of a new artist's song in the in the top 10 chart, but all predictors found are artist qualities rather than economic variables (see Table 5.2). In the model of "first in top 10": being in the pop, rock, hip-hop, rap, or soul genres decreases the predicted probability of a new artist's song being in the top 10, and having a previous song in the top 100 decreases the predicted probability of a new artist's song being in the top 10. The variables "pop/rock," "hip-hop/rap/soul," and "previous top 100" (in addition to the variable "male") are also statistically significant in the base control model without economic variables.

Table 5.2 Probit Model, "First Top 10"

	Marginal Effect		Standard Error	
Variable	Base	Model	Base	Model
Female	0.0347	0.0341	0.0369	0.0383
Male	0.0446*	0.0456	0.0271	0.0278
Pop/Rock	-0.1018***	-0.0997***	0.0345	0.0346
Hip-Hop/Rap/Soul	-0.0652**	-0.0613**	0.0272	0.0276
Prev Top 100	-0.0328***	-0.0336***	0.0060	0.0061
Log GDP/Capita		0.3637		0.3309
GDP/Capita Change		-0.0052		0.0047
S&P 500		0.0000		0.0005
Unemployment		-0.0032		0.0063

* p < 0.10 ** p < 0.05 *** p < 0.01

The Cox semi-parametric duration model demonstrates the independent variables' effects on the total number of weeks an artist's hit spends in the top 10 chart

(see Table 5.3). In this survival analysis, the number of previous top 100 charted singles by the artist and the rate of change in GDP per capita have a significant negative effect on a song's survival time in the top 10 of the chart. The number weeks an artist's song spends in the top 10 has a 1.69% higher hazard of failure as the number of previous top 100 singles by the artist increases by one song. The number weeks an artist's song spends in the top 10 has a 3.57% higher hazard of failure as the rate of GDP per capita increases by one percent.

Conversely, the level of GDP per capita and being a pop or rock artist have a significant positive effect on a song's survival time in the top 10 of the chart. The number of weeks an artist's song spends in the top 10 has a 98.17% lower hazard of failure with a one-unit increase in the log level of GDP per capita. If an artist is in the pop or rock genres, the number of weeks an artist's song spends in the top 10 has a 23.71% lower hazard rate of failure.

Table 5.3 Cox Model, Weeks in Top 10

	Hazard Ratio		Standard Error	
Variable	Base	Model	Base	Model
Female	1.0834	1.0598	0.1519	0.1503
Male	1.0409	1.0380	0.1307	0.1315
Pop/Rock	0.8122	0.7629*	0.1172	0.1114
Hip-Hop/Rap/Soul	0.9738	0.8628	0.1350	0.1239
Prev Top 10	0.9842	0.9807	0.0193	0.0192
Prev Top 100	1.0099	1.0169*	0.0089	0.0089
Log GDP/Capita		0.0183***		0.0264
GDP/Capita Change		1.0357*		0.0218
S&P 500		0.9986		0.0024
Unemployment		0.9930		0.0297

* p < 0.10 ** p < 0.05 *** p < 0.01

Because neither of the variables expressing previous artist success is significant, being an established artist with a previous song in the top 10 or top 100 carries no

weight with the number of weeks a song spends in the top 10. A song can be successful in the top 10 chart regardless of whether the artist has previous chart success.

6. Discussion and Conclusions

Music is the dominant form of culture production in the United States, and the music industry can serve as a model for the public consumption of culture (Anderson et al). My research provides empirical models that examine how modern consumers interact with culture goods under changing economic conditions. I find that between 2006 and 2013 U.S. consumers support stability in the top 10 singles of the *Billboard* Hot 100 chart as economic conditions improve, yet eagerly endorse music by unestablished artists new to the top 10 of the chart.

The Cox model, measuring a song's survival time on the top 10 of the chart, demonstrates that positive changes in the level of GDP per capita increases the number of weeks an artist's single stays in the top 10 of the *Billboard* Hot 100. The negative effect with the change in GDP per capita is a fraction of the positive effect with the level of GDP per capita on a single's chart longevity. Economic conditions indeed inform artist success in the music industry. As GDP per capita, a metric of social well-being, increases, consumers endorse stability in the culture they consume. As social well-being increases, there is less chart turnover of both established and new artists. This stability within the top 10 of the chart may reflect the larger social stability that the consumer experiences during times of economic prosperity.

The positive relationship between economic growth, unestablished artist entry, and song longevity are supported by research by Cowen and Grier, who argue that incentives for artists to create art grow with a growing economy, and that art industries

experience positive effects from rising wages. Additionally, in looking to data from 1995 through 2008, Hong finds that levels of GDP positively enhances a single's life at the number one chart position.

For an artist who has never been in the top 10 of the chart, being in the pop, rock, hip-hop, rap, or soul genres decreases the chance of the artist's single breaking into the top 10. In the sample of new artists to the top 10 between 2006 and 2013, 38% belong in the pop or rock genres and 34% belong in the hip-hop, rap, or soul genres. The remaining 28% of new artists to the top 10 are split between the alternative, country, dance, electronic, soundtrack, and comedy genres. The pop and rock and hip-hop, rap, and soul genres have the highest number of artists and the highest competition within the genre; this competition serves as a barrier for singles of these genres to enter the top 10 of the chart.

If an artist has never been in the top 10 of the chart, the artist's previous success in the *Billboard* Hot 100 chart decreases the chance that their new single will break into the top 10. New artists to the top 10 have a better chance of breaking in if the artist's past music is less successful and consumers have less exposure to the artist's previous work. As observed in the Cox duration model, having previous singles in the top 100 decreases the number of weeks an artist's current single spends in the top 10 of the chart. In examining chart dynamics between 2006 and 2013, consumers demonstrate a preference for newness and endorse the music of less-established artists.

This preference for newness contradicts previous literature. As argued by Klemperer (1995), switching costs including time costs, learning costs, personal relationship loss costs, and brand relationship loss costs serve as barriers to the

consumption of new experience goods like music. In previous empirical studies researchers find that an artist's past success significantly informs the artist's future success in the music industry, and that consumers endorse the music of established artists. However, there are discrepancies between these studies and my own. Between 2006 and 2013 consumers access music and artists in completely different ways than in periods capturing the 20th century.

Anderson, Denisoff, Etzkorn, and Hesbacher (1980) analyze stability and change in the culture industry using pop and rock music between 1940 and 1977. In Hamlen's model career longevity informs the success of future record sales, but Hamlen only looks at sales of the album and uses data from 1955 through 1987 (1991) . Crain and Tollison (1997) look into artist concentration and artist popularity using *Billboard* chart data from 1959 through 1988. Alpert (1983) shows that previous success positively enhances the future success of an artist's album, but he uses data only from 1983. Strobl and Tucker (2000) explore dynamics of success in the U.K. music industry using data from 1980 through 1993 and do not control for gender or artist genre. Bradlow and Fader's findings from 2001 also support the bandwagon effect of superstar's success, but they only model this success with singles on the *Billboard* Hot 100 in 1993. Hendricks and Sorensen's research from 2009 demonstrates the skewedness of success toward established artists through testing music industry dynamics between 1993 and 2002.

The data in previous studies is weighted to albums and songs created and consumed in the second half of the 20th century—during this time the music industry lacked the dynamism given by more modern technological progress, internet resources,

and increased access to information. Bhattacharjee, Gopal, Lertwachara, Marsden, and Telang (2007) argue that technological capabilities enhance consumer engagement with artists. The internet and its information-sharing platforms can reduce the risk of quality uncertainty and the search costs associated with pursuing a new artist. Bhattacharjee, Gopal, and Sanders (2006) also argue that the increased availability of information via the internet and online sharing technologies reduce the costs to consumers. The internet reduces the consumer's exposure value uncertainty and the variability in consumer expectations historically tied to engaging with a new artist. The preference for cultural newness aligns with past literature that times of economic improvement see a more eager endorsement of culture goods, particularly new, innovative, and otherwise unseen (or unheard) art.

As an experience good, music must be listened to for a consumer to observe its quality and to gain utility. Today consumers use a variety of sources to connect with other consumers regarding artists and their songs. Artists have fan pages on blogs and social media websites in which consumers can engage with other fans from anywhere in the country. Artist concerts are broadcasted live from YouTube.com. Any established radio station in the U.S. can be accessed through the internet and by cell phones with Wi-Fi or a data plan. The expanding capability of technology and availability of information lowers the costs of listening to and engaging with new artists for consumers. The technology of the 21st century effectively increases the ability for new artists to access consumers and vice versa, allowing an artist to achieve success regardless of their previous success.

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