The Bowie Effect: Investigating the Influence of Technology on the Market for Concert Tickets

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Abstract:

A fundamental question in many economic studies relates to the substitutable or complementary relationship of different goods. The Bowie Effect is a change in relationship between live music and recorded music from complementary to substitutable. I consider the specific case of recorded music and live music from 2001 to 2007. A dataset of 700 tours sampled from the 100 top grossing tours for the time period is analyzed against data describing price and availability of internet, cable, and compact discs. Price changes in possible substitutes result in changes in quantity demanded which are statistically indistinguishable from zero. This may be the first empirical paper testing the Bowie Effect and sets the groundwork for future study.

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I. INTRODUCTION

In 2002 David Bowie said “Music itself is going to become like running water or electricity” (Pareles, 2002). Economists listened and wondered what he meant. Bowie went on to say that musicians had better be prepared to tour nonstop in order to support themselves; touring would be the only “unique situation that’s going to be left” (Pareles, 2002). Though he never stated his argument in economic terms, Bowie reasoned essentially this: recordings of what musicians do have become better and better imitations of what musicians do. The prices of these recordings have fallen which will cause people to buy more recordings and attend less concerts. The experience portion of attending a concert will become the only appreciable difference between recorded music and performed music. Recordings of the musician performing will become close substitutes for the actual experience of seeing the musician perform.

Everyone who enjoys attending concerts or adding to his or her record collection ought to consider the present state of the market and look toward its future. Those who love to discover new music through YouTube, social networking, Pandora, or other internet utilities probably already have an intuitive understanding of the reasoning behind Bowie’s predictions. If David Bowie spoke the truth, then we can predict how concert prices will be affected by record sales and the changing availability of other substitutes.

With rising concert ticket prices, expanding access to high-speed internet, computers, television via cable and satellite, determining how these phenomena fit together and affect one another is of great importance to anyone interested in music, technology, or both. Less than a decade ago few could have fathomed the exponential increase in the volume and quality of media available through the internet, or the rapid rise in the number of internet users. Between

2004 and 2006 revenue from legal digital music downloads increased from $183 million to $878 million; that comprises a 479 percent increase in two years. Increased prevalence of bit torrent downloading websites makes it likely that illegal music downloading has grown at the same rate if not more. Oberholzer and Strumpf (2004) found that they observed ten song downloads per minute over the course of collecting over 1.75 million observations of peer to peer music downloads. They estimated that for every song downloaded via a pay service, that song is downloaded 4 to 15 times through peer to peer services.

Many authors have written on how increased access to recorded music over the internet has affected the recorded music industry, but few have considered how this phenomenon has affected the live music industry. The next section contains a review of the existing economic literature on concert ticket pricing; an explanation of the economic model follows that. The empirical results can be found next followed by the conclusions of the paper.

II. LITERATURE REVIEW

In order to understand the Bowie Effect one must first consider the topic of concert tickets in a more general way. The pricing of concert tickets piques interest initially because of the fact that the industry is characterized by high fixed costs and very low marginal costs. Another initial consideration is how to model or determine firms' pricing strategies when they face fairly high fixed costs in the purchase and upkeep of a venue, vastly mutable variable costs depending on what type of act to book, or merchandise to sell, and extremely low marginal cost. In fact, the marginal cost for selling the next ticket could include as little as the cost of the paper and ink to print it. This negligible marginal cost continues until the binding quantity of maximum capacity, creating a market in which short run supply is perfectly inelastic. Courty (2000) has written on ticket pricing in general, among his work is a fairly comprehensive discussion of many of the related issues, including price discrimination (called “scaling the house”), venues competing for acts, primary and secondary markets for tickets, capacity constraint, demand uncertainty, and complementary goods.

1. Competitiveness and Implications for Pricing

The question of whether the market is competitive or monopolistic arises since a given artist can play only one venue per night. With an artist playing one venue per night, and venues having different characteristics, the market may take on some characteristics of monopolistic competition. Venues plaster bills all around town exclaiming that a particular band will be playing on *their* stage for *one night only* this year, so if you want to see that band, you must patronize that venue. Many authors consider the music venue as a monopolistic firm; Sherwin Rosen and Andrew Rosenfield (1997) investigated different aspects of ticket pricing, developing a theoretical model based on the venue selling tickets as a monopolistic firm, often engaging in price discrimination.

Volker Nocke and Martin Pietz (2004) considered whether firms ought to engage in practices like introductory offers and final sales as opposed to uniform pricing. This is relevant because often different firms engage in different pricing methods, sometimes increasing prices as the performance date approaches, sometimes maintaining uniform pricing. Under the kind of demand uncertainty that ticket selling venues face, Nocke and Pietz’s model predicts that profit is maximized by having final sales, that is, decreasing price as concert dates approach. Increasing price as the concert date approached garnered the lowest profits in the model, and uniform pricing resulted in a middle level of profit. These findings seem to contradict the pricing practices of some successful outdoor festivals such as the Bonnaroo and Austin City Limits festivals, which increase the prices for tickets as the event date approaches. This could be because of the increased planning necessary to ensure adequate supplies of necessities for festival-goers. Providing further specificity, Pascal Courty (2003) considered ticket pricing under demand uncertainty. He finds that there is never a time when rationing ticket sales by time period is optimal. These findings agree with Nocke and Pietz (2004). Courty (2000) concludes that the two strongest pricing strategies for monopolistic ticket selling firms are to sell on a short time interval to informed, high valuation consumers or sell earlier to less informed, possibly lower valuation consumers. The second strategy is designed to cause other consumers to fear that tickets may become unavailable later, thus leading to a "buying frenzy".

2. Experience Good and Mob Good

DeSerpa (1994) describes live music as a mob good: part of the utility of the good comes from that good's consumption along with other people. Others such as Alan Krueger (2005) consider it as merely an experience good. The concert as experience good idea derives from the fact that no concert attendee can predict exactly how the concert will go that night; perhaps the singer has a sore throat, or the guitarist sprained a finger and cannot play with as much virtuosity as normal. There can be technical issues with amplifiers or speakers, health issues with the band, or other unforeseen events. Malfunctions of pyrotechnics or other stage equipment provides a tragic example of such an event. Then again, any given concert could be a particularly good one for any of these reasons. With a mob good part of the utility associated with the good itself is the experience of consuming it along with other consumers: the mob good is a subcategory of experience good. In another article, DeSerpa (1996) notes that "the 'mob' itself provides an important joint product that cannot be obtained if buyers consume the ordinary commodity in isolation". The mob good aspect of a concert comes from the utility gained by enjoying a concert with a friend, or just with a large group of people who enjoy similar music. The crowd noise and mass of people in a confined space, which some might consider to reduce utility under other circumstances, becomes part of the enjoyment of the concert.

3. Scalping

Another topic of great interest in ticket pricing is scalping. Most writers acknowledge the existence of this secondary market as a self-correcting mechanism for misallocation in the primary market. Courty (2003) also notes that the traditional explanation for the misallocation in the primary market is due precisely to demand uncertainty faced by firms – it makes more sense for them to under price and sell out than to overprice and not cover costs. This is especially true in a market in which demand would likely be more elastic than, say, the market for food or clothing, since concert-going is considered a more recreational and luxury activity than eating or keeping warm. Writers have spilled a great deal of ink on the topic of scalping and secondary markets for tickets in general, including Swofford (1999), Williams (1994), and others, so the question that arises is whether or not concert tickets have been chronically underpriced. Halcoussis and Mathews (2007) provide evidence that selling concert tickets on an auction system, in their case using Ebay, allowed high valuation consumers to overbid low valuation consumers and thus result in better allocation of tickets, reduced scalping, and more revenue for the selling firm due to more consistently practiced third degree price discrimination.

4. The Pricing Decision and Demand

Daniel Marburger (1997) has considered optimal pricing for performance goods by including terms for concession sales, sales that occur inside the venue separate from the ticket price, in his model and assumes marginal cost of a ticket to be trivial in the model. Concession sales included food, beverages, and venue specific merchandise. Marburger found that without the concession element, firms would tend to set prices within the unit elastic segment of the demand curve. When Marburger included concession sales as part of the pricing decision, venues tended to set prices in the more inelastic section of the demand curve. This indicates that venues would sacrifice revenue on ticket sales in order to provide themselves the opportunity of generating additional revenue from concession sales. These findings seem reasonable since once a customer has entered the venue, he or she has effectively subjected him or herself to a monopolistic market for food and beverages. Often, venues will not allow outside foods or beverages, thus creating an environment in which the venue can ensure that it will be the only producer in the market for food and drinks. One may observe similar phenomena in movie theaters, theme parks, and sporting arenas; consumers and producers both know that the monopolistic price within the confines of the environment is far above the competitive market price outside of it.

Empirical work by Moe and Fader (2008) has supported the theory that decreasing price as the concert date approaches can lead to increased profit; showing that generally lower and mid level valuation consumers buy tickets later – and at lower price tiers – than higher valuation consumers. Moe and Fader raise the possibility that this is due to fear of capacity constraint in high valuation consumers – this uncertainty leads to excess demand among higher valuation consumers and may lead to an incentive for intertemporal pricing in order to compound the increased demand. Other writers have considered intertemporal pricing strategies as well as the excess demand created by buying frenzies. DeGraba and Mohammed (1999) describe a model of intertemporal mixed bundling in which goods bundled in an initial time period create increased demand by threatening shortages to the high valuation consumers; this increased demand in turn creates an actual shortage in the second time period market for individual goods. Excess demand is also considered by DeSerpa (1994) in relation to ticket pricing in general. While the majority of DeSerpa's analysis regards season tickets applied to sports teams, season ticket analysis is also applicable to theater and orchestral ticketing policies.

If concert tickets had been chronically underpriced, they are certainly on track to remedy that situation. Connolly and Krueger (2005) document the rapid increase in ticket prices since the mid-1980s – on average outpacing CPI by as much as 11%. In considering this expansion of prices for concerts, the authors also ask us to keep in mind decreases in overall ticket sales, but large expansions in total revenue, most of which is accruing to a small segment of high-grossing acts. Krueger also noted that over 60% of revenue for recorded music (compact discs, cassettes, vinyl albums, and DVDs) comes from 25% of the consumers in the market. Jeff Leeds (2004) of the New York Times noted that many record companies have started to release deluxe compact disc packages (which contain t-shirts, posters, books, or other bundled products) in addition to their traditional compact disc products. This indicates that the devoted, top end of the market might provide the source of revenue that record companies need in the future as prices for recorded music decrease for the majority of the market.

This article, and another by Krueger (2005), investigates the effects of technological change on ticket prices and markets. The latter notes that "from 1996 to 2003 average concert ticket price increased by 86%, while the CPI increased by 17%"; in this article Krueger concludes that the decrease in the complementary relationship between concert tickets and recorded music, due to increased file sharing and CD copying have led to the increase in concert ticket prices. This phenomenon Krueger had termed "The Bowie Effect" after the quotes attributed to David Bowie. While other economists have studied how venues set prices for concert tickets, few have focused on the demand side of the market. My interest lies in discovering what changes people's willingness to purchase concert tickets.

III. MODEL

Record companies adopted a business model one hundred years ago which assumed that recorded music and live music were complements. To the mind of the record executives, more consumption of one meant more consumption of the other. Technological innovation, which reduced the cost of producing recorded music, led to increased sales of both recorded music and live music. Figure 1 demonstrates this model. This phenomenon occurred because as production costs decreased, more firms could supply recorded music at the market price. Competition and other market pressures forced the price of recorded music down which changes the slope of the budget constraint (denoted P in the Figures) and shifts the intercept of the Qr (quantity of recorded music) axis up. As a result, consumers buy more records. Since recorded music and live music are complementary, consumption moves from point A to point B.

Historical examples of this model would include the technology that allowed changes from tin cylindrical phonographs to acetate records, and eventually to polyvinyl records (like the kind some of us still have at home). The eventual introduction of mediums such as Stereo 8 and cassette tapes also followed this model. The presence of lower cost methods of creating, reproducing, and distributing recorded music led to lower consumer prices; this in turn led to increased sales of recorded music, and higher attendance at live popular music concerts. This model was based on the assumptions of the music industry and is not tested empirically in this paper; it is included to demonstrate the difference between the predictions of the older model of concert and record consumption and the Bowie Effect model.

That model continues up through the introduction of the compact disc. The decades from the 1980s and 2000s could represent the first step in a significant change in behavior for three reasons. Two of these reasons resulted from increasing availability of personal computers and the standardization of the compact disc's digital data format as a music storing medium. First, the mp3 file, because of its digital format, has ushered in an age of rapid, high quality, and easy digital generation and replication of music. Since the music is stored as data on a compact disc the reproduction of that data is as simple as making a copy of any data with a personal computer. This capacity to reproduce music at nearly zero cost means that the music can be obtained without purchasing it from the firm that first produced it.

The second main cause of change is the steep rise in the availability and usage of the internet. The ease of data transfer between personal computers amplifies the speed and ease with which any digital recording can be disseminated outside of the firm's ability to set or enforce prices. Free-riding becomes rampant because there is no cost-effective mechanism to enforce excludability in the consumption of the music once it has entered a digital format. Even though the technological change that allows for mp3s and internet file sharing has also decreased the price of producing recorded music for firms in the form of compact discs, the technology also causes a free rider problem. Record companies have started to invest in countermeasures such as DRM to keep people from freely recopying digital music

Increased availability of other substitutes such as music television, streaming internet radio, and YouTube at a lower price is the third factor driving the change in consumer behavior. The low price of consuming content from the internet or television means that recorded music has become available on demand at a negligible marginal cost. Combine this with the fact that recorded music has become a better substitute for live music in regards to sound quality, and it seems to make them even closer substitutes. Music television introduced the music video and internet content also often involves a visual component to the performance. The presence of a visual element could also make the recorded music experience a closer substitute to live music.

Figure 2 presents the predictions of the Bowie Effect model. The Bowie Effect essentially predicts that the same technological innovations which reduce the cost of producing, disseminating, and consuming recorded music will also serve to make recorded music a closer substitute with live music. As previously discussed, this idea is observable throughout the history of recorded music to some level, as far as the quality of the recording better approximating the sound quality of live performance. As technology progressed sound quality became better; early problems such as hiss, difficulties in accurately reproducing deep or bass tones, and short usage life as well as lack of reliability of recordings were all steadily resolved. The main difference was that there still was nothing quite like the "real thing", and technology had not yet improved to such a point where recorded music could be produced with near flawless sound quality and distributed via massive networks of interconnected electronics such as television networks, both cable and satellite, or the internet.

A mathematical representation of the model would include an exogenous variable T for technology level, of which both price level and marginal utility of recorded music would be functions. Generally, year could be an adequate proxy for the technology level T since technology generally increases with time. This indicates that the marginal rate of substitution between recorded music and concerts, MUr/MUc, would change with the change in T. Since live music is the metric against which recorded music has been most often judged, as the value of T increased, a corresponding increase in the marginal utility of recorded music would bring it closer and closer to meeting the marginal utility of live music at all possible consumption levels and the marginal rate of substitution would eventually become nearly constant for all levels of consumption.

The flattening of the indifference curve and the lower cost of recorded music may result in a decrease in the quantity of live music demanded by consumers and an increase in the quantity of recorded music demanded. This model assumes that the substitution effect of having the relative cost of recorded music decrease in comparison to live music will outweigh the income effect, which would increase consumption of both goods as the real price of recorded music decreased compared to all other goods. Consumption, on Figure 2, will move from point A to point B. This is where I anticipate the situation stands now, with recorded music a much better substitute for live music than it once was. If recorded music and concerts are in fact better substitutes than they once were, changes of the price of one good should affect the quantity of the other good sold. Therefore, if the price of records falls, less concert tickets will be sold.

Recorded music is also nearly free or at the very least has a negligible marginal cost; available through television, internet file-sharing programs, streaming internet radio, and YouTube. The recording industry has realized the new situation and has reacted by cutting compact disc prices and setting up pay-to-download internet services. Some bands have even released albums solely on the internet, bypassing compact disc format altogether. Radiohead's recent *In Rainbows* is probably the best known and most high-profile example of this; there is also the eponymous self-released debut album by Clap Your Hands Say Yeah, which was praised by David Bowie himself.

Figure 3 predicts the result of a full or extreme Bowie Effect, in which recorded music and live music become perfect substitutes. The quantity of concerts consumed would drop to zero because of the much lower cost of recorded music and the nearly perfect substitution between to two. This kind of result may occur in the future; indeed one can easily imagine this case frequently depicted in science fiction films and novels. These technologies could include large scale interactive holography (which incidentally is very similar to sound recording, using the imprint of light waves on crystalline structures), brain implants providing constant and instantaneous connectivity to information networks, and other as yet unrealized advances.

IV. EMPIRICAL RESULTS

1. Econometric Models

The econometric model to be estimated is an Ordinary Least Squares regression. The chosen specification measures the cross price elasticity of concert tickets and substitutes; the use of quantities and prices transformed by the natural logarithm function provides the necessary information to interpret the cross price elasticity directly. This specification using the logarithm provides a measure of cross price elasticity directly since it measures percent change in quantity of tickets sold for a given percent change in prices.

The logarithm of the average quantity of tickets sold for each performer per concert on a given tour acted as the dependent variable. By using this as the dependent variable, I intend to gain an approximate measurement of the percentage change in quantity of tickets demanded depending on the change of the independent variables. The independent variables of interest included the logarithm of the price index for a monthly internet subscription, the logarithm of the cost of a record in the form of a compact disc in 2001 dollars, and the logarithm of the monthly cost of a basic cable subscription in 2001 dollars. Including a variable containing the logarithm of the deflated average price for a concert ticket allows us to observe the effect of a percentage change in real price on quantity demanded. This allows us to take the coefficients of the estimation as a price elasticity of demand for concert tickets.

Models were specified using normal ordinary least square regressions, least square regressions paneled by artist, and least square regressions paneled by artist with instrumental variables. Since the price of a concert ticket was used as an independent variable determining the quantity of tickets sold, the model may suffer from endogeneity. Hausman tests were completed for model specifications with random effects and fixed effects against equivalent models with the concert ticket price variable instrumented out. The variables chosen to instrument the concert ticket price variable out were the number of cities the tour traveled to, the number of shows the tour included, and the agency that conducted the tour. The number of shows and cities would be independent from ticket quantity because the ticket quantity variable was an average per show, so the intuition is that a tour performing more shows in more places would have more costs to cover, so the ticket prices for these tours would be higher, on average. These variables were meant to provide a proxy for costs associated with producing the tour. Touring agency was also used, with a binary variable set up for each agency.

The Hausman tests revealed that the fixed-effect specification with instrumental variables was not significantly different from the specification without instrumental variables. The random effects model, however, was statistically significant in the difference between the specification with and without instrumental variables. This indicates that the instrumental variables are necessary in the random effects model in order to avoid endogeneity. Sargan tests, however, found that the instrumental variables used were invalid. Thus these results indicate that the fixed effects model is not improved by the use of instrumental variables, but the instruments used would have been valid if they were necessary; while the random effects model needed instrumental variables to control for the endogeneity of the concert ticket prices but the instruments chosen were invalid ones.

Since the model predicts that concerts and recorded music have become substitutable, we expect positive cross price elasticity. When prices of records increase, the quantity of concerts attended should increase as well since consumers shift away from the now relatively more expensive item towards its substitute. If prices of records decrease, quantity of concerts should as well. This ought to occur as long as the substitution effect between the two goods outweighs in income effect of having more income relative to the overall price level. Since the model anticipates a decrease in the price of recorded music, we expect to see the dependent variable decrease as well. Based on these considerations the model predicts a positive coefficient for each of the price related independent variables.

2. Data

The data used for this paper came from sources well known in their respective industries. Pollstar, a magazine covering the live music industry, provided data on musicians' tours from 2001 to 2007. The tour data provided for analysis comes from lists of the top 100 grossing tours in North America for a given year. From this list of 700 tours, 646 tours were accepted as part of the sample, rejected observations included comedy tours, circuses, and dance/performance art tours. This was in order to create a set of panel data which could track changes in tour characteristics by year while holding the unique characteristics of each artist constant, as well as to keep our scope of analysis within the music industry. Initial analysis included regressions on the data paneled by artist and year, as well as ordinary least squares regressions without paneling.

Initial issues of selection bias resulted from the available data, which contained only observations in the top 100 grossing artists of the year. This pool of available data represented the most successful musicians, and thus presumably higher ticket prices and numbers of tickets sold than an average touring musician. Since the tour observations come from a very specific segment of the market – that is, the highest grossing tours of the year – the sample may not be representative of the market as a whole. Trends occurring in the market generally over the last eight years may not be picked up in the sample because of the unique nature of the artists considered. Many of these artists have been popular for decades and are getting closer to retirement; there may be an effect of people just wanting to go see these artists before they retire. One might expect the concert market more generally to have this effect much less pronounced. Conducting the sampling in a non-random way further altered the relationship of the sample data to the population. Instead of measuring a random sample of the full population of touring musicians, the sample became a sample of the population of musicians capable of conducting a top 100 grossing tour.

The bias of the sample implies that the coefficients of regressions performed on the data will be specific to the very top end of the market. As previously mentioned, any given venue has an extremely inelastic short run supply of tickets, since each venue can only sell the amount of tickets that will fill it to capacity. With very popular artists this presents a methodological problem because demand will soar above supply in these cases. For this population, the higher prices, charged presumably by the most popular bands, will coincide with higher quantities of tickets sold because of the increased likelihood that these artists' concerts sell out. Coefficients one would normally expect, such as a negative relationship between price and quantity, could wind up reversed.

Some artists, such as Bob Dylan, appear on this list every year; as they are perennial favorites and maintain nearly non-stop touring schedules. Other artists appear only a handful of times either because they tour infrequently or take years off in between tours. The minimum number of tours by an artist is 1, the maximum is 7 and the mean is 1.6. The average year of the sample tours is 2003.99; Figure 4 illustrates the number of sample tours per year and demonstrates that the sample contained a fairly even distribution of observations from each year. The average rank of the sample tours by gross revenue was 50.16, indicating that the sample was balanced between the better ranked, and thus higher grossing tours, and some of the lower ranked, lower grossing tours. The characteristics of each observation include the average ticket price, average quantity of tickets sold per show, average revenue per show, total tickets sold by tour, the number of cities the tour visited, and the total number of shows played.

The Recording Industry Association of America (RIAA) provided data describing the sales of recorded music in the form of compact discs, cassettes, and vinyl. These data were used as characteristics for the years in which the tour observations occurred. Supplementary data on recorded music sales came from the International Federation of the Phonographic Industry (IFPI). I chose to use the RIAA data, which was more complete and went back to the early 1990s. Figures 5 and 6 show that although costs of recorded music have decreased since 2001, quantities of recorded music sold have also decreased. Data on cable subscriptions and prices were garnered from the National Cable and Telecommunications Association. Figure 7 shows that the real price of cable subscriptions has increased since 2001 and Figure 8 indicates that cable subscriptions have not shown a steady upward or downward trend.

Real prices of concert tickets have shown a positive trend over the sample period as demonstrated in Figure 9. Contrast this with Figure 10, which shows a clear downward trend in internet subscription prices. Both Figures 11 and 12 display views of estimated percentages of US households with internet access; one is a short run view, the other a long run. There is clearly increased quantity of internet access and decreased prices, two trends which would bode well for the predicted Bowie Effect.

The data on home internet and computer usage comes from U.S. Census as part of the Current Population Survey (CPS). Since the CPS only recorded observations of internet and computer usage in 1997, 1998, 2000, 2001, 2003 other data observations were interpolated and extrapolated to give an estimate of computer and internet usage percentages in U.S. households from 1997 through 2007. The Bureau of Labor Statistics produced the price index for internet subscriptions. The index runs from 2001 to 2007 with 1997 as the base year. Census data was also used for measurements of the CPI to standardize prices to 2001 dollars, and GDP per capita as a control variable for overall economic climate.

3. Results

Table 2 contains the OLS regression results for the three main specifications. In all three, the independent variable accounting for the price of the concert ticket had a statistically significant positive coefficient, indicating that more expensive tickets sold higher quantities than less expensive tickets. The only other statistically significant variables in these models were the variables for number of cities and shows that the tour covered. The negative coefficients for both of these variables indicate that tours that went to more different cities and played more shows tended to sell less tickets on average than a tour going to fewer cities and playing fewer shows. This could be because better established artists have reliable demand for the tickets to the shows that they do play, so they do not have to tour in as many cities or play as many shows. The main issue with these results, besides statistically inconclusive coefficients on the main explanatory variables of interest, is that the use of price as a determinant of quantity presents the problem of endogeneity into the model since price and quantity are simultaneously determined in supply and demand models.

Table 3 contains the results of the panel regression specifications, which have R-square values between 0.04 and 0.1; the independent variables in the model can account for about 4 to 10 percent of the variation in the quantity of tickets sold. The coefficient of the variable containing the logarithm of the price of cable subscription is positive for the specifications not using instrumental variables (though statistically insignificant in all but one specification), indicating that when prices of cable subscriptions increase the quantity of concert tickets bought decreases, and when cable prices decrease the quantity of concert tickets bought decreases as well. The cross price elasticity is thus positive and indicates that cable and concerts are substitutes. This can only be stated with reservation, since the effect of this variable is not statistically significant for any specification except the fixed effects regression paneled by artist and without instrumental variables. The variable for internet subscription prices exhibits a statistically insignificant negative coefficient in four out of five specifications. This indicates that internet subscriptions and concerts have negative cross price elasticity and thus are complements, but once again, the results are statistically insignificant. A negative, though again statistically insignificant, coefficient for the logarithm of compact disc price once again indicates that records and concerts are complements.

None of these outcomes are convincingly statistically significant. Though one of the coefficients happen to match the prediction of the model in a few specifications, no one can make a sure interpretation of the econometric model as it stands and the results remain ambiguous. The ambiguity of the coefficients for these variables could indicate that though recorded music and live music have become substitutes, the income effect of reduced prices for recorded music has baffled the substitution effect. If the income effect dominates, it could entirely swamp the substitution effect and make the coefficients of the econometric model statistically insignificant or significant in the wrong direction.

The average price of the concert ticket proved to be statistically significant independent variables in two specifications of the model: both with random effects. The positive coefficient goes completely contrary to economic intuition; showing that as prices increase, the quantity of tickets sold also increased. In order to understand this result one must consider the previously mentioned issue of market segment represented by the sample. For these musicians, all grossing in the top 100 tours in North America, demand expands at an even faster rate than price increases and short run inelastic supply contributes to the problem. Some of the artists, most notably Tom Petty and Bruce Springsteen, make normative efforts to keep the prices of their concert tickets below profit maximizing levels in order to allow lower income fans to attend their concerts. This fact, combined with demand increasing at an enormous rate for older musicians such as Bob Dylan and the Rolling Stones, leads to a market in which quantity of tickets sold can increase even while real prices for tickets increase as well. Another possibility is that the fans of these top grossing musicians tend to be of an older generation; perhaps this cohort has a lower rate of using the internet as a way to obtain substitutes for experience goods than the cohort maturing with more exposure to the internet.

V. CONCLUSION

The econometric models used found no significant change in the quantity of concert tickets sold when prices of recorded music changed. The expected results did not occur for most of the variables in the regression model. One must keep in mind that since the sample used for this analysis represents the cream of the crop, the market for these tickets does not necessarily reflect the exact state of the rest of the market. There may be distortions at the top of the market for concert tickets. These results indicate that the hypothesized Bowie Effect does not significantly affect the market for concert tickets at this time in the upper segment of the market.

The results may be so inconclusive because the model assumption that the substitution effect would overpower the income effect did not exist. If this happens to be the case, a sample of another segment of the market would not likely yield any better results unless the consumers in these different market segments had vastly different demands. If, on the other hand, the econometric model did not achieve the predicted results because of the complications of the sample bias, hope yet remains that a more comprehensive data sample could bear relevant and predicted results.

For the music industry, these results indicate that there is no clear move towards recorded music or live music. Prices of recorded music have fallen, and demand has fallen faster. Live concerts have maintained revenue even though concert attendance has dropped thanks to higher ticket prices. The industry seems to be increasing prices in the hopes that the devoted fans will have an inelastic enough demand that even though some consumers might become priced out of the market, enough additional revenue can be extracted from the remaining customers that profits will not fall.

The econometric analysis in this paper investigated the current state of the market but did not empirically test the hypothesis that concert tickets and recorded music used to be complements. Further research ought to test the past market for the characteristics that it would have under the model of the Bowie Effect, such as negative cross price elasticity. In the future, empirical analysis could make use of a broader and more representative sample of data in order to get a picture of the concert ticket market as a whole; instead of just the tip of the iceberg contained in this sample.

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VII. DATA APPENDIX

Tour Characteristics from Pollstar Yearly Reports

- Average ticket price
- Average tickets sold per show
- Total tickets sold
- Average revenue per show
- Cities
- Shows
- Total revenue
- Rank by gross revenue
- Split headline

Cable Industry Statistics by Year from National Cable and Telecommunications Association

- Quantity of basic cable subscriptions
- Quantity of premium cable subscriptions
- Number of cable systems nationwide
- Revenue from basic cable subscriptions
- Revenue from premium cable subscriptions
- Total revenue from cable subscriptions
- Network revenue
- Local station revenue
- Sports related revenue
- Cable advertising revenue
- Average price of basic cable monthly subscription

Output Indices for Broadcasting Industries by Year from Bureau of Labor Statistics

- Total broadcasting output
- Radio and television output
- Radio output
- Television broadcasting output
- Cable output
- Cable distribution output

Producer Price Indexes for Recording Industry by Year from Bureau of Labor Statistics

- Production costs for cassettes, compact discs, and records
- Production costs of visual media
- Production costs of other media

General Economic Indicators by year from Bureau of Labor Statistics

- CPI
- GDP per capita

Census Household Surveys and Current Population Surveys

- Estimated percentage of US households with computers
- Estimated percentage of US households with internet access
- Estimated percentage of US households with cable

Artist characteristics from Billboard

- year of first studio album release
- total number of studio albums released

Record Industry Statistics by Year from International Federation of the Phonographic Industry and Recording Industry Association of America

- Total quantity of compact discs sold
- Total revenue from compact discs sold
- Total quantity of digital music sales
- Total revenue of digital music sales

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- Price Index for Monthly Internet Access reproduced

VIII. FIGURES

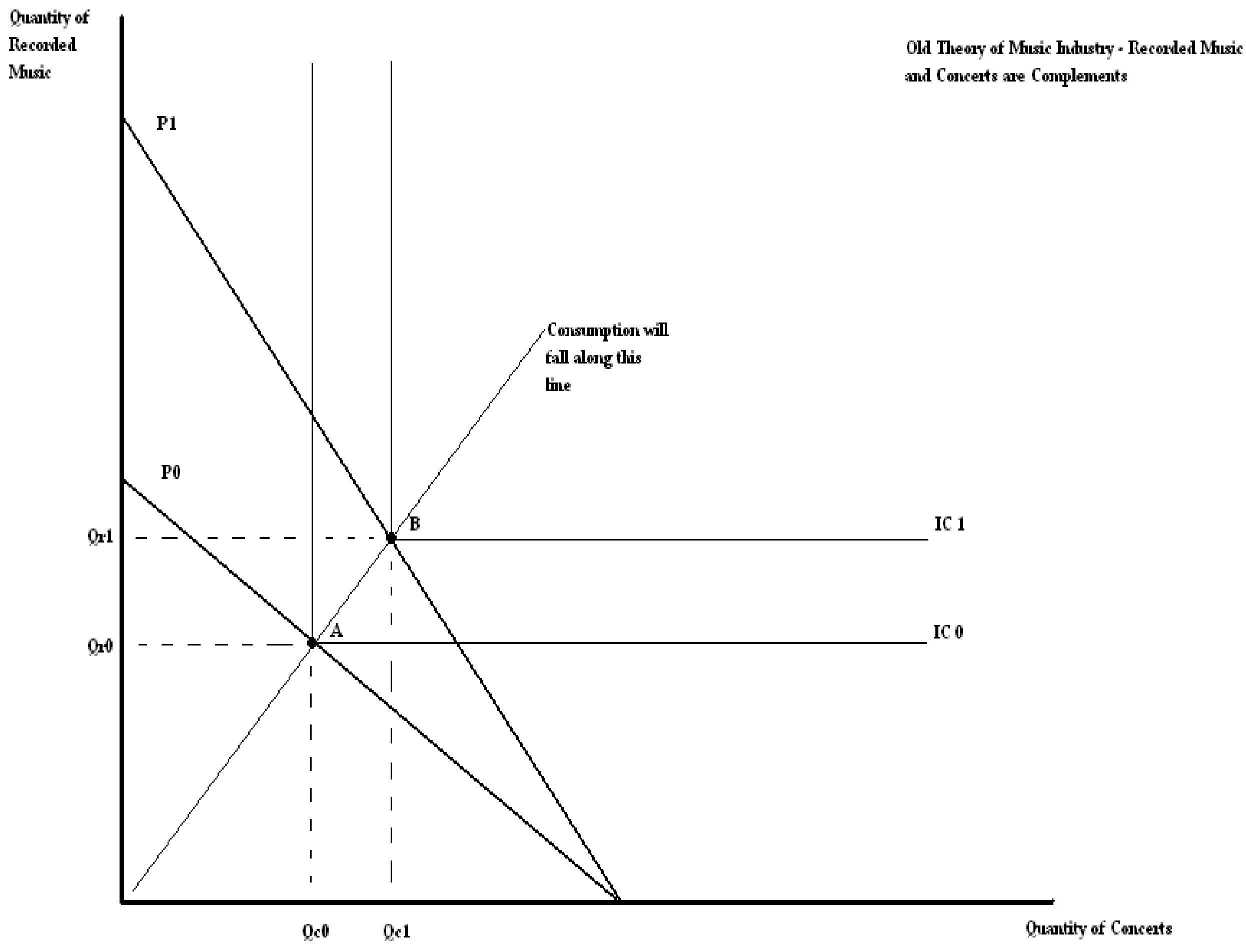

FIGURE 1

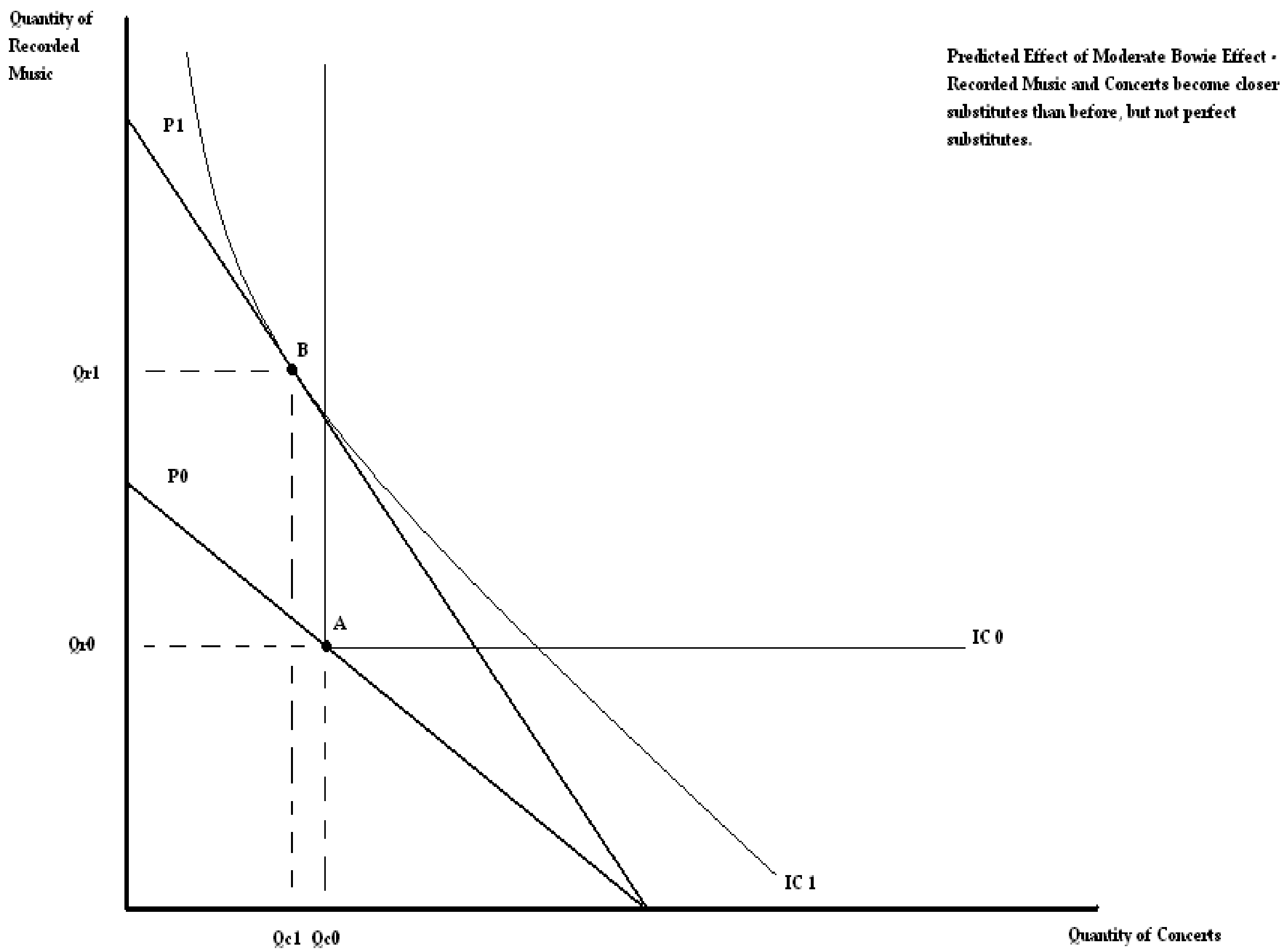
Quantity of Recorded Music
Predicted Effect of Moderate Bowie Effect - Recorded Music and Concerts become closer substitutes than before, but not perfect substitutes.
P1
B
Qr1
P0
A
Qr0
IC 0
IC 1
Qc1
Qc0
Quantity of Concerts

FIGURE 2

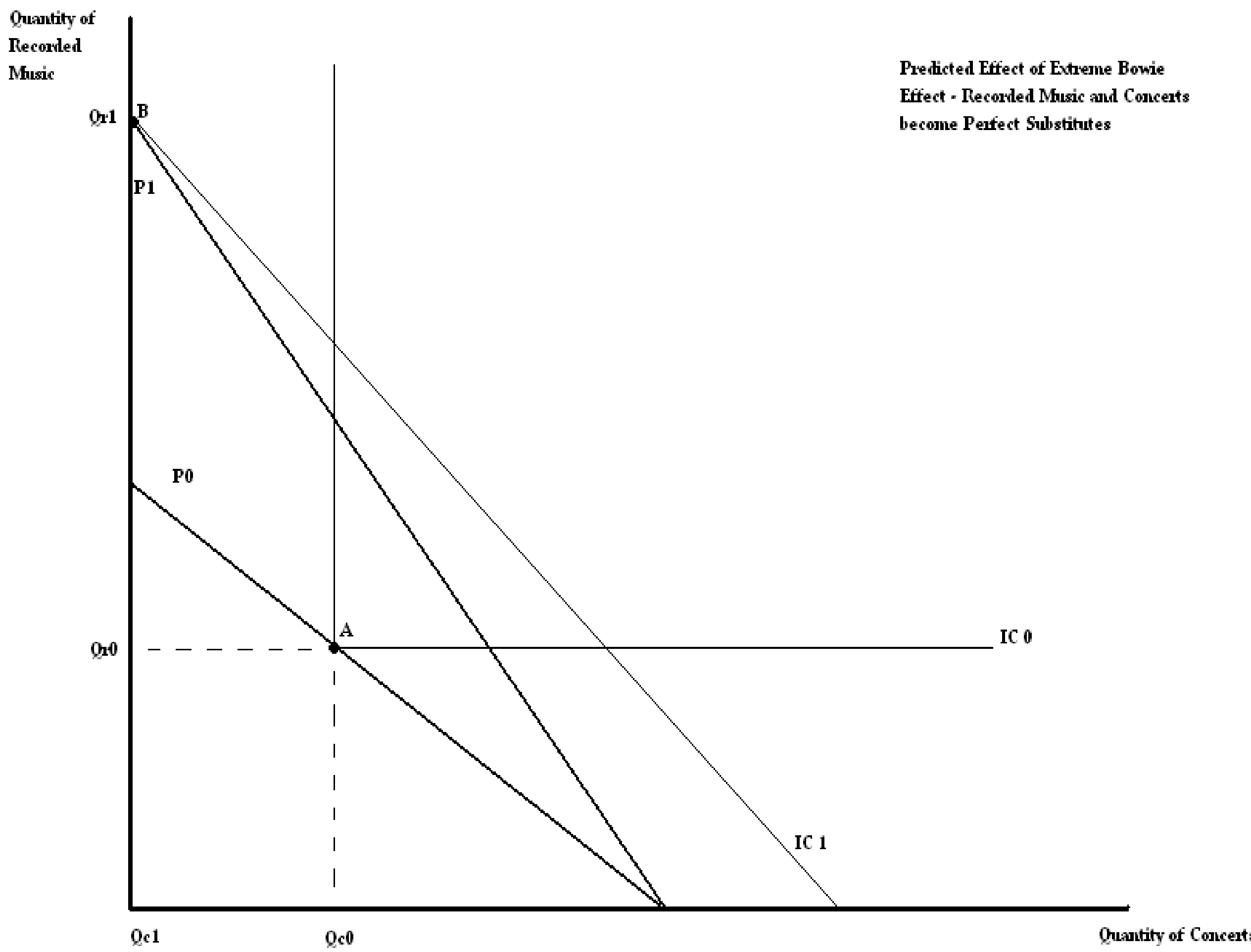
Quantity of
Recorded
Music
Predicted Effect of Extreme Bowie
Effect - Recorded Music and Concerts
become Perfect Substitutes
Qr1
B
P1
P0
A
Qr0
IC 0
IC 1
Qc1
Qc0
Quantity of Concerts

FIGURE 3

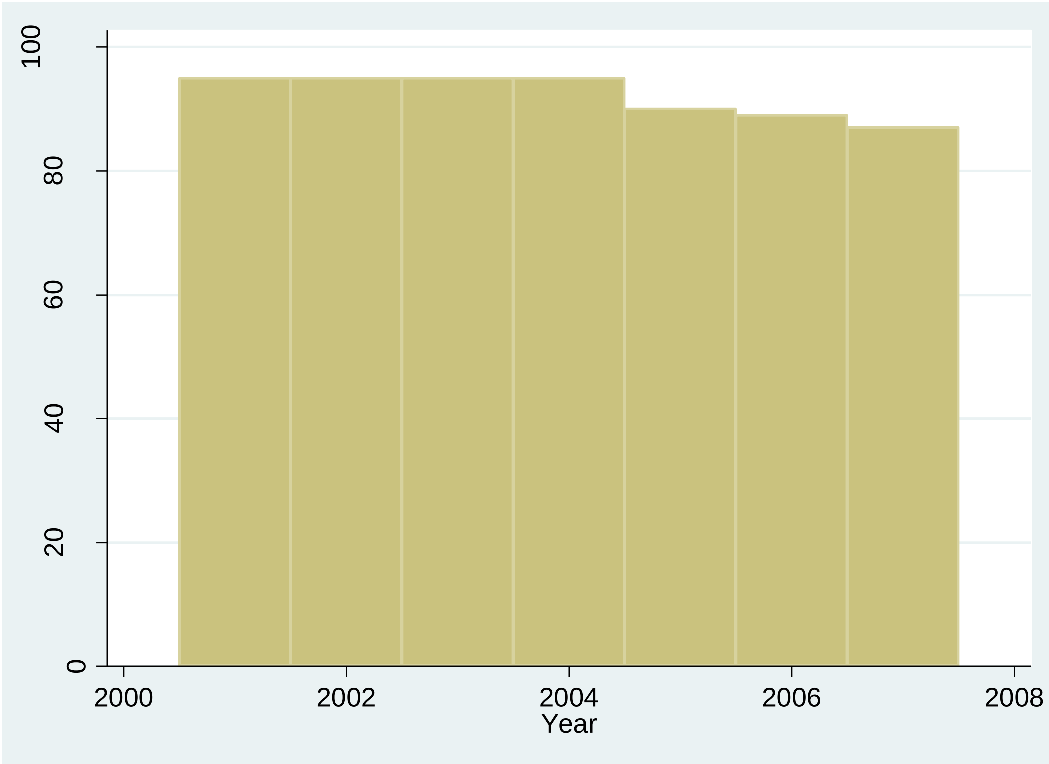

Figure 4: Number of Observations by Year, 2001 to 2007

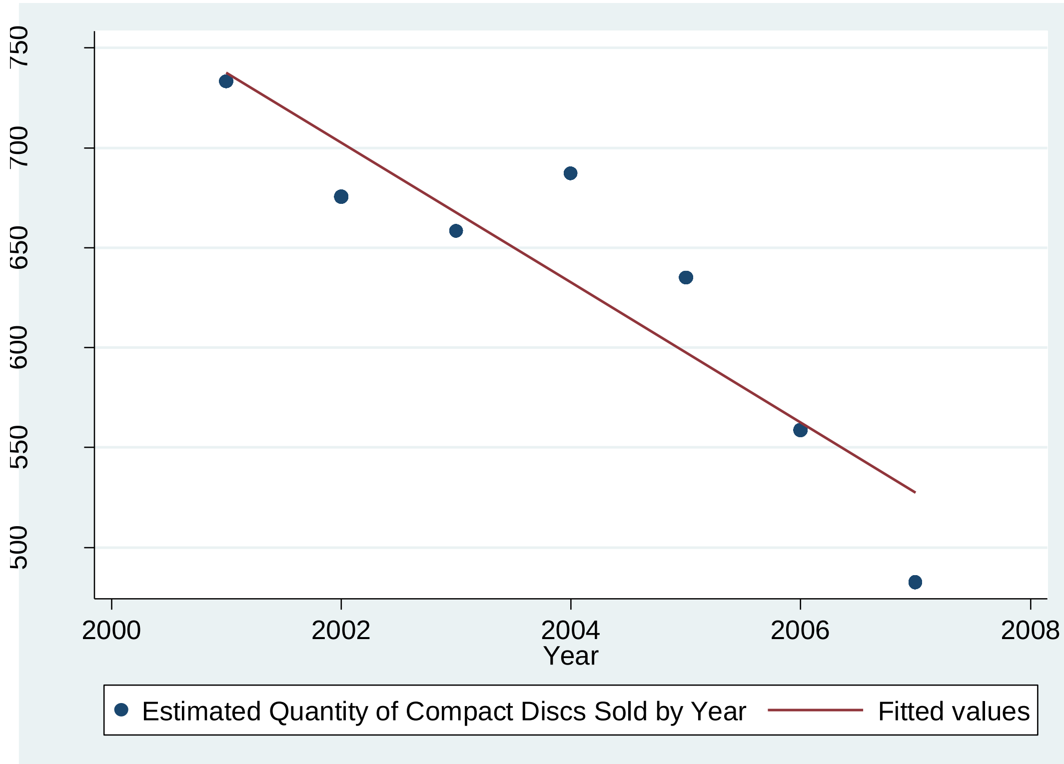

Figure 5: Quantity of Records sold by Year, in millions

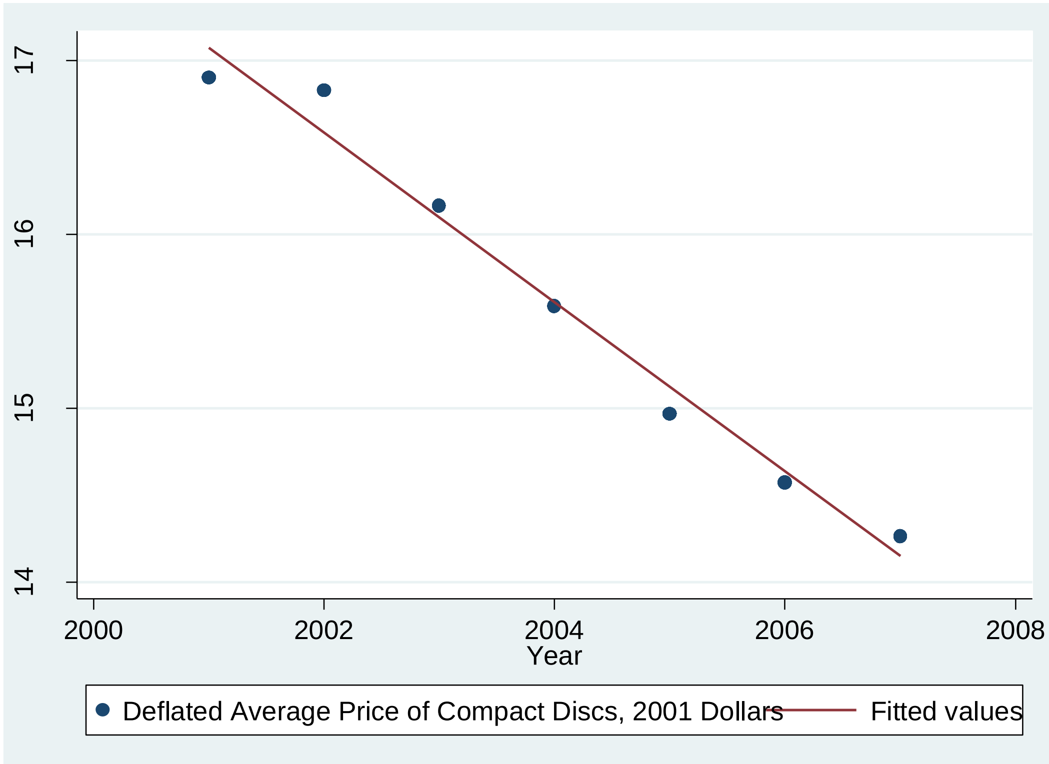

Figure 6: Price of Records by Year, in dollars

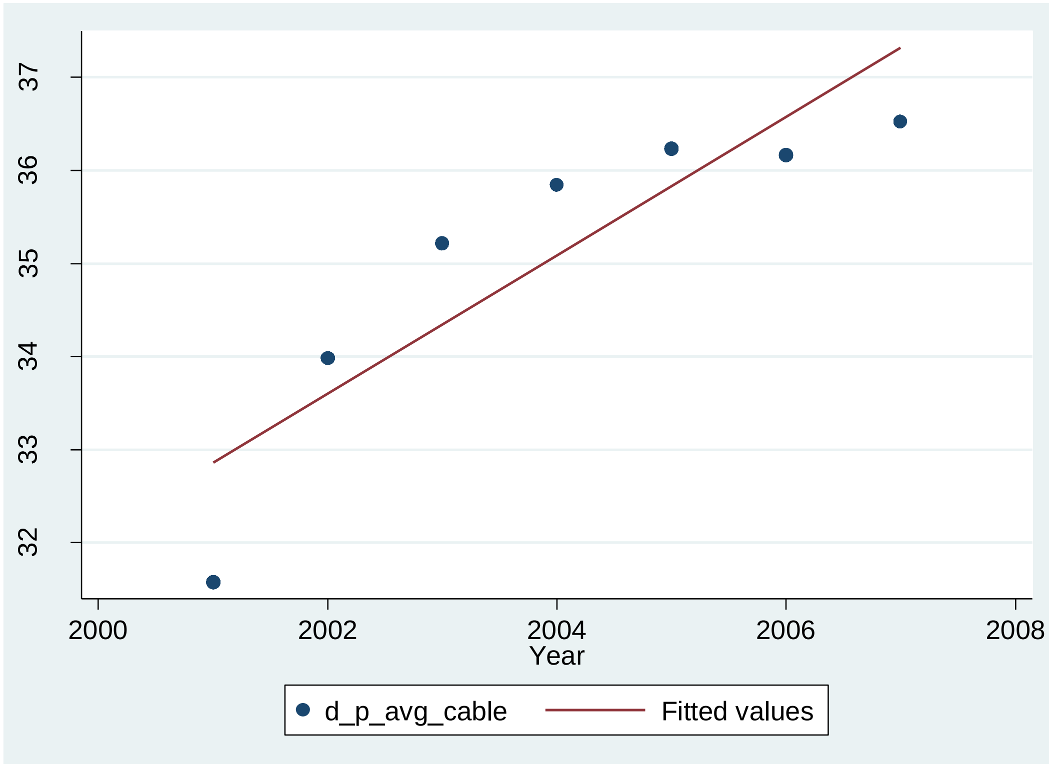

Figure 7: Deflated Average Price of a Monthly Cable Subscription by Year, in dollars

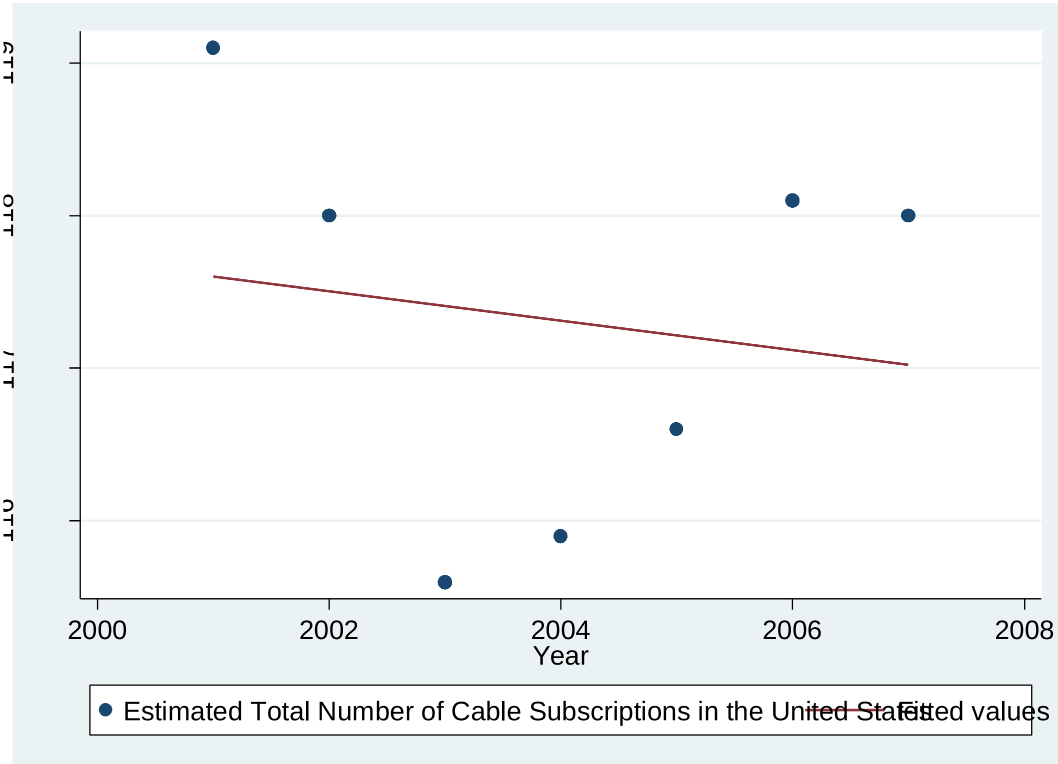

Figure 8: Number of Cable Subscriptions by Year

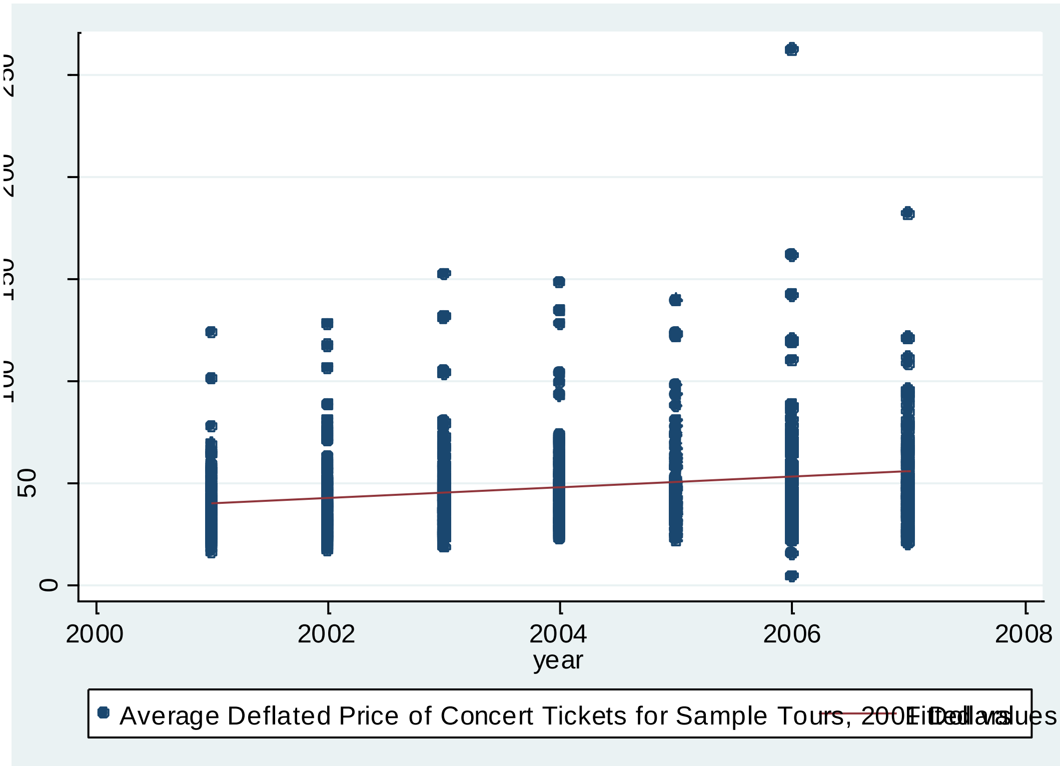

Figure 9: Average Prices of Concert Tickets for Sample Tours by Year, in 2001 dollars

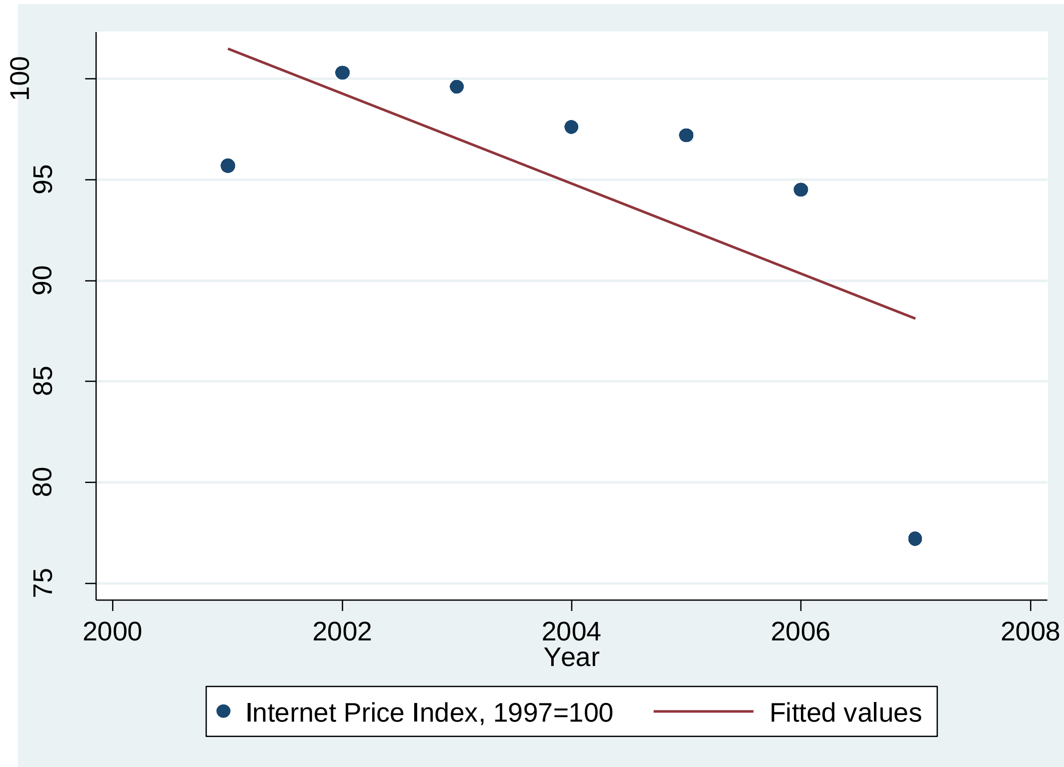

Figure 10: Internet Price Index by Year, 1997 = 100

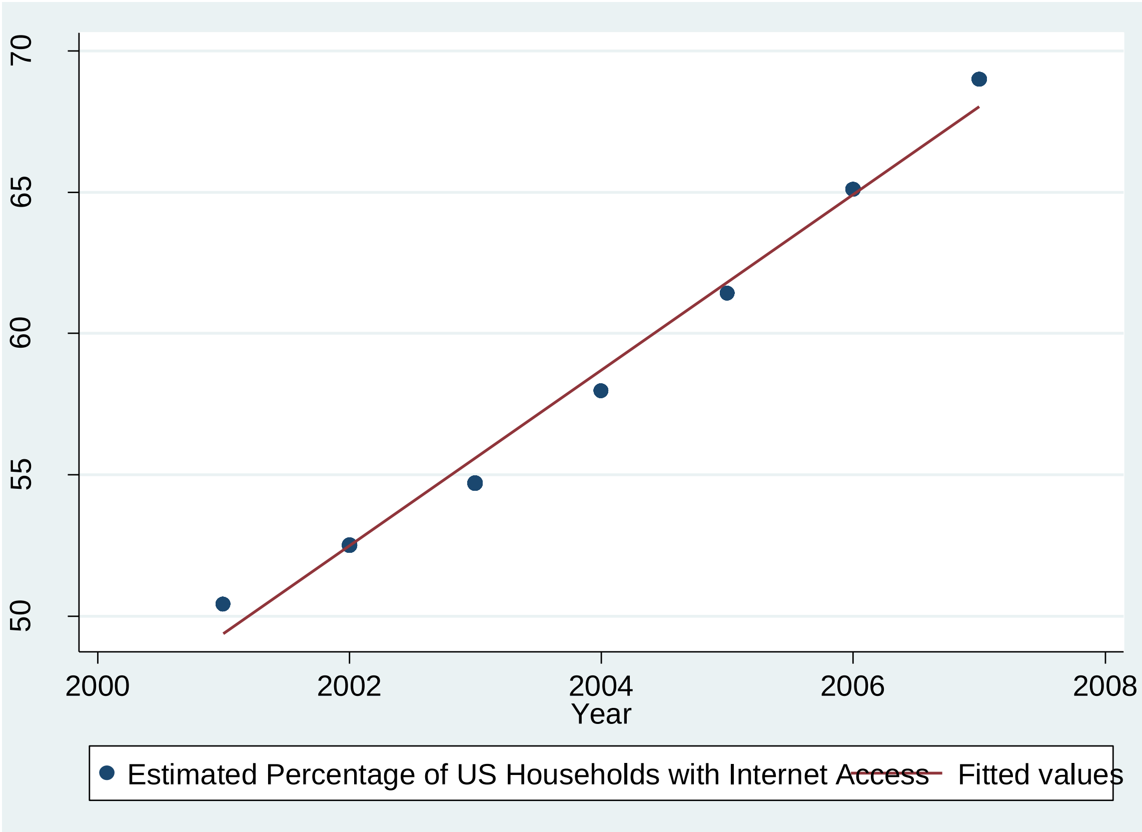

Figure 11: Estimated Percentage Of US Households with Internet Access by Year

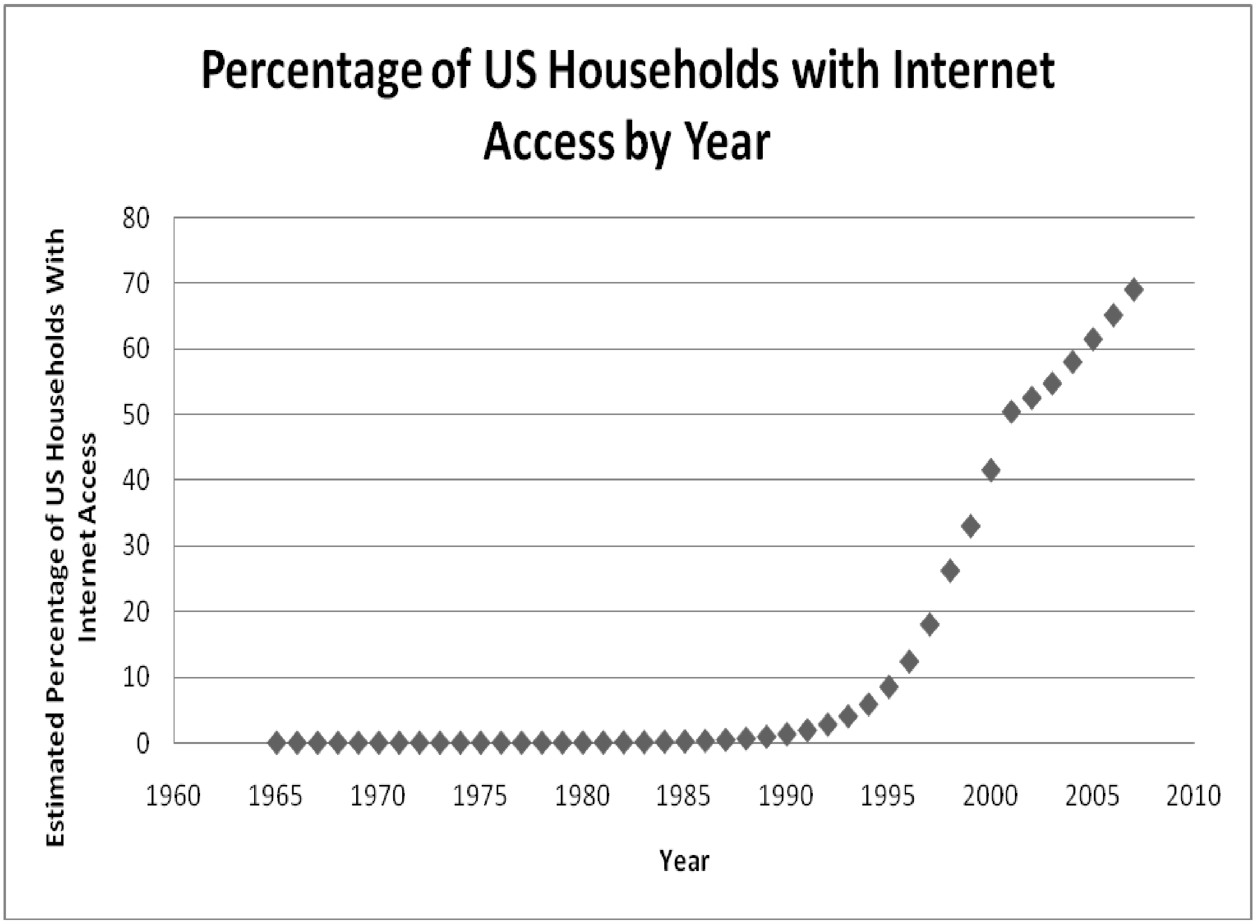

Figure 12: Long Run Percentage of US Households with Internet Access By Year

IX. TABLES

Variable	Mean	Standard Deviation	Minimum	Maximum
Year	2003.93	1.99	2001	2007
Average Price of a Concert Ticket	51.64	27.92	4.94	298.36
Average Tickets Sold per Show	10238.58	8306.131	1222	86609
Total Tickets Sold in a Year	434670.2	529381	42600	6446814
Average Revenue per Show	549383.4	722694	55023	9076420
Cities	42.10	21.85	1	155
Shows	48.14	24.59	4	188
Total Revenue (millions of dollars)	20.03	20.48	3.3	162
Rank	50.15	29.32	1	100

Table 1: Summary Statistics of Characteristics of Sample Tours and Artist Characteristics

Dependent Variable: Logarithm of Average Number of Tickets Sold per Show by the Artist in a given Year	OLS Regression 1 Coefficients (Standard Error)	OLS Regression 2 Coefficients (Standard Error)	OLS Regression 3 Coefficients (Standard Error)
Logarithm of Price Index for Monthly Internet Subscription	0.46** (0.06)	0.46** (0.06)	0.33** (0.06)
Logarithm of Average Price of Compact Disc in 2001 Dollars	-0.06 (0.17)	-0.17 (0.22)	-0.13 (0.21)
Logarithm of Average Price of Monthly Cable Subscription in 2001 dollars	0.48 (0.69)	0.72 (0.75)	1.05 (0.71)
Logarithm of Average Ticket Price for an Artist in a given Year	-0.46 (0.33)	0.13 (0.81)	0.22 (0.76)
Logarithm of GDP per Capita	-	2.98 (3.76)	2.68 (3.56)
Cities	-	-	-0.005* (-0.002)
Shows	-	-	-0.005** (0.002)
N	646	646	646
R-Square	0.10	0.11	0.19

Table 2: Ordinary Least Square Regression Results

*Statistically Significant at the 0.05 level

**Statistically Significant at the 0.01 level

Dependent Variable: Logarithm of Average Number of Tickets Sold per Show by the Artist in a given Year	Panel Regression Coefficients (Standard Error)			Panel Regression with Instrumental Variables Coefficients (Standard Error)	
Panel Effect:	Fixed	Fixed	Random	Fixed	Random
Logarithm of Price Index for Monthly Internet Subscription	-0.28 (0.12)	-0.24 (0.29)	-0.35 (0.24)	0.96 (1.15)	-0.03 (0.35)
Logarithm of Average Price of Compact Disc in 2001 Dollars	-0.09 (0.13)	-0.5 (0.13)	-0.08 (0.12)	-0.234 (0.295)	-0.05 (0.18)
Logarithm of Average Price of Monthly Cable Subscription in 2001 dollars	2.65* (1.2)	2.24 (1.19)	0.67 (0.61)	-1.92 (4.33)	-1.01 (0.80)
Logarithm of Average Ticket Price for an Artist in a given Year	-0.11 (0.12)	-0.15 (0.12)	0.35* (0.065)	3.30 (2.65)	1.36** (0.19)
Cities	-	-0.005* (0.002)	-	-	-
Shows	-	0.002 (0.002)	-	-	-
N	646				
R-Square	0.044	0.086	0.10	0.096	0.099

Table 3: Panel Regression Results

- *Statistically Significant at the 0.05 level
- **Statistically Significant at the 0.01 level