
DIGITIZATION AND RECORDED MUSIC SALES WHITHER THE 'LONG TAIL'?

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ABSTRACT

Recently, business models have reformed in the recorded music industry. Many have seen promise in the leveling of the playing field referred to as the 'long tail effect'. Others predict a scaled-up presence of pop stars with an enhanced 'superstar effect'. So which effect is evident in the data? In this research, point of sale data is tested during a transitional period from 2004 to 2008 for a 'superstar', 'long-tail', and combined effect. It is evident there is a superstar effect in digital formats, a long tail effect in non-digital formats, and a shrinking middle class of artists. **JEL Classification:** L26, L82, Z11

INTRODUCTION

Technological changes and digitization have been devastating to old business models in the recorded music industry. The key changes have included MP3s, peer-to-peer file sharing, subscription services, and, essentially, free music. This destruction opens up potential opportunities. But who benefits? Has this new economic reality changed the sales distribution profile in favor of pop stars or independents? There is potential for the industry to restructure in a decentralized way which fosters the relationship between the fan and the band. If artists and bands are free from constraining relationships with large companies with distribution monopolies and marketing bottlenecks such as terrestrial radio, then artists and bands can create their own rules. According to the French indie band Phoenix, there is 'no one between you and your fans' and there is more possibility for 'indies to make the pop charts' in the new paradigm (Phoenix 2010). But the broader context of the conditions of production in the music industry presents a new issue: the absence of scarcity goes hand-in-hand with the absence of property rights. This diminishes the chances for remuneration and may adversely affect the incentives for artists.

In 1995, Robert Frank and Philip Cook published the book *The Winner Take All Society*. In it, they sought to explain why in entertainment and sports it is generally the case that there are a few very highly paid superstars at the top, and a very large group of lowly paid players and entertainers at the bottom. In a market economy, people are supposed to be paid their marginal product, but can it be the case that talent is so unequally distributed in society, or are there other possible explanations? According to Frank and Cook, the winner-take-all markets can arise whenever payoffs are determined by relative rather than (or in addition to) absolute performance (Frank

and Cook 1995: 24). The outcome is not necessarily desirable, since in a society where winner-take-all markets are prevalent, the unequal distribution of income has a depressing effect on economic growth, according to Frank and Cook. The reason is that the competition in these markets leads to a misallocation of resources in society. Those at the top earn more than they would in competitive markets based on absolute performance. In effect, the superstars in these markets have a degree of monopoly in the selling of their labor services. It is exploitation of the worker in reverse—it is now the capitalist who is exploited. Of course, in entertainment and sports where large amounts of public funds are often used to build venues for these performances, there is an additional cost to the consumers of entertainment and sports.

Winner-take-all markets can be toppled by the development of technology. The creation of the Internet has led to a potential for reducing the costs of disseminating information about musical groups. Though it does not make the playing field totally level, fundamentally both the Rolling Stones and the local rock band have access to the Internet. In this case, technology increases competition and helps to eliminate the institutional structures (the record companies, radio, and so on) that helped create the winner-take-all market. When a few superstores negotiate contracts with a few record companies, it is not surprising that compensation is higher. The record companies believe that they can still profit on their investment, even at high rates of compensation for the superstore. However, if bands that are just starting out are able to get their music directly to the consumers without going through the record companies, both the musicians and the consumers will be better off.

In his book, *The Long Tail*, Chris Anderson argued that the Internet and digital recordings would result in decreased distribution costs and inventory carrying costs which would increase product supply and variety. Following this, consumption patterns will diversify because preferences are better matched, and sales will move away from a small number of high-volume hits towards a larger number of low-volume niche products. These will make up a relatively larger proportion of revenues for retailers. Consumer search costs are lowered by online search, recommendation, and filtering tools (e.g. Brynjolfsson, Hu, and Simester 2011). This could help less-known and new artists gain exposure. According to the Long Tail thesis, the democratization of music production, distribution, and consumption should shift the music industry's balance of power away from incumbents and in favor of these insurgent entrepreneurs.

The winner-take-all market and long tail are paradoxical distributional outcomes which could both theoretically emerge from the same shift to digital technology in content-generation industries like the recorded music industry. As alluded to above, these may be countervailing trends. This notion is explained in more detail in the section below. Therefore, the purpose of this research is to discover the underlying distributional trends over time in the recorded music industry in light of the sweeping digital technology changes that have occurred.

WHO WILL LEAD THE MUSIC INDUSTRY INTO THE FUTURE?

Today, the Internet and digital technology have revolutionized the music industry. Signing with a major record company is no longer needed when the costs of recording and distributing technology have been dramatically reduced. New contractual arrangements and business models are being used by both established and

new artists. The fundamental research question addressed in this paper is whether these recent changes in technology coupled with entrepreneurial initiative in the form of new business models can change the ‘winner-take-all’ structure and create a ‘new artistic middle class’ that will better distribute the revenues generated by the industry.

Hypothesis 1. There is a ‘superstar’ effect in the market for recorded music today. The superstar hypothesis is that sales have become relatively more skewed toward hits over time. If the distribution of recorded music sales has shifted toward top quantiles over time at the expense of all the other quantiles, this hypothesis will be supported (illustrated in Figure 1).

Hypothesis 2. There is a ‘long-tail’ effect in the market for recorded music today that helps new or insurgent artists increase sales at the expense of established or incumbent artists. The long tail hypothesis is that sales have become relatively less skewed toward hits and superstars over time. If the distribution of recorded music sales has shifted toward bottom quantiles over time at the expense of all other quantiles, this hypothesis will be supported (Figure 1).

The superstars hypothesis predicts that demand will become more homogeneous. The long tail hypothesis predicts that demand will become more heterogeneous. Paradoxically, the same technology change which leads to the leveling of the playing field in the long tail thesis could lead to the superstar thesis. Many researchers with relevant data believe the popular long tail theory has recently become dogmatic: nothing more than ‘web utopian fantasies’ (e.g. Gomes 2006).

Hypothesis 3. There is some combination of the ‘superstar’ and ‘long-tail’ effects. The hybrid hypothesis is a combination of the effects of the above two hypotheses. If the distribution of recorded music sales has shifted such that both top and bottom quantiles increase at the expense of the middle quantiles, this hypothesis will be supported.

This hypothesis could also be referred to as the ‘shrinking middle class’ hypothesis. Some recent studies have found a distribution becoming skewed toward the tail and the head simultaneously while the distribution is tucked towards the origin as absolute sales fall across the entire distribution, but relatively more for the middle quantile (Elberse and Oberholzer-Gee 2008, and Page and Garland 2009). This ‘hit-heavy, skinny tail’ implies greater inequality. However, unlike the superstars hypothesis, superstars in this distribution see a shrinking absolute share, even though their relative share is increasing. But this is also true of the observations in the tail – the ‘underdogs’ – because the tail becomes longer but thinner.

Evaluation of these hypotheses is of great importance for the future of the music industry. The long tail theory itself became a hit among many industry operators and observers because it fit many peoples’ world view of increased competition and diversity. Some skepticism followed as creative industries continued to see shrinking sales. If there is a long tail effect, a leveling of the playing field is occurring, likely benefiting new entrepreneurs. If there is a superstar effect, consolidation by the few at the top of the hierarchy is occurring, likely benefiting incumbents. As Page and Garland (2009) ask, if indeed the tail of available niche products lengthens – a supply side effect – will it then ‘fatten’ with sales – a demand-side effect? This will depend upon how the demand for recorded music changes in response to the digital revolution (Tschmuck 2006). A change in the distribution of revenues from incumbent to insurgent entrepreneurs would imply increased creative freedom and innovation (e.g. Verboord 2011). On the other hand, investment in new talent could be dampened due to the

incumbent firms' heavy losses. This latter prediction is suggested by Schumpeter's later work (Schumpeter 1942, cited in Audretsch 2008). If innovation needs to be funded and large, incumbent firms can make the necessary investments. If startup costs are prohibitive to get a new creative act up and running, well-capitalized record labels may be necessary. But, both effects could cause innovation in business models as artists and firms cooperate or defect in enforcing copyrights, or shift to different approaches to making money.

To examine these questions, this paper quantifies year-end sales in the recorded music industry over a five-year period from 2004 to 2008. Specifically, a random sample of 2,051 artists, 7,010 titles – which are albums, singles and videos – included on 1,836 labels are observed to see if and to what degree sales distribution profiles are changing from year to year. The changes are measured by a variety of techniques also used in other studies of this nature. But, no other research has addressed all of the above hypotheses in the recorded music industry with such a large sample or in such a recent, relevant time frame.

This research will be proceed as follows: the next two sections will cover the data collection and a description of the data, respectively; following that are four sections on empirical results including Gini coefficients, absolute sales changes including summary statistics, and regression analysis results; the paper then finishes with concluding remarks; finally, all tables and figures referred to in the text follow after the conclusion section.

DATA COLLECTION

The data for this study comes from Nielsen Soundscan. Nielsen Soundscan collects point-of-sale transaction data on unit sales from over 14,000 retailers across the U.S. It comes from retail, mass merchant and non-traditional distribution channels (on-line stores, venues, mail order, and digital services). Big retail chains, such as Wal-Mart, Tower Records, Virgin Megastores, and Sam Goody – now For Your Entertainment (F.Y.E.) – report to Soundcan. The sales information collected by Nielsen is used by most music industry operators and has been used to create the Billboard music charts since 1991. They provide academic access packages as well.

The necessary information for our research from the Nielsen system, pulled from 'Chart and Sales History' reports, are only available starting in 2004, due to a Nielsen system upgrade that July. But, the available time frame begins in week 1 of 2004 and goes through week 52 of 2009. Our focus is on a random sample of artists available during this time frame. Because of limitations in the system, the random sample covers 2004 through 2008. Artists were chosen randomly by a random letter generator and random page generator.

Individual 'artists' are defined by Nielsen Soundscan. An 'artist' could be an artist's stage name, an artist's real name, a band name, an orchestra conductor's name, a compilation of different conductors together, a movie soundtrack, a record label sampler, or other collaborations such as a movie or documentary for which copyright holders have an interest in tracking. Some artists release titles with a band as well as solo. If the solo artist's name or stage name was listed on the page randomly selected, this became part of the sample. But any other artist-band collaboration the artists might be involved with was omitted if it was not listed on that page. The reason for this is that

an artist and band collaboration includes other creative inputs from other artists. It is the combination of inputs, i.e. defined by Nielsen's listed 'artist', which were randomly chosen and so belong in the random sample. So in general, an individual artist could be an individual artist's name or stage name with or without any collaboration by another artist, conductor, band, or bands. For example, if an artist showed up on the randomly chosen page, but a release recorded by this artist and her band showed up on another page, only the solo artist is included.

We used the Chart and Sales History title reports because they displayed year-to-date (YTD) and release-to-date (RTD) unit sales broken into each sales format for each week. The broad format characterizations are albums, singles, or videos. These are then divided into YTD total units and YTD digital units. Total unit sales information for album releases also includes more specific formats: LPs, cassette tapes, CDs, DVDs, digital albums (bundled). Digital tracks have their own serial number and are categorized differently than digital albums and unbundled tracks, but are not included in this sample. Singles are shorter than albums with one or more tracks. Songs on a single can also come out on an album. Singles often contain a song or songs which are the most popular song or songs from an album and therefore serve a promotional purpose. Total unit sales for single releases specifically includes: CDs, 12-inch singles (12"), cassette tapes, digital singles (bundled), Maxi CDs. Total unit sales for videos specifically includes: UMDs (obscure), DVDs, video tapes. The detailed level of the formats included here is important because of the technology changes that have been occurring over the last few years and shifting consumer preferences.

When a yearly sales figure of zero is observed for a given artist's title, it is not known whether this title is available for sale or not. All that is known is that at some point in the past, the title was registered with Nielsen Soundscan. A band, for example, could have broken up years ago. This is important because the number of titles and artists with yearly sales of zero doubles from 2004 to 2008. So certain analyses below are done for two groups. The first group is non-conditional sales, which includes the zeros. The second group is conditional sales, which drops the zeros. So 'conditional sales' for the second group is conditional on sales being greater than zero, or nonzero.

DATA DESCRIPTION

Figure 2 displays all unit sales, bundled digital sales, and unbundled track sales from 2004 to 2008 for the sample used for this study. Non-digital sales are also shown, which is all sales minus digital sales. All unit sales rise from about 5 million in 2004 to peak at 7 million in 2006. From there, all unit sales decline to about 3 million – its lowest value – by 2008. The rise in digital unit sales increases consistently across this time frame from 43,000 in 2004 to 380,000 in 2008. Comparatively, digital sales are still dwarfed by CD sales. Digital sales are only 3% of CD sales in 2004 and 14% of CD sales in 2008. So, digital albums do not compensate for the sharp decline in physical CD albums. But at the same time, unbundled track sales rise drastically from 3 million to 43 million. This exemplifies an increased consumer preference for individual songs over the album as a unit. This is facilitated by the record label and retailer strategy of mixed bundling (Elberse 2009). Figure 3 confirms the above trends with sales per artist while average unbundled track sales do decline for artists in 2008. This decline is a symptom of the crowding of the market due to lower barriers to entry

catching up to the sales numbers. The supply of artists and bands has increased and so has competition.

Figure 4 compares unit sales for the more popular formats: digital, CDs, and DVDs from 2005 to 2008. Figure 5 compares unit sales for the less popular formats: LPs, cassettes, Maxi CDs, 12 inch singles, video tapes, and UMDs. Although bundled digital unit sales numbers are available in 2004, the remainder of the formats are only available starting in 2005. For these formats, in order to find year-to-date (YTD) sales, release-to-date (RTD) sales for year t are subtracted from year $t+1$ RTD sales. Because the first year available is 2004, 2003 RTD figures are not available, and 2004 YTD numbers cannot be computed for the titles released before 2003. This is why Figures 4 and 5 only show a four year period.

Looking at Figure 4, DVD sales peak in 2006 but then bottom out by 2008. This follows the pattern of overall unit sales in Figure 2. CD sales do the same, but the yearly changes are much more pronounced. Starting from 5.4 million in 2005 and peaking at nearly 7 million in 2006, CD sales settle to a new low by 2008 at 2.6 million. Bundled digital album sales rise consistently over the years, but are relatively small in volume. Figure 5 tracks the less popular formats over time. Perhaps not surprisingly given consumer technology trends, audio cassette sales plummet from 2005 to 2008. Another implication from Figure 5 is that LP sales are a niche market on the rise: increasing 107% from 2005 to 2008.

EMPIRICAL RESULTS

In this section, the distribution of sales is investigated for artists for each year of the sample by comparing changes in the proportion of the total sales captured by different percentiles of artists. To start, relative changes in the distribution of sales are analyzed by quantile. Subsequently, Gini coefficients are compared in the same manner.

Following the analysis of Elberse and Oberholzer-Gee (2008), Table 1 shows sales distribution percentages corresponding to multiple quantiles of artists for each year in the sample. This shows, for all formats taken together, the percentage of total sales received by each decile of artists, as well as by each percentile above the 90th. These numbers imply that the market becomes more concentrated from 2004 to 2006. This is because each quantile of artists shown from the 60th on up to the 99th account for a smaller percentage of total sales from 2004 to 2006. The top 1% of artists increases until 2006 and is the driver this change. More concentration, in a relative sense, implies the tail of the distribution gets less. This suggests a superstar effect. However, later on the market becomes less concentrated. From 2006 to 2008 for artists there is less concentration because these same quantiles account for an increasing percentage of total sales. Less concentration implies the tail of the distribution receives relatively more sales. This suggests a long tail effect. Specifically, in 2004, 95% of artists account for 2.65% of total sales. This drops to 1.08% by 2006, but rises again to nearly 2% in 2008. In 2004, 99% of artists account for 17.65% of total sales. This dips to a low of 7.35% in 2006, but rises again to 12.62% by 2008. Figures 6, 7, and 8 illustrate this distributional pattern for artists by graphing the percentage of total sales captured by each quantile listed for each year. This depicts the increasing and then decreasing trend in relative concentration.

GINI COEFFICIENTS

Another way to compare relative shifts in industry concentration over time is with Gini coefficients. A Gini coefficient has values between zero and one and measures the degree of consolidation of a variable across individuals contributing to it. A higher Gini coefficient implies a higher concentration of the distribution. For example, a Gini coefficient of unity implies one individual sells 100% of the total sales while the remainder of individuals sell 0%. A lower Gini coefficient implies a lower concentration in the distribution of sales. The Gini coefficient results are displayed in Figure 12. All Gini coefficients are in the upper nineties which implies an extremely high concentration of sales. As with the analysis above, there is a trend of rising inequality and then declining inequality across the five-year time span. But for Gini coefficients, the peak concentration years range from 2005 to 2007. Many of these year-to-year changes for this measure are quite small which throws doubt upon their economic significance.

Figure 13 shows the same Gini coefficient calculations but with zero sales dropped. A similar pattern is observed, however the decreasing concentration observed above in the later years is much less pronounced. In all three figures, there is rising inequality and then a leveling out in which consolidation of sales remains about the same or declines only slightly in the final year or two. So when only non-zero sales are taken into account, there is a superstar effect for the first three years – 2004, 2005, and 2006 – for albums, titles, and labels. Then, in 2007 and 2008, there is a slight decline in concentration. All of the Gini coefficients for artists end up higher at the end of the five-year period. This is a clear superstar effect, regardless of the slight decline in concentration observed in the final two years. Importantly, after removing the top selling artist, Johnny Cash, it is evident that he is the driver of these changes in the Gini coefficients. But that is the nature of a superstar, ‘winner-take-all’ business: if you remove the superstars, there is no business.

ABSOLUTE SALES CHANGES

This section looks at absolute changes by analyzing the location, scale, skewness, kurtosis, and inter-quartile measures from year to year. This illuminates the distributional shapes and, for example, how tails shift relative to the median. In this section, quantile is abbreviated with a Q, such that $Q_{.75}$ is the 75th percentile or 3rd quartile. $Q_{.50}$ stands for the median or 2nd quartile. Table 2 shows absolute distributional changes from year to year across artists. For albums, singles, and videos together, the number of artists with zero yearly sales increases every year. For all formats, this number trends up from 477 artists in 2004 to 806 artists by 2008. The percentage of artists who sell one or more units, i.e. the percentage of artists that have non-zero sales, remains fairly constant at around 60%. For all formats, the number of artists reaching sales levels above the 50th percentile of unit sales increases steadily from 573 artists in 2004 to 947 in 2008. The number of artists with sales levels above the 90th percentile rises consistently from 117 in 2004 to 204 in 2008. The number of artists with sales above the 99th percentile rises from 12 to 21 over this five-year period.

Summary statistics for the sales distributions for artists are revealed in Table 3. The location of the median ($Q_{.50}$) and scale, $(Q_{.75}-Q_{.25})/(Q_{.75}+Q_{.25})$, remain the same

for each year. Scale remains the same because the 25th percentile is 0. The measure of skewness, $(Q_{.75}+Q_{.25}-2Q_{.5})/(Q_{.75}-Q_{.25})$, is positive and declines, i.e. becomes less skewed, steadily over time from 0.91 in 2004 to 0.75 in 2008. This means that the sales distribution becomes less concentrated which implies the long tail effect. Similarly, kurtosis, $(Q_{.9}-Q_{.1})/(Q_{.75}-Q_{.25})$, generally declines over time from 15.75 in 2004 to 11.06 in 2007 with a slight rise again in 2008 to 11.75. A decline in kurtosis implies a more rounded peak and shorter, thinner tail for the distribution. These numbers provide evidence that the distribution of artist sales becomes less asymmetric and less concentrated. However, the decline in kurtosis means the sales distribution becomes less spread out. The inter-quartile measure $(Q_{.75}-Q_{.25})$, i.e. the difference between the 3rd and 1st quartiles, decreases consistently each year from 45.5 in 2004 to 16 in 2008. This implies that the middle class of artists is shrinking, which supports the hybrid hypothesis. The left tail inter-quartile measure $(Q_{.50}-Q_{.25})/Q_{.5}$ remains constant at 1. This is consistent with a long, flat tail. The right tail inter-quartile measure $(Q_{.75}-Q_{.50})/Q_{.50}$ declines each year starting from 21.75 in 2004 and ending at 7 in 2008. This also implies that the middle class of artists is shrinking, which supports the hybrid hypothesis.

REGRESSION ANALYSIS

There is much evidence that the sales distributions are changing from year to year. The next step is to test the statistical significance of these differences. In this section, unit sales are regressed on sales rank in the following log-linear form for annual sales:

$$\ln(\text{Sales}+1) = \beta_0 + \beta_1 \cdot \ln(\text{Sales Rank}) + \varepsilon \quad (1)$$

‘Sales’ are the total unit sales for each year from 2004 to 2008. ‘Sales Rank’ represents artists or titles ordinally ranked by the sum of their yearly unit sales. Sales is regressed on sales rank for artists as well as titles for total unit sales, digital unit sales, non-digital, and unbundled track sales. The coefficients on Sales Rank are then compared between years. Subsequently, the same regressions are performed with zero sales dropped. Firstly, β_0 can be considered a measure of overall sales in a given year. Secondly, β_1 can be considered a magnitude of how rapidly the share of yearly sales drops off as sales rank increases. The long tail hypothesis implies that β_1 will decrease (e.g. Elberse and Oberholzer-Gee (2008)) in absolute value over time due to the institutional and technological changes as consumers diversify consumption as more variety is made available to them. So, the slope with which sales drops off will be less steep or become less negative over time. The intuition is that less popular artists will gain a larger share of sales over time. It is the same analogy for regressions with titles instead of artists.

The superstar hypothesis would be just the opposite effect, with an absolute value of β_1 increasing over time. The slope will become steeper or more negative from year to year. The same institutional and technological changes on the supply side allows consumers not only to ‘ride down the long tail’ to seek out unique, niche, and less popular content but also buy more of what the superstars have available because superstars can reach larger audiences than they could before the institutional constraints and bottlenecks were lifted.

Because both variables are in log form, β_1 represents an elasticity. These elasticities will be negative because as sales rank increases for an artist, they are moving down the list with lower sales. As rank increases, sales decline. The β_1 then can be referred to as a rank elasticity of sales or the elasticity of sales with respect to rank.

The β_1 s for each year are graphed for ease of comparison in Figure 11. To interpret these coefficients economically, recall that they represent elasticities. If β_1 increases over time – decreases in absolute value – then sales become less elastic with respect to rank over time. For example, a 1% increase (decrease) in sales rank causes a decline (rise) in the average artist's sales of 2.83% in 2004, and a decline (rise) in sales of 2.34% in 2008. All coefficients are statistically different from zero, $p < 0.01$, and all R^2 s are high. β_1 increases, or decreases in absolute value, for artists from 2004 through 2008 for all unit sales and non-digital sales. This implies a long tail effect: less concentration of sales over time. However, the β_1 for digital units and for tracks declines, or increases in absolute value, each year from 2004 to 2008. This implies a superstar effect: less concentration of sales over time for these particular formats.

The tests for statistically significant differences between the β_1 s between each pair of consecutive years show that these are all highly significant, $p < 0.01$. So, the differences in concentration – the superstar and long tail effects – implied by the coefficients on sales rank each year are significant.

For artists, the story for the regressions performed with only non-zero sales is similar. The coefficients on sales rank are graphed in Figure 12. All coefficients are statistically different from zero, $p < 0.01$ and all R^2 s are high. For all unit sales and non-digital sales, β_1 increases, or decreases in absolute value, each year for artists. This implies a long tail effect, but the year-to-year differences here are far less pronounced than above. This can be seen in Figure 12. Likewise, for digital units and tracks, the superstar trend is much less obvious. For artists the β_1 on $\ln(\text{Sales Rank})$ does not change much for digital sales. Unbundled track sales for artists show no obvious trend.

For artists with non-zero sales only, the tests for statistically significant differences between the β_1 s between each pair of consecutive years are more nuanced. For all unit sales and non-digital sales, these are all highly significant, $p < 0.01$. For bundled digital sales, the year-to-year differences are insignificant for 2004-2005, are significant at 5% for 2005-2006 and 2006-2007, and significant at 1% for 2007-2008. For unbundled track sales, the difference is significant at the 1% level from 2004-2005, insignificant in between and then significant at the 1% level again from 2007-2008. The same implications from the above regressions with sales of zero included still stand for all unit sales and non-digital sales when the zeros are removed from the regression: a significant long tail effect. For the two digital formats considered, the superstar effect is non-existent when only non-zero sales are considered in the regression.

So, a superstar effect is evident in the digital formats: bundled digital albums and singles and unbundled tracks for both artists and titles. Consider this the 'digital superstar effect'. A long tail effect is evident in overall unit sales and non-digital sales for artists. Consider this the 'non-digital long tail effect'. However, when only non-zero sales are considered these trends are not as conspicuous, though they are still present. For non-zero artist sales, the digital superstar effect is diluted while the non-digital long tail effect is still there. In addition to the least squares approach above, quantile regressions are also used to estimate coefficients and the results above are corroborated. Therefore, for the sake of brevity the results are not reported here.

CONCLUSIONS

The recorded music industry is without question a winner-take-all industry where superstars like Johnny Cash and the Allman Brothers rule. Superstar artists still provide the most lucrative revenue streams for an ailing business. Observing the trends in the unit sales distribution over this five-year period, our study provides support for the superstar effect and the “winner-take-all” view of the music industry. Though this research provides some support for the long tail effect, it is for non-digital sales which would appear to be somewhat at odds with the idea that the Internet and digital technology has enabled niche artists to increase their market share. Why then does the superstar effect continue in the industry today? Though there are undoubtedly varied answers and the subject matter of another paper, we can perhaps make some conjectures.

The fears that our music culture is being watered-down and homogenized by Internet technology and globalization are partially true. But this new technology and connectedness brings forth important benefits such as lower barriers to entry. Perhaps strangely, the notion of a ‘utopian’ long tail effect of a leveling playing field and a cornucopia of niches is also partially true. The evidence we find for a long tail effect is not a dramatic erosion of the empires of the superstars, but more akin to a persistent ‘trickling down’ of demand towards indie artists. The indies most likely are using digital and Internet technology to connect with their indie fans, but our evidence of a long tail effect in recorded music sales is found in the physical and analog world. Indie fan loyalty and reciprocity may be expressed in buying CDs and LPs at shows and record stores. For many indie artists and fans, cultural relevancy is more important than commercial gains – at least on the surface (e.g. Bourdieu 1993, 1984). The evidence we see for our hybrid hypothesis can be interpreted as a hollowing out of the middle class of artists. So although we observe a long tail effect, artists in the middle are not necessarily flourishing when it comes to record sales – perhaps they are losing the most in this situation.

Our results are preliminary and subject to the limitations of the data collected through SoundScan. One problem is that SoundScan was created in the pre-digital, pre-Internet era and the organization of the data and the means of access reflects these limitations.

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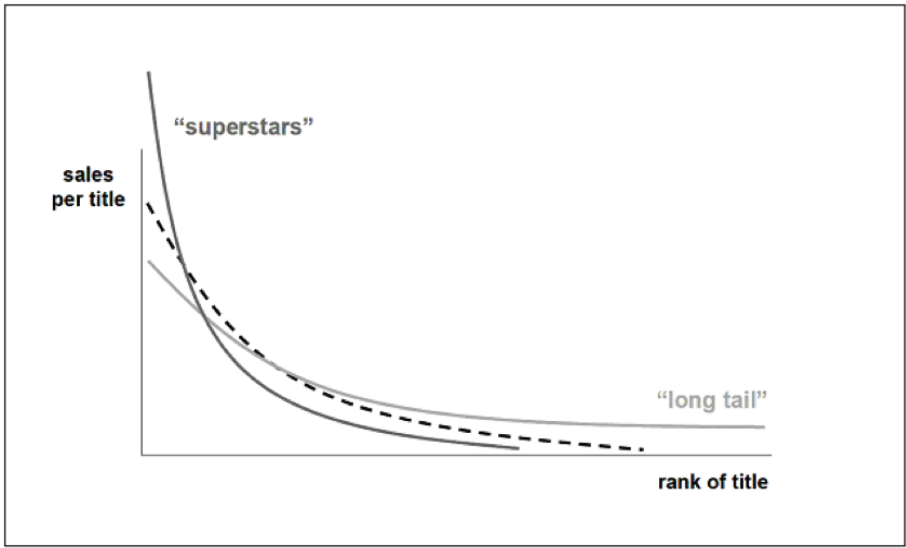


FIGURE 1: ILLUSTRATION OF THE SUPERSTAR AND LONG TAIL EFFECTS
 This is from Elberse and Oberholzer-Gee (2008) who examine both hypotheses of sales data for movies, another industry affected by the digital revolution.

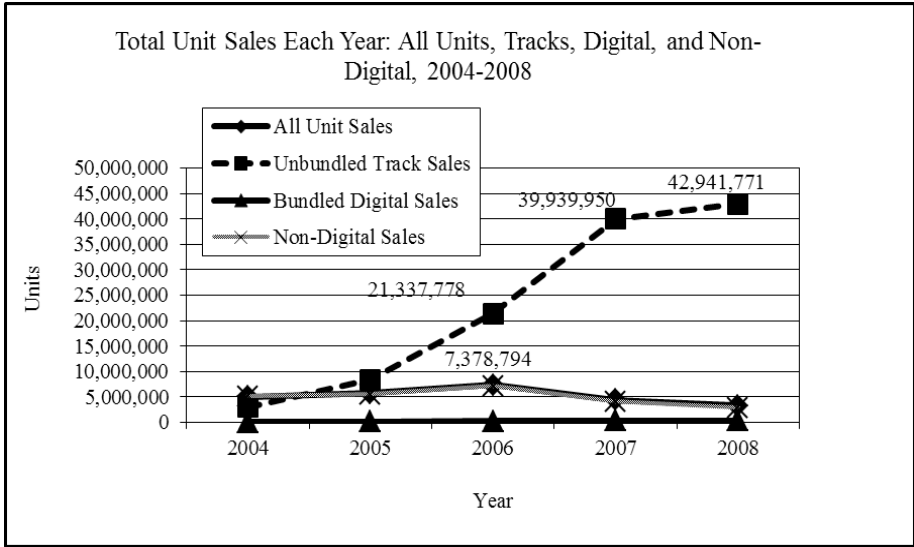


FIGURE 2: TOTAL UNIT SALES EACH YEAR: ALL UNITS, TRACKS, DIGITAL, AND NON-DIGITAL, 2004-2008. For each year of the sample period. Included are all unit sales, unbundled digital track sales, bundled digital units sales (i.e. digital albums or singles), and non-digital sales (all unit sales less bundled digital sales).

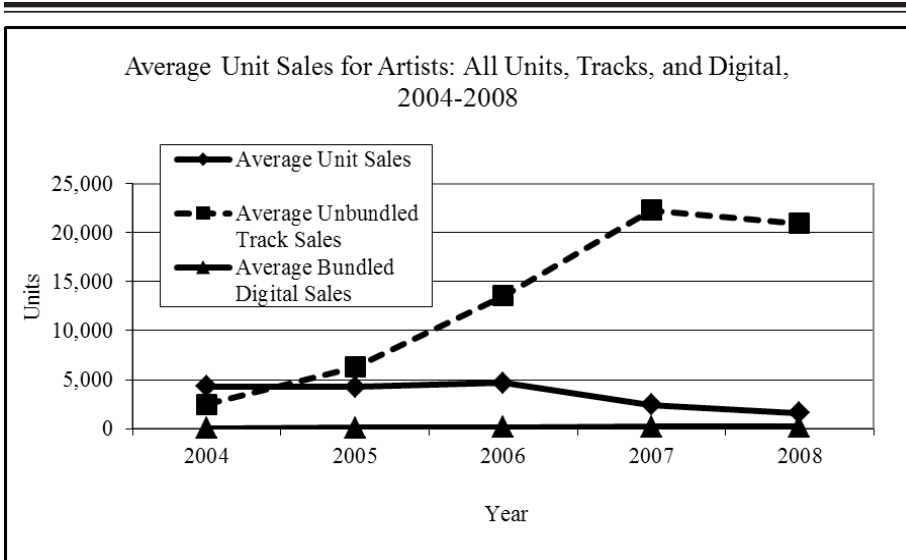


FIGURE 3: AVERAGE UNIT SALES FOR ARTISTS: ALL UNITS, TRACKS, AND DIGITAL, 2004-2008. For each year of the sample period. Included are unit sales, unbundled digital track sales, and bundled digital unit sales

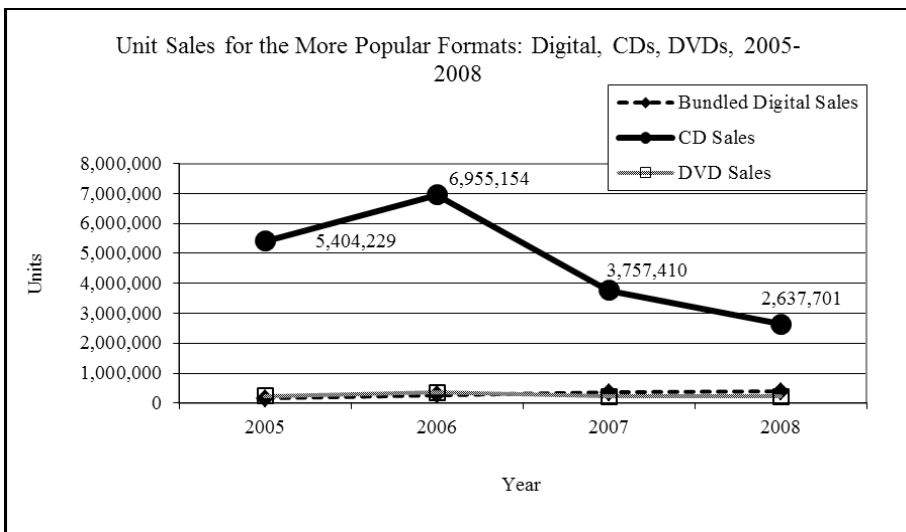


FIGURE 4: UNIT SALES FOR THE MORE POPULAR FORMATS: DIGITAL, CDS, DVDS, 2005-2008. Bundled digital albums and singles, CDs, and DVDs from 2005 through 2008.

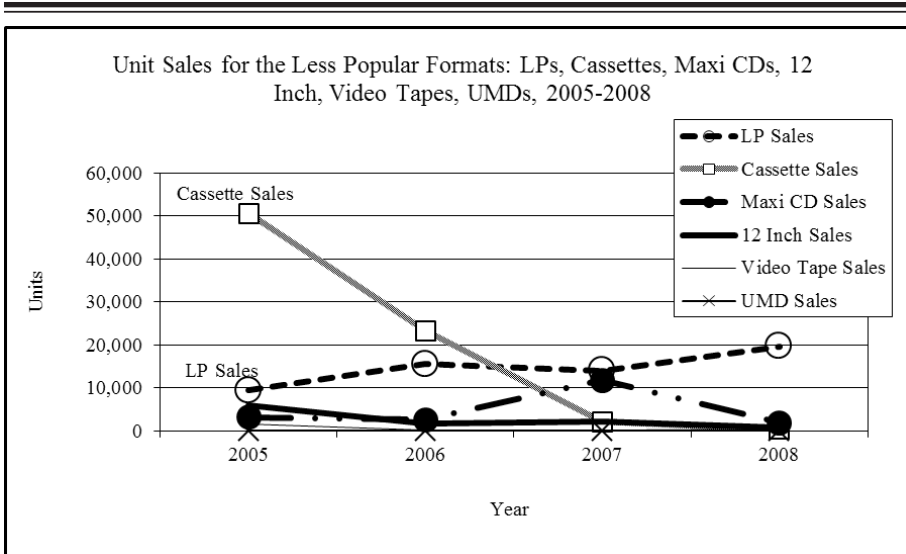


FIGURE 5: UNIT SALES FOR THE LESS POPULAR FORMATS: LPS, CASSETTES, MAXI CDS, 12 INCH, VIDEO TAPES, UMDS, 2005-2008. LPs, cassettes, Maxi CDs, 12 Inch singles, video tapes, and UMDs.

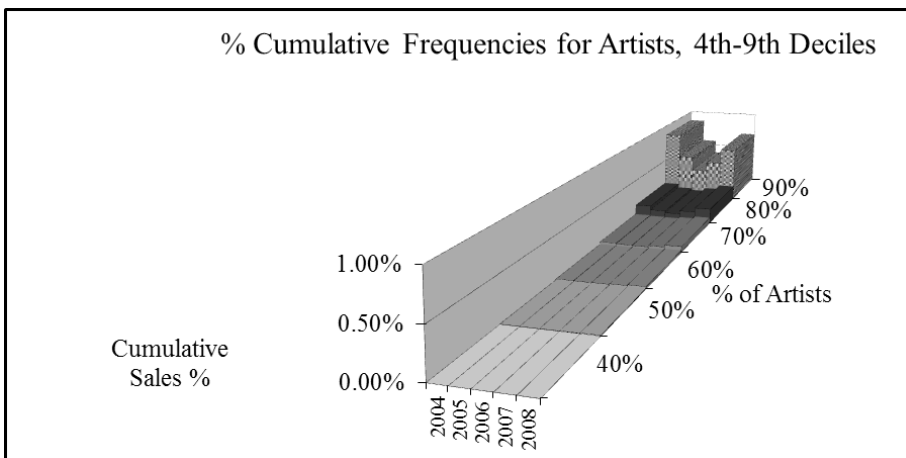


FIGURE 6: PERCENT CUMULATIVE FREQUENCIES – PERCENT OF TOTAL SALES ACCRUING TO 4TH THROUGH 9TH DECILES OF ARTIST UNIT SALES, 2004-2008.

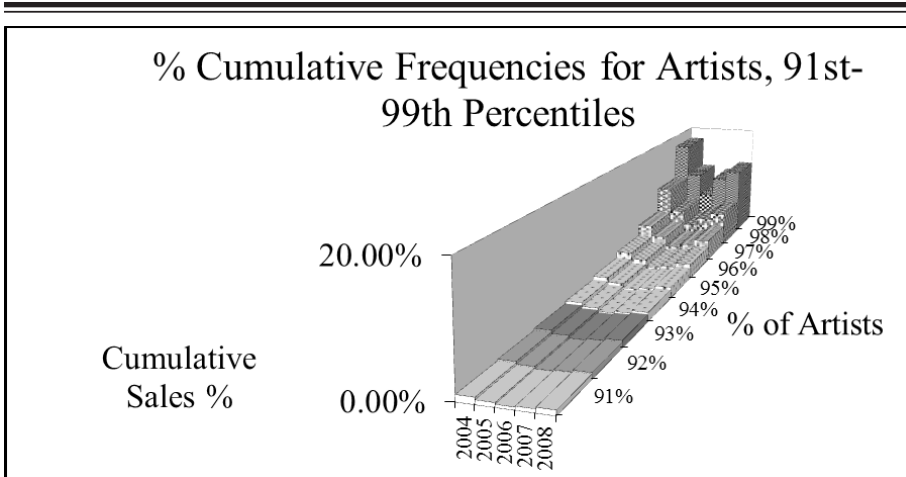


FIGURE 7: PERCENT CUMULATIVE FREQUENCIES – PERCENT OF TOTAL SALES ACCRUING TO 91ST THROUGH 99TH PERCENTILES OF ARTIST UNIT SALES, 2004-2008.

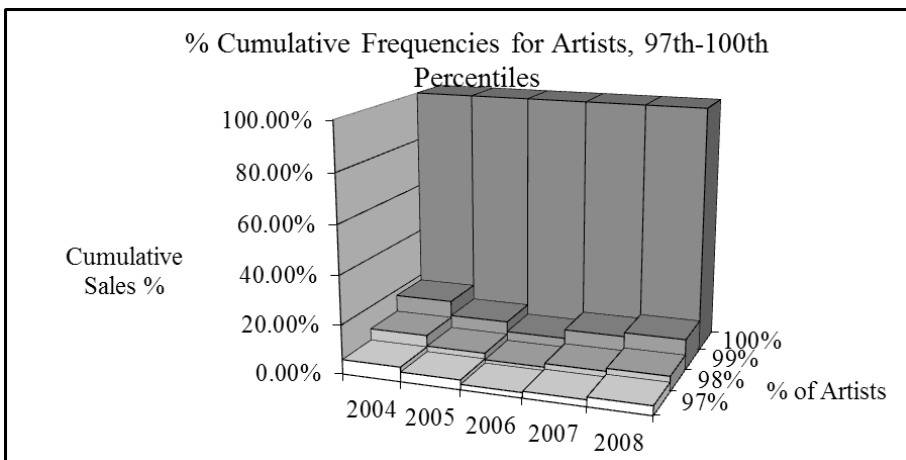


FIGURE 8: PERCENT CUMULATIVE FREQUENCIES – PERCENT OF TOTAL SALES ACCRUING TO 97TH THROUGH 100TH PERCENTILES OF ARTIST UNIT SALES, 2004-2008.

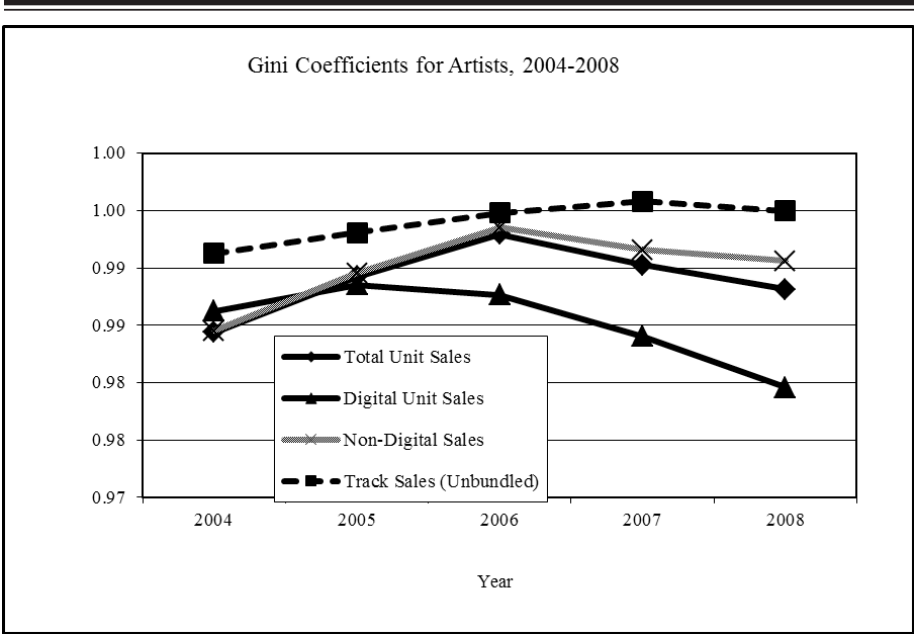


FIGURE 9: GINI COEFFICIENTS FOR ARTISTS, 2004-2008.

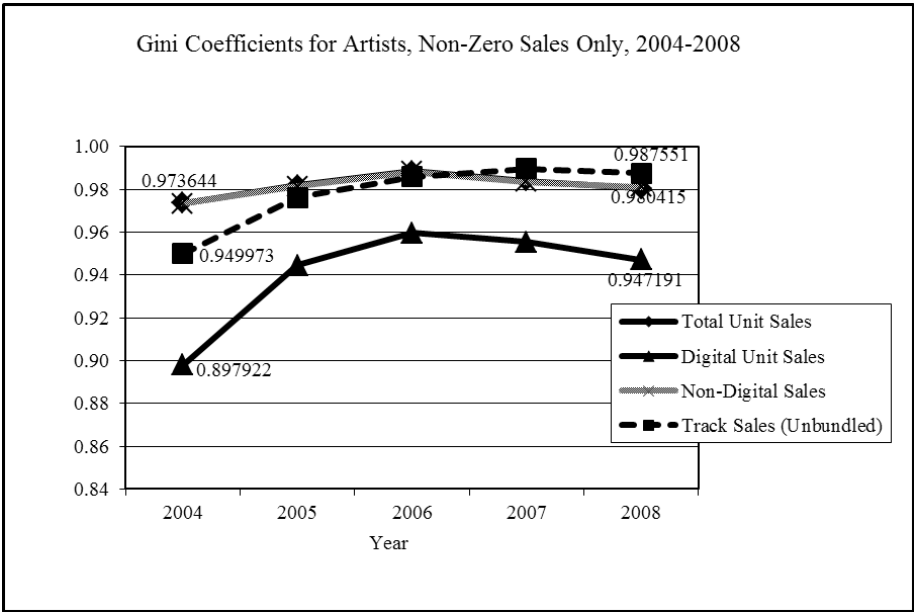


FIGURE 10: GINI COEFFICIENTS FOR ARTISTS, NON-ZERO SALES ONLY, 2004-2008. From 2004 through 2008 for only non-zero total unit sales, bundled digital unit sales, non-digital unit sales, and unbundled track sales.

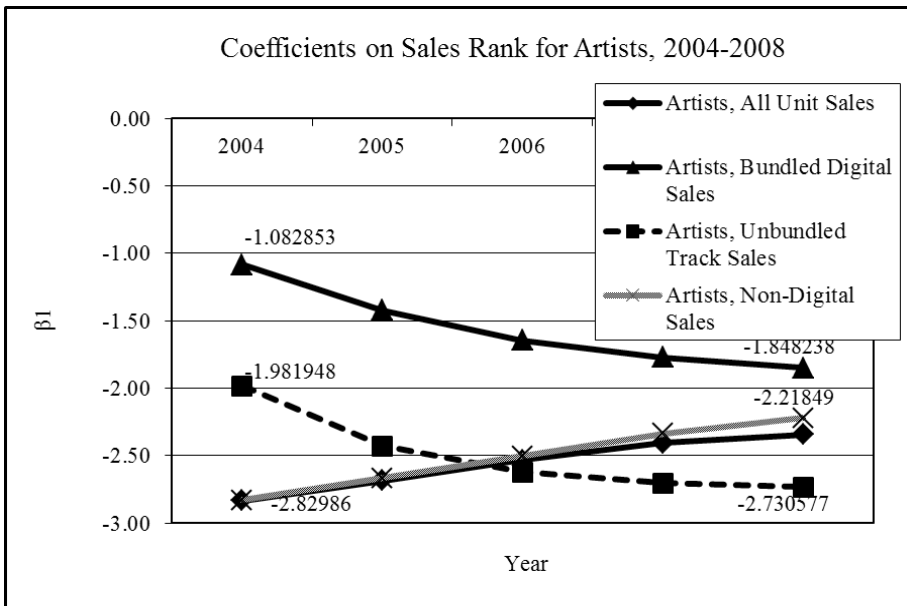


FIGURE 11: COEFFICIENTS ON SALES RANK FOR ARTISTS, 2004-2008. For all unit sales, bundled digital albums and singles, unbundled digital track sales, and non-digital unit sales for each year.

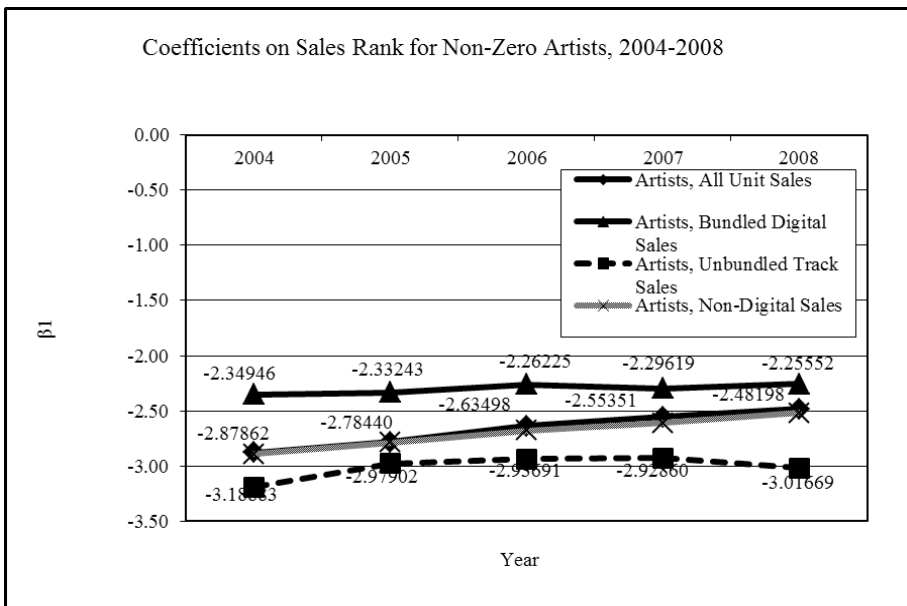


FIGURE 12: COEFFICIENTS ON SALES RANK FOR NON-ZERO ARTISTS, 2004-2008. Coefficients on sales rank for artists with only non-zero sales for all unit sales, bundled digital albums and singles, unbundled digital track sales, and non-digital unit sales for each year.

TABLE 1: THE PERCENT OF TOTAL SALES ACCRUING TO DIFFERENT QUANTILES OF ARTISTS, 2004-2008. Specifically, this shows the 1st through 9th decile, and then 91st through 99th percentile of artists. For example, the bottom 95% of artists account for 2.64% of sales in 2004, but the bottom 95% of artists account for 1.40% of sales in 2007, and so on.

% artists	% sales		All Formats		
	N=1172 2004	N=1336 2005	N=1575 2006	N=1795 2007	N=2051 2008
10	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
20	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
30	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
40	0.0000%	0.0000%	0.0003%	0.0003%	0.0004%
50	0.0028%	0.0025%	0.0032%	0.0050%	0.0005%
60	0.0119%	0.0102%	0.0105%	0.0165%	0.0257%
70	0.0404%	0.0331%	0.0300%	0.0459%	0.0693%
80	0.1620%	0.1119%	0.0879%	0.1283%	0.1807%
90	0.8631%	0.5586%	0.3778%	0.4958%	0.6919%
91	1.0540%	0.6916%	0.4509%	0.5913%	0.8237%
92	1.2678%	0.8498%	0.5385%	0.7192%	1.0033%
93	1.5954%	1.0709%	0.6650%	0.8793%	1.2239%
94	2.0274%	1.3823%	0.8280%	1.1018%	1.5393%
95	2.6468%	1.8380%	1.0749%	1.4057%	1.9449%
96	3.7797%	2.6744%	1.4625%	1.8441%	2.6160%
97	5.9164%	3.9328%	2.1797%	2.7226%	3.8100%
98	10.7007%	6.2677%	3.5702%	5.0546%	6.2428%
99	17.6450%	11.5334%	7.3497%	10.9743%	12.6179%
100	100.000%	100.000%	100.000%	100.000%	100.000%

TABLE 2: ABSOLUTE DISTRIBUTIONAL CHANGES FOR ARTISTS: THE DISTRIBUTION DESCRIBED IN SALES UNITS, 2004-2008.

	Number of Artists		All Formats							
	N=1172		N=1336		N=1575		N=1795		N=2051	
	sales level	2004	sales level	2005	sales level	2006	sales level	2007	sales level	2008
Sales=0		477		546		605		707		806
Sales>0		695		790		970		1088		1245
Q.50	2	573	2	623	2	756	2	822	2	947
Q.75	46	293	31	330	25	391	19	438	16	510
Q.90	717	117	471	134	302	158	210	180	188	204
Q.99	44424	12	32868	14	27513	16	20600	18	16763	21
% non-zero		59.30%		59.13%		61.59%		60.61%		60.70%

This shows how many sales were equal to zero, greater than zero, greater than the median (Q_{.50}), 3rd quartile (Q_{.75}), 90th percentile (Q_{.90}), 99th percentile (Q_{.99}) numbers of sales, as well as the percentage of non-zero sales across all years for all formats.

TABLE 3: SUMMARY STATISTICS FOR ARTISTS: LOCATION, SCALE, SKEWNESS, KURTOSIS, INTER-QUARTILE, LEFT TAIL, RIGHT TAIL, 2004-2008.

Distributions for Artists		Sales Levels				
All Formats		N=1172	N=1336	N=1575	N=1795	N=2051
Measure	Definition	2004	2005	2006	2007	2008
Location	Q.5	2.00	2.00	2.00	2.00	2.00
Scale	$(Q.75 - Q.25) / (Q.75 + Q.25)$	1.00	1.00	1.00	1.00	1.00
Skewness	$(Q.75 + Q.25 - 2Q.5) / (Q.75 - Q.25)$	0.91	0.87	0.84	0.79	0.75
Kurtosis	$(Q.9 - Q.1) / (Q.75 - Q.25)$	15.75	15.19	12.33	11.06	11.75
Inter-quartile	$(Q.75 - Q.25)$	45.50	31.00	24.50	19.00	16.00
Left Tail	$(Q.5 - Q.25) / Q.5$	1.00	1.00	1.00	1.00	1.00
Right Tail	$(Q.75 - Q.5) / Q.5$	21.75	14.50	11.25	8.50	7.00

This displays the location of the median, scale, skewness, kurtosis, and inter-quartile measures for each year.

