# Music Originals as Capital Assets

By Rachel Soloveichik

Abstract

In 2007, I estimate that musicians and recording studios created original songs, including recorded performances, with an estimated value of $7.8 billion. These songs were sold on CDs in 2008 and will be played on the radio, on television and at live concerts for decades to come. Because of their long working life, the international guidelines for national accounts recommends that countries classify production of music and other entertainment, literary and artistic originals as an investment activity and then depreciate those songs over time. However, BEA did not capitalize this category of intangible assets until the July 2013 benchmark revision. In order to change the national accounts, I collected data on music production from 1900 to 2010. I then calculated how GDP statistics change when songs are classified as capital assets.

To preview, my empirical results are: 1) In 2007, musicians and studios created recorded music worth $4.3 billion and non-recorded music worth $3.5 billion. Together, these musicians and record studios created original music with a nominal value of $7.8 billion producing recorded music, approximately 0.056% of nominal GDP; 2) Nominal music investment has grown much slower than overall GDP. Between 2000 and 2010, music investment fell from 0.083% of GDP to 0.053%. 3) Original music remains valuable for decades after it is first produced. I calculate that the aggregate capital value of all original music was $30 billion in 2007.

The views expressed here are those of the author and do not represent the Bureau of Economic Analysis or Department of Commerce. Email: Rachel.Soloveichik@bea.gov

## Introduction

The music industry has changed dramatically since 2000. Recorded music sales have fallen from $14.0 billion in 2000 to $8.3 billion in 2010 (nominal). At the same time, nominal concert revenue has increased from $1.4 billion to $3.1 billion (nominal). There are many papers in the economics literature documenting these changes and analyzing why those changes occurred (Connolly and Krueger 2005) (Mortimer and Sorenson 2005) (Liebowitz 2006). However, there are few papers tracking the aggregate music industry over time. In this paper, I will examine four separate channels for musicians to earn money: a) sales of music (CDs, downloads, records, tapes, etc.); b) royalties from radio broadcast, television and public performances; c) live music concerts; d) sheet music sales. I then combine those four revenue sources to estimate the total value of original music created each year.

In 2007, I estimate that musicians and recording studios created original songs with a value of $7.8 billion, including the expected revenue from live concert tickets. I define "original songs" as the complete intellectual property associated with music, including written notes, song lyrics, recorded music and music videos. The cost of producing this $7.8 billion worth of music could be treated either as a current expense or it could be treated as an investment. If original songs have a useful life of less than one year, then the production costs for music should be treated as a current expense. In that case, the final revenue from the sale of music is all that matters for gross domestic product (GDP), and production costs for music are an expense in the same way that CD manufacturing and music advertising is an expense. Until the July 2013 benchmark revision, BEA used this method to account for music production.

In contrast, items with a useful lifespan of more than one year are generally classified as capital assets. If original songs have a long useful life, then the production costs for music

should be treated as a capital investment. In that case, the capital investment in music is added to GDP as part of private investment and added to the pre-existing capital stock of music to get the total capital stock of original music. This capital stock of copyrighted music then returns a flow of value to its owner, and that flow is counted in GDP as part of capital services. GDP counts both the flow of value and the initial investment. As a result, GDP is always higher when a good is changed method 1) to method 2). Finally, the total capital stock of copyrighted music is depreciated, which is known as consumption of fixed capital. In addition to the well-known GDP, BEA also estimates net domestic production. Net domestic production equals GDP minus consumption of fixed capital. Because net domestic production does not include the cost of maintaining the capital stock, it is generally viewed as a better long-term measure of the total sustainable output of an economy.

In this paper, I will show that it is possible to calculate GDP when music production is treated as a capital investment (method 2). I can't directly observe total expenditures creating original music, the total amount of music capital or the flow of services provided by music capital. Nevertheless, I can observe the revenues earned by a song over time. I define the value of a song as the net present value of the future revenues it will earn for its copyright holders, starting from the first time the song is performed and ending when consumers lose interest and switch to newer songs. I also assume that unobserved production costs for music are, on average, equal to the net present value of songs created. In other words, a musician who created songs worth $1 million spent $1 million worth of time and energy composing. As a result, it is possible to account for song production and song depreciation in the same framework that is already used to account for physical capital production and depreciation. This is the framework recommended by the international guidelines for national accounts, System of National Accounts

2008, for all expenses related to the production of entertainment, literary and artistic originals (SNA 2008 10.115).

From a theoretical point of view, whether live concert revenue should be included in estimating the value of entertainment capital is controversial. On the one hand, musicians typically perform pre-existing songs at concerts rather than composing new songs for each concert. This suggests that live concert revenues could be viewed as a return on pre-existing capital stock of copyrighted music. On the other hand, musicians expend substantial amounts of time and energy performing their songs at concerts. This suggests that the musician's profits from ticket sales could be viewed as a payment for work time, not capital revenue. In this paper, I will treat live concert revenues as a return on entertainment capital. As a robustness check, I also calculated music investment when live concert revenues are excluded from the asset category. These results are available upon request.

To preview, my empirical results are:

1) Original songs have a useful lifespan of at least 50 years, but more than half of their value comes from sales in the first three years.

2) The music industry has shifted from recorded music to royalties and concerts. In 2000, musicians earned $14.0 billion from purchased music (CDs, tapes, downloads, etc.), $1.5 billion from royalties and $1.4 billion from live concerts (nominal $'s). In 2010, musicians earned $8.3 billion from purchased music, $2.5 billion from royalties and $3.1 billion from live concerts.

3) Ticket prices for live concerts and royalties for broadcast music have risen significantly faster than the rest of the music industry. Previous researchers have studied the concert industry and concluded that the price growth cannot be explained by quality

improvements or input cost growth (Mortimer and Sorenson 2005). Instead, bands are simply raising the ticket price for concerts over the last decade (Connolly and Krueger 2005).

Taken together, results 2) and 3) show that the treatment of live concert revenue has little effect on real GDP growth since 2000. When concert revenues are included in the industry, nominal revenue remains steady and prices increase. When concert revenues are excluded, nominal revenue falls dramatically and prices remain steady. Real music production drops between 2000 and 2010 in both scenarios

This research on capitalizing music production is part of a broader research project on improving the treatment of intangible assets in the national income and product accounts. Other researchers at the BEA have developed a satellite account measuring the annual investment and capital value of R & D (Robbins and Moylan 2007), educational investments (Fraumeni, Reinsdorf, Robinson and Williams 2008) and the role of intangible assets in foreign direct investment (Bridgman 2008). In previous papers, I estimated investment in theatrical movies (Soloveichik 2013a), books (Soloveichik 2013b), miscellaneous artwork (Soloveichik 2013c) and long-lived television programs. (Soloveichik 2013d).

This paper consists of four sections. In section 1, I describe my data on nominal revenues earned by the music industry and calculate the nominal value of music production back to 1929. In section 2, I describe my price index and calculate the real value of music production back to 1929. In section 3, I describe the various ways in which an original song can earn money and estimate the total revenues earned by recording studios and musicians over time. I also estimate the non-music sales costs and subtract them to get the value of music originals. Finally, I combine the real production data from section 2 with the depreciation schedule to estimate capital stocks of music from 1929 to 2010.

# 1. Nominal Music Production

Musicians earn money from their original songs in four possible ways: 1) They can record the songs and sell them, either on CD or as a download for computers, IPods or ringtones for cellphones (or records or tapes, etc.). In order to simplify the discussion, I will often refer to this market as CD sales, but my data includes all legal purchases; 2) They can license the songs for radio play, television broadcast, commercials, theatrical films or live performance by another artist; 3) They can print the songs for individuals to play themselves; 4) They can perform the songs at a live concert and earn money by selling tickets.

In this paper, I define the value of a copyrighted song as the expected present value of future revenues minus future costs. For example, suppose that a song earns X in Year 0, Y in Year 1 and Z in Year 2. Given a discount rate, $\rho$, the value of is:

$$\text{Net present value at release} = X + Y/(1+\rho) + Z/(1+\rho)^2$$

$$\text{Net present value at year 1} = Y + Z/(1+\rho)$$

$$\text{Net present value at year 2} = Z$$

In this paper, I discount future revenues at the $\rho = 7\%$ real. In other words, a musician is indifferent between being paid $1 now and $1.07 (inflation adjusted) next year. I chose the discount rate of 7% real because the music industry is risky, and so discount rates should be high enough to compensate for the risk.[1] Because I am focusing on revenues, I do not include any piracy or other illegal copies which do not pay royalties to the musicians or recording studios.

[1] My estimates of nominal production, real production, depreciation and capital stock are all sensitive to the discount rate used to calculate the net present value of music. Please e-mail me for alternative estimates when a different discount rate is used.

**Revenues Across Distribution Channels 1929-2010**

Figure 1 shows the value of music sales by year of initial release. My main dataset source is the Recording Industry Association of America (RIAA) website. They report annual sales for CDs, tape cassettes, Internet downloads, ringtones, records and other products from 1973 to 2009. Before then, I use the paper "The Record Industry: The Growth of a Mass Medium" (Gronow 1983) to get historical sales. I then benchmarked those datasets to the 2007 Economic Census, which reports that US recording studios earned $8.4 billion from selling music. I also adjusted the sales data to account for revenue not reported to the Economic Census, non-US musicians selling songs in the US and US musicians selling songs abroad. The adjustment factors are based on the paper "Pop Internationalism: Has A Half Century of World Music Trade Displaced Local Culture" (Ferreira and Waldfogel 2010).[2] Finally, I adjusted the sales data for classic CDs sold for years after initial release and the re-release of old songs on compilation albums.

The most striking result from Figure 1 is that nominal revenues from the sale of music have been plummeting since 2000. The RIAA data include digital downloads and ringtones – so the decline isn't just a shift from CDs to IPods. Instead, consumers are not buying as much music. These findings are not new to this paper. A number of industry and academic experts have discussed this phenomenon in recent years. The industry sources are adamant that the main cause of the revenue decline is illegal downloading (Hiatt and Serpick 2007) (RIAA website). The economic literature is more mixed, but generally agrees that illegal downloads are a major

[2] Joel Waldfogel calculated import and export shares from his dataset and e-mailed them to me. The shares match closely with the published graphs in the table.

cause of revenue declines (Oberholzer-Gee and Strumpf 2005) (Mortimer and Sorenson 2005) (Krueger 2004) (Liebowitz 2006).

Figure 2 shows the net present value of music royalties by year of initial release. Most royalty payments are for performance royalties, which are paid every time a song is played on the radio, broadcast on television or performed live by another artist. The main data source for performance royalties is the annual reports by ASCAP and BMI given in 'Music, Money and Success' (Brabec and Brabec 2008). ASCAP and BMI handle more than 95% of performance royalties in the US, and so their annual reports are a very good proxy for the total performance royalties paid in the US. 'Music, Money and Success' reports revenue for 1984, 1988, 1992 and 1996-2007. For 2008-2009, I used the online reports published by ASCAP and BMI. Before 1984, I used the book 'American Popular Music and its Business' (Sanjek 1988) to get ASCAP and BMI revenue. I then interpolated between the years with data to get annual estimates of royalty. I then benchmarked those datasets to the 2007 Economic Census, which reports total industry revenue of $2.6 billion in 2007.[3] Finally, I adjusted the performance royalty and synchronization royalty data to account for non-US musicians, exports and classic songs played years after their original release. These adjustments allow me to calculate the value of US music production from revenue data.

Figure 3 shows the net present value of live concert revenues by year of initial release. The main data source for Figure 3 is Pollstar, an industry group that tracks the live concert market (Connolly and Krueger 2005) and (Pollstar 2010). Alan Krueger generously shared his Pollstar data from 1982 to 2001 in an e-mail. After 2001, I use Pollstar's Year-End Business Analysis for 2010 to track revenue. I adjusted the Pollstar revenue data to exclude non-music

[3] This excludes royalties paid by television programs or theatrical movies to use music in their new products. Those royalties are already counted in the television or movie industry.

events such as dance performances and non-US musicians performing in the United States. I then benchmarked those datasets to the 2007 Economic Census, which reports total industry revenue of $3.4 billion in 2007.[4] I then added another $0.8 billion in revenue to account for musical groups which are too small to survey on the Economic Census and underreporting by musical groups that do answer the Economic Census. Finally, I adjust the concert revenue to account for classic songs played for decades after their original release[5].

Before 1982, I could not find any data on live music concerts. I will use nominal GDP to extrapolate spending on live concerts. In 1982, musicians earned $0.35 billion from live concerts, 0.11% of nominal GDP. I assume that consumers spent the same fraction of GDP on live music concerts for every year from 1929 to 1981.

The most striking result from Figure 3 is that nominal concert revenues increased by 132% between 2000 and 2007. This increase has already been analyzed in earlier papers. Mortimer and Sorenson (2005) argue that this increase can be attributed to music piracy. They show that the expected revenue from recording an album has shrunk significantly since 2000. Therefore, musicians devote less of their time and energy to recording new albums, and more to touring. Connolly and Krueger (2005) also find a large increase in nominal prices for concert tickets. They argued that the price increase occurred because CD albums and live concerts by the same artists are complementary goods. In the past, artists underpriced their live concerts to encourage CD sales. However, artists now get much less revenue from CDs , and so they charge the market clearing price for live concerts.

Figure 4 shows the net present value of printed music sales by year of initial release. Sheet music and songbook sales are much smaller than the other three categories, so there is less

[4] This excludes symphony orchestra performances, which I count in the live theater industry.
[5] Most musicians perform songs written at different times in the same concert. I allocate revenue in proportion to the number of songs from each year.

data available. My main dataset is the Economic Census, which gives sheet music and music book sales in 2002 and 2007. The National Music Publishers' Association gives sales data for 1978, 1992, 1994, 1995, 1996, 1998, 2000 and 2001. In addition, the Census of Manufactures gives sheet music sales for 1929, 1931, 1933, 1935, 1954, 1958, 1963, 1972 and 1977.[6] I then interpolated between the years with data to get annual sheet music sales. Finally, I adjusted the annual sales data to account for reprinting of classic songs, imports and exports of music.

The most striking result from Figure 4 is that sheet music revenue has been small since the 1930s. In 1929, publishers sold $50 million worth of printed music, 44% of total music revenue. Sheet music sales then plummeted to $1.8 million in 1933, only 12% of total music revenue. Some of that decrease was probably caused by the Great Depression, which reduced American's income for purchasing leisure goods. However, new competition from radio contributed as well. Before radio, sheet music was the cheapest way for Americans to enjoy music. With radio, Americans could enjoy the latest songs for free. Sheet music sales recovered a bit when the economy improved, but sales never regained the 44% market share of the 1920's.

**Measuring the Value of Copyrighted Music 1929-2009**

Figures 1-4 measured the total revenue earned by musicians, recording studios and royalty organizations. Not all of this revenue is actually a return to copyrighted music. Before they can sell a CD, recording studios need to stamp the CD and ship it to stores. Royalty organizations need to negotiate fees with individual broadcasters and sue the broadcasters who use their music without payment. In addition, musicians need to advertise their new songs to

[6] The Census of Manufactures does not track songbook sales, so the sheet music sales are always lower than total printed music.

build market interest. When I calculate the value of song, I subtract all the non-music costs to get the return on original music.

I use RIAA data to calculate non-music costs for purchased music from 1973 to 2009. I do that by comparing the retail prices for albums and singles. Physically speaking, a single and an album look identical, and they cost the same amount for the recording industry to manufacture, ship or sell on-line. However, an album typically contains 10-20 songs and is sold for $15-$25 in stores. At the same time, a single contains 1 song and is sold for approximately $5 in stores. The price difference between the two is the value of the entertainment assets contained on the CD. I can therefore estimate the price of an individual song:

Price Per Song = (Album Price – Single Price)/(Average number of Songs Per Album[7] – 1)[8]

Price per physical CD = (Price per single CD – Price Per Song)

Price for digital file = (Price for single download – Estimated Price Per Song)

This formula provides a price per physical CD of around $4 in 2004. By comparison, a 2004 article on the music industry estimated that it costs around $3.39 cents to manufacture ship and sell a CD at a big box retailer like Wal-Mart. The same article also states that small music retailers have higher costs, but does not provide any specific numbers (Cohen 2004).[9] This

[7] In this analysis, I assume that CD and tape albums have precisely 15 songs. I also experimented with using a separate average for each year from 1985 to 2007. This yielded similar results on average, but the yearly data was much noisier. I also assume that record albums have 12 songs on average.
The numbers in this paper do not match the published NIPAs precisely. When I calculated those numbers, I was not aware that records contained fewer songs than CDs or tapes. Because of that mistake, I underestimated prices and overestimated real music production in 1960's and 1970's. Nominal music production is almost unchanged.

[8] This formula assumes that publishers charge the same price per song for singles and albums. Singles generally contain the most popular songs, so publishers might charge a higher price per song. In that case, this formula is an overestimate of physical costs and an underestimate of music values. In practice, creative industries generally charge the same price for all their products, regardless of quality (Orbach and Einav 2007).
This formula also assumes that retail CD prices are based on costs. Recording studios have monopoly power over individual songs, so their actual pricing strategy may be much more complex.

[9] In particular, the article reports that CDs cost $1.70 to manufacture and ship and $3.69 for retailer overhead for each sale. However, Wal-Mart uses CDs as a loss leader for other products, and therefore is willing to lose about $2.00 per CD. Independent music stores typically charged higher prices for CDs.

figure of $4 counts both wholesaler costs and retail costs. I assume that wholesales pay 50% of those costs, or $2 per physical CD.

I use Census of Manufactures data to calculate non-music costs from 1954 to 1972. The Census of Manufactures does not separate album and single prices like the RIAA does. However, it does report wholesale prices and quantities for cassette tapes, 78 rpm records, 45 rpm records and $33^{1/3}$ rpm records. Most 78 and 45 rpm records were singles and most cassette tapes and $33^{1/3}$ rpm records were albums. Accordingly, I use the price difference between the different types to estimate music costs. Before 1947, single records accounted for vast majority of sales (Sanjek 1988). Therefore, I cannot use the same strategy to calculate non-music costs before 1947. I will assume that non-music costs are fixed from 1929 to 1947. Finally, I interpolate between 1947 and 1954.

Figure 5 shows non-music costs for purchased music from 1929 to 2009. I find that non-music costs have fallen sharply with over time. In 1929, non-music costs accounted for than 70% of the wholesale price for records. By the 1970s, physical hardware accounted for only 15% of the wholesale price for records. In addition to being cheaper, the new records also had better sound quality. Since 2000, non-music costs have stayed fixed around 33% of retail prices. At first glance, this stability seems surprising. In 2009, digital music purchases accounted for 40% of total industry revenue. Non-music costs for downloads are only $0.40, much lower than the $4 cost of physical CDs. However, consumers are frequently download individual songs rather than a full album. Therefore, the fixed costs are spread on a much smaller retail price. As a percentage of revenue, non-music costs are similar for digital downloads and physical CDs.

I cannot calculate such precise non-music costs for royalties, concerts or sheet music. Based on the ASCAP and BMI annual reports, I estimate that royalty organizations keep about

15% of the royalties they collect to pay for their administration costs.[10] I also estimate that bands earn enough money from merchandise sales (such as T-shirts) to cover their touring costs and the promoter's share of ticket sales. Accordingly, sales, manufacturing and distribution costs for live concerts are effectively zero (Connolly and Krueger 2005). I was unable to find any industry-specific estimate of the production costs for sheet music, but in a separate paper I calculate that printing, shipping and other production costs account for approximately 40% of the wholesale price for books (Soloveichik 2013b). I will assume that these costs are constant over time.

Marketing expenses are much more complex to calculate. According to the industry literature, marketing accounts for about 1/3$^{rd}$ of the non-manufacturing costs for CDs (Cohen 2004). I have not been able to find any industry literature on advertising for other music markets. In this paper, I will assume that marketing is 1/3$^{rd}$ of industry revenue in all music markets. To check that assumption, BEA purchased advertising data from Kantar Media. Kantar's data only tracks the cost of purchased advertising time, so their advertising numbers are always much lower than the total cost of marketing. Therefore, I cannot use Kantar data to calculate the cost of marketing for any particular year. However, I did find that advertising relative to total music production has not changed much from 1995 to 2010. Over that same time period, CD sales have plummeted and royalties and live concerts have increased dramatically. This suggests that marketing is a relatively fixed share of revenue.

Figure 6 shows my estimate of the annual value of music released from 1929 to 2010. I calculate Figure 6 from the sales data in Figure 1-4. I then subtract the non-music costs given in Figure 5 and described in the discussion earlier. In 2007, I estimate that non-music costs like advertising account for another 39% of total industry revenue and new music production

[10] Early in ASCAP's life, distributions were a much smaller share of receipts (Sanjek 1988). However, the money retained was used to build the ASCAP, and so should be counted as an investment.

accounts for approximately 50% of total industry revenue. The remaining 11% is a return on pre-existing songs over and above the cost of creating new music. This does not mean that the music industry is extraordinarily profitable. Instead, musicians made substantial investment creating original music in the past decades. They are now choosing to bank some of those returns rather than reinvesting it all in creating new music.

This paper counts music investment when the song is first released, **not** when the song is written or recorded. I make this choice for two related reasons: 1) It is extremely difficult to determine when musicians actually wrote a song. Accordingly, my quarterly numbers would be too speculative to include in the NIPAs; 2) Conceptually, unreleased songs could be counted in inventories as "work in progress," similar to the treatment of uncompleted manufactured goods. This paper does not count unreleased songs in inventory. Instead, this paper is focused on how GDP changes when entertainment originals are reclassified as capital assets.

## 2. Real Production

It is difficult to develop a price index for copyrighted songs. Each song is a unique artistic creation, and so I can never compare the cost of producing two identical songs over time. Furthermore, the main input to producing a song is the musician's time and energy. It is impossible for me to determine which songs the musician slaved over, and which ones were easy to write. In this paper, I will create a consumption-based price index to estimate the cost of purchasing a unit of music over time. I define a unit of music as one purchased song, one minute of radio music, one live concert or one book of sheet music.

My price index does not adjust for music variety. Between 1984 and 2008, music variety increased substantially. If music consumers appreciated this extra variety, then music quality increased over time and my price index will over-estimate the true inflation rate. This problem is not unique to the music industry (Blonigen and Soderbery 2009) , and so my price index for music is consistent with other price indexes used in the GDP statistics.

My price index assumes that the quality of musical **composition** has remained constant over time. I do not assume that the quality of the music listening experience has remained fixed over time. IPods are a big improvement over CD players and CD players were a big improvement over records and tapes. Similarly, radio sound quality has improved with the introduction of FM radio, satellite radio and digital radio. However, I believe that these quality improvements are mostly attributable to improvements in the quality of the electronic equipment and media that are used to disseminate copies of the music. After all, recording studios can and do re-release classic songs on CD or ITunes. These songs are often digitally remastered so their sound quality is better than the first release on record or tape.

My consumption-based price index only tracks legal music consumption. In other words, the number or price of illegal downloads and pirated CDs has no impact on my price index. The number and market share of illegal downloads has been increasing rapidly over the last decade (RIAA website). By 2006, consumers downloaded approximately 1 billion tracks per month (Hiatt and Serpick 2007) – more than ten times the legal sales of music. Accordingly, the average price paid by consumers per unit of music consumed (including illegal copies) has fallen substantially even while the legal price for music stays fixed. However, BEA's general practice

is to ignore illegal activity when measuring prices.[11] In this paper, I will only track prices for legal consumption.

There are a variety of ways in which music is purchased. In this section, I will construct four separate consumption-based indexes for music: 1) A per-song price index for CD albums, cassettes, downloads and other music sales; 2) A per-minute price index for radio airplay and television broadcast; 3) A per-event price index for live concerts; 4)A per-book price index for sheet music and song books. In order to simplify the calculations used in preparing the national accounts, BEA plans to combine those four indexes into two. The first will be called "non-recorded music" and include live concerts and broadcast music. The second will be called "recorded music" and include CDs and sheet music The BEA's price indexes use slightly different source data than my price indexes, so they do not track my indexes precisely.

**Price Index for Recorded Music**

CDs, downloads and other purchased music account for the overwhelming majority of recorded music after 1933. Therefore, prices for CDs track the overall recorded music price index very closely. My main price data for CDs is taken from RIAA's annual reports. These annual reports provide both the units shipped and the retail value of shipments for a variety of formats such as ringtones, digital albums, CD albums, etc. I can then calculate average retail prices for each format according to the simple formula:

Average Price for Format X= (Total Value of X)/(Number Units of X).

In this paper, I want to measure the price of the intellectual property contained on a CD, but **not** the price of the CD as a physical good.[12] Therefore, I subtract the non-music costs to get

[11] This is partially a data issue. Very little data exists on illegal activity, so any price adjustments would be too speculative to include in GDP.

music prices alone. The procedure for calculating the non-music costs is described earlier in section 1. I then calculate the average price per song according to the formula:

Song Price in Year X = (Total Revenue$_X$ - Total Non-music Costs$_X$)/(Number of Songs$_X$)

RIAA's data only goes back to 1973. Before then, I use the Census of Manufactures to estimate album[13] and single sales for 1954, 1958, 1963, 1967 and 1972. Before 1947, most records sold were singles. I use the book 'American Popular Music and its Business' (Sanjek 1988) to estimate total record sales for 1921, 1925, 1929, 1930, 1932, 1935, 1940-1942, 1944, 1947. I then interpolate between the years with data to get annual price indexes. Because the price index is interpolated, it is relatively smooth.

I use a variety of datasets to estimate printed music prices. At the current time, printed music is a very small share of the music industry, so I could not find any data on prices after 1975. Therefore, I use my book price index to proxy for printed music prices from 1975 to 2009 (Soloveichik 2010c). Before 1975, I use the book 'American Popular Music and its Business' (Sanjek 1988). That book gives sheet music prices for 1932, 1942-1944, 1971 and 1975. I also use the book ""The Great Depression in America: a Cultural Encyclopedia" (Young and Young 2007), which gives prices for 1920, 1926, 1932 and 1938. I then interpolate between the years with missing data to estimate annual prices for printed music.

Figure 7 shows a price index for recorded music from 1929 to 2010.[14] I find that CD prices have risen much slower than overall inflation. In 1929, recordings studios charged $0.31 per song. In 2009, recording studios charged $0.83 per song. Over the same time period,

[12] When CDs were first introduced, they were priced higher than tapes with the same songs. The price difference was probably discriminatory pricing because CDs were actually cheaper to manufacturer. Accordingly, my price index does not match a format specific price index.
[13] I assume 78 rpms and 45 rpms have 1 song, 33 rpms have 8 songs and long-play records have 12 songs.
[14] These price indexes no match the published NIPA numbers exactly. When I calculated the NIPA prices, I assumed that long-play records had 15 songs. Since then, I have changed that to 12 songs each.

Americans increased their music purchases substantially. In 1929, Americans bought approximately 100 million songs on records. In 2009, Americans bought 7.5 billion songs on CDs and downloads. This is a real growth rate of 5.5% per year. Sheet music prices have risen significantly faster than CD prices. However, they account for a very small fraction of recorded music prices, so they have little impact on average prices.

**Price Index for Non-Recorded Music 1929-2010**

Non-recorded music is split evenly between broadcast music and live concerts. Both industries have experience robust price growth over the past decade. In contrast, recorded music prices have been steady over the same time period. I believe that the different price trends are caused by piracy. Pirated downloads are a good substitute for CDs, so CD prices have been pushed downwards. In contrast, radio networks and live concerts rarely pirate songs.

Most royalties are handled by licensing organizations that represent large groups of artists. The two main organizations, ASCAP and BMI, both charge a fixed fee to radio or television stations for playing their songs. The fee depends on the station's size, profits and music usage patterns.[15] However, it does not change with the number of songs played or the minutes of music each month.[16] I calculate real broadcast music usage according to the following formulas:

TV Time Index = (.25+.75*(Viewership for music programs))*(Total TV Minutes)

Radio Time Index = (.25 +.75*(Listenership for music programs))*(Total Radio Minutes)

Broadcast Music Usage = (TV Time Index)*(TV Weight)+(Radio Time Index)*(Radio Weight)

[15] Non-music programs use music for theme songs, background music and commercials.
[16] This fee only covers the right to play over the radio or television. Advertisers and broadcasters must pay additional royalties if they use a song as part of their program (like a jingle or theme song).

In 2007, radio music programs were common but television music programs were virtually nonexistent. Therefore, it might seem that radio networks should higher royalties per broadcast minute. However, radio broadcasters earn less money than television broadcasters. These lower earnings reduce the royalty rate charged. Overall, ASCAP charges similar prices to radio and television on a per-minute per-user basis (Brabec and Brabec 2008).

I use a variety of datasets to estimate television music time from 1946 to 2009. The American Time Use Survey gives average television viewership for adults from 2003 to 2009. The trade organization TVB provides television viewership data from 1946 to 2002.[17] Finally, I use data from 'Stay Tuned' (Sterling and Kittross 1978) to estimate the market share for television music shows. Television music shows were common during the 1950s and then faded to almost nothing.

I use a similar technique to estimate radio music time from 1929 to 2009. Arbitron tracks average radio listening time from 1980 to 2009.[18] I use advertising data from the CS ad expenditure dataset from 1955 to 1980 (Galbi 2008) as a proxy for radio listenership. Before 1955, I use data from Lichty and Topping (1975) on average listenership for households with radios and data from 'Stay Tuned' (1978) on the number of households with radios. Finally, I use data from 'Stay Tuned' to estimate the market share for radio music shows. Music shows were common when radio was first developed, but they were replaced by radio soap operas and game shows in the 1930s and 1940s. After television was developed, most of those soap operas and game shows shifted to television. In their place, FM radio introduced music shows for

[17] TVB reports the number of households with televisions and average viewership per television household. Their data is based on Nielsen data, so it misses out-of-the-home viewership.
[18] I could not locate any data published directly by Arbitron. Instead, I use a report published by the Corporation for Public Broadcasting that cites Arbitron data.

drivers. I assume that radio music grew rapidly after television was introduced, and then stabilized at 80% of listenership from 1965 to 2009.

For live concert prices, my main source is the academic paper "Rockonomics: The Economics of Popular Music" (Connolly and Krueger 2005). That paper calculates concert prices from 1981 to 2003.[19] After 2003, I use Pollstar's reports on average ticket prices.[20] Before 1981, I use BEA's pre-existing deflator for the live entertainment as a proxy for concert prices. That price index is given in Table 2.4.4U, line 211.

Figure 8 show a price index for non-recorded music from 1929 to 2010. I find that live concert prices and broadcast royalties track closely back to 1965. However, broadcast music prices were much lower than live concert prices between 1929 and 1942. Between 1942 and 1965, broadcast music prices were higher. These differences can be explained by the history of radio and royalty organizations. When radio first started, royalty organizations had a difficult time collecting licensing fees. After a few years, the royalty organizations were more successful and were able to collect significant payments from broadcasters.

**Overall Price Index & Real Production for Music 1929-2007**

Figure 9 shows real production from 1929 to 2010. The data in Figure 12 is based on the nominal production data in Figure 6 and the price indexes in Figures 7 and 8. I find that real music production shrank from $9.1 billion in 2000 to $7.8 billion in 2010. Because of that decrease, real GDP growth falls slightly when music production is classified as an investment activity. The decrease is similar whether or not live concerts are included. On the one hand,

[19] They give a number of possible price indexes. I use their Fisher index by venue. Their price index by artist rises significantly faster than their price index by venue. I interpret that as an increase in earning power for established musicians, not a decrease in musician quality over time.
[20] I collected mean ticket price from Pollstar back to 1995. I found it matched Krueger's index closely.

nominal music revenue grew faster when live concerts are included as part of the revenue form which net present value is measured. On the other hand, prices rose faster when live concerts are included. Therefore, the treatment of live concerts has little effect on real GDP growth.

## Section 3: Revenue Streams From Original Music

In this section, I will estimate the revenue streams and costs separately for each channel. I will then combine the separate revenue streams to get an overall depreciation rate for songs.

In this paper, I will use five separate datasets to estimate the rate at which studios receive revenue from their copyrighted movies: 1) Billboard charts of album sales in the United States; 2) Music Monitor's tracking of radio airplay by month of airplay and year of original song release; 3) A website listing the songs played in a sample of television programs and theatrical movies; 4) A website listing the songs played in a sample of live concerts; 5) A website listing the top selling sheet music by week. All of these datasets required extensive cleaning before they could be used. Please contact me for more information on the exact cleaning procedures.

**Purchased Music Sales (CDs, ITunes, Records, Cassettes, etc.)**

Figure 10 shows the lifespan for an individual song on CD. I found that the typical song sells most of its copies soon after release. More than half of all album sales occur in the first quarter after an album is released, and only 13% of album sales occur more than one year after release. Because a popular song can be re-released on compilation albums, the lifespan for songs is slightly longer than the lifespan for a particular album. However, compilations account for only 12% of CD sales on average. In addition, many compilation albums are released within

five years of the original song release. Therefore, the vast majority of sales revenue occurs within the first two years after a song is released on CD.

The lifespan on CD given in Figure 10 relies on a number of assumptions. Billboard's charts only report sales for best-selling 250 albums. According to industry sources, the best-selling albums account for approximately 70% of total sales. In my analysis, I adjust for the missing data by over-weighting sales for CDs ranked 150-250. This procedure implicitly assumes that CDs ranked 150-250 have the same average age as CDs ranked 250+. In addition, Billboard's charts do not provide actual sales figures, only ranked sales. The precise pattern of CD sales over time changes when I use different formulas to impute gross sales based on chart rank. However, these changes have little impact on overall depreciation rates for music.

As a robustness test, I also experimented with using an alternative dataset on CD sales from the Recording Industry Association of America (RIAA).[21] I find that the RIAA and Billboard dataset produce almost identical depreciation profiles, as shown in Figure 10. According to both datasets, more than 75% of CD sales occur in the first year after a song is released. Sales then decrease rapidly, and very few albums sell any significant quantities more than five years after initial release. In the remainder of my paper, I will use the Billboard revenue data to estimate depreciation profiles for songs. Results remain very similar when I use the RIAA depreciation profile.

It is important to note that the short lifespan for CD **sales** does not necessarily mean that nobody is listening to old songs on CD. CDs are durable products, and so consumers may be buying a CD soon after release and then listening for decades. Furthermore, there is an active

[21] The RIAA does not directly measure sales. Instead, they give out awards for albums that ship 0.5 million, 1 million, 2 million, etc. copies. The time lag between awards is a proxy for quarterly sales.

resale market for used CDs, and so new fans of a musician can buy his or her CDs without the recording studio making any money.

**Broadcast Royalties**

Musicians earn royalties in a variety of ways. Musicians earn performance royalties whenever a radio station rebroadcasts a pre-existing song. Musicians also earn synchronization royalties whenever a television program, commercial or theatrical movie combines their song with film to create a new artistic work.[22] Finally, musicians earn performance royalties once again when a television station broadcasts a program with a pre-existing song, even though the producer has already paid synchronization royalties for the song.

My radio royalty data is taken the company Mediaguide. This company produces a product called Music Monitor, which tracks airplay by song more than 2,000 radio stations across the US. In my analysis, I requested a dataset tracking market share by month and year of airplay. For example, songs composed in 1946 accounted for 0.016% of the radio market in March of 2006. I can then estimate the depreciation rate by tracking the radio market share for a year over time. Because the sample of radio stations is very large, it might seem that this procedure produces a very precise estimate of the depreciation rate. In fact, I only observe 41 months of data, from January of 2006 to May of 2009.[23] My estimates may be biased if this period was unusual in any way.

[22] As discussed in Section 1, I will not count synchronization royalties in the aggregate music market because they have already been counted in the theatrical movie industry or will be counted in the television industry. However, I will still count those royalties when I calculate depreciation rates.

[23] The dataset provided by Music Monitor starts in January of 2004. However, the market share for classic songs dropped dramatically during 2004 and 2005. This market share decline is not a data error by Music Monitor – Arbitron data reports a similar decline in the market share for Oldies stations. Nevertheless, I believe that including this unusual time period would produce a misleading depreciation curve. I therefore started the sample in January of 2006, after the taste shift had already occurred.

My television and movie royalty data is taken from the website tvtunefinder.com. This website identifies the songs performed for a sample of popular TV shows. I then looked up the release date for a stratified sample of songs listed on tvtunefinder. It is important to note that the shows listed in tvtunefinder.com are not necessarily representative of the entire industry.

Figure 11 show the average market share by age of songs for radio royalties, synchronization royalties and television broadcast royalties. I find that radio royalties, synchronization royalties and sheet music sales decrease extremely fast at first. For example, songs released in 2005 accounted for 27% of the radio market in January of 2006, but only 16% of the radio market in December of 2006. On the other hand, I find that royalties from television broadcast diminish significantly slower. Intuitively, the slower decrease can be explained by the fact that the songs incorporated into the theatrical movie or television episode get new royalties each time the television episode or theatrical movie is re-run.[24]

Based on the radio airplay data, I estimate that older songs depreciate much slower. In January of 2006, songs released before 1995 accounted for 26.4% of the total radio market. These same songs accounted for 23.7% of the total radio market in May of 2009. This is equivalent to an annual depreciation rate of 3.8% per year. I found similar results for television royalties, but the data from tvtunefinder.com is too volatile to estimate a long-term depreciation rate precisely. I will assume that television royalties decrease at the same rate as radio royalties.

[24] This paper was written before I finished my research on long-lived television programs. For this analysis, I assumed that that broadcast television program viewership decreases at the rate of 40% per year and theatrical movie viewership decreases at 3% per year. My results would change slightly if I recalculated depreciation using more recent data (Soloveichik 2013a and d).

**Live Concert Revenues**

All of my data on concert songs is taken from the website Setlist.com. This website collects the program of songs performed (called a set) at concerts for a sample of 379 artists. The main data starts with concerts during the 1960s, and continues until concerts at the end of 2008.[25] I then weighted each concert by the venue's reported capacity (as listed on Onlinegigs.com). For example, a concert at Madison Square Garden counts for more than a concert at a local bar.[26] I then looked up the release date for a stratified sample of the songs listed on Setlist.com. Based on that information, I calculated the market share by vintage.

Figure 12 shows the market share for songs by vintage. At first, songs depreciate fast. Songs less than one year old have a 29% market share. The next year, their market share falls to only 13%. After the first few years, the depreciation rate slows dramatically. Between the second decade and the third decade, songs depreciate by an average of 5.2% per year. These results track market share by audience, not revenue. According to 'Rockonomics, the Economics of Popular Music' (Connolly and Krueger 2005), older artists charge higher concert prices. Controlling for average ticket costs, artists raise their prices by 2.2% per year. Therefore, the true long-term depreciation rate is 3.0% per year.

**Printed Music Sales**

Figure 13 shows the market share for songs over time. I find that new music has a 15% market share. The market share then drops to 5% in the next year. Between years 2 and 10, the measured market share jumps around a lot. But there is a general tendency to decrease over

[25] The musicians listed are setlist.com are not a random sample of the music industry. Instead, fans decide which musicians they are interested in tracking. They then e-mail in set-lists or post the set-lists directly. I cannot check whether the songs posted on Setlist.com are accurate. However, Setlist.com was the best data I could find.
[26] I restrict the sample to concert venues that were listed in onlinegigs.com. Depreciation is slightly faster when I impute capacities for venues with missing data or weight all venues equally.

time. Because the data is so volatile, I could not calculate a precise depreciation rate. I will use the long-term depreciation rate from the radio data. In other words, sheet music sales drop by 67% from year 0 to year 1 and then decrease by 3.8% per year thereafter.

**Non-Music Sales Costs**

Advertising is the main non-music cost. In section 1, I estimated that musicians and recording studios spent 33% of their revenue after physical costs on promotions. This includes public advertising, salespeople to get CDs in record stores, studio overhead to monitor advertising and other costs. BEA purchased a dataset from Kantar that gives advertising airtime. Unfortunately, that Kantar dataset does not report the precise songs advertised. In a paper on theatrical movies (Soloveichik 2013a), I found that virtually all movie advertising promoted new releases. I assume that CD advertising, royalty advertising and sheet music advertising also promote new songs. However, many live music concerts advertise even though they are playing only classic songs. I assume that concert advertising tracks concert revenue over time.

Musicians and recording studios also spend some money on physical costs to manufacture, distribute and administer their songs. In section 1, I estimated that recording studios spent approximately 15% of wholesale CD revenue on physical costs. I assume that CD stamping costs track CD sales revenue over time. In section 1, I also estimated that royalty organizations spent 15% of gross revenue collecting the royalties and administering distribution. I assume that those royalty costs track royalty revenue over time. Finally, I estimated that sheet music printers spent 40% of wholesale revenue on printing. Those printing costs track revenue.

**Combined Depreciation Rates**

There are many possible reasons why a copyright might decrease in value over time. For example, all consumers in a target market might have already bought the CD. Alternatively, a song might fall out of fashion because of cultural change. In this paper, I will not attempt to distinguish between the various reasons a consumer might stop buying an old song. I will simply attempt to estimate the schedule at which musicians and recording studios earn money from their songs, and the costs associated with those revenues.

In Figures 10-13, I showed that the lifespan for songs is different on CD, radio, television and live concerts. Therefore, the average lifespan for a song depends enormously on the weights given to each revenue stream. In my analysis, I will weight each product based on sales in 2007. This gives a weight of 57% to purchased music, 10% to royalties, 31% to live concerts and 2% to sheet music. The depreciation schedule would change if I use a different weighting method.

Figure 14 shows the depreciation schedule for original songs. Based on revenue alone, original songs depreciate by 65% in the first year of life. Depreciation is slightly slower when I subtract advertising costs. But songs still depreciate by approximately 50% in the first year of life. After the first year, depreciation slows dramatically and finally stabilizes at approximately 4% per year. The depreciation schedule shown in Figure 14 is too complex to use in the national income and product accounts (NIPAs) directly. Instead, BEA plans to use a simple geometric rate of 26.7% per year.

Figure 15 shows the capital stock of music over time under three different scenarios. The first scenario uses the combined depreciation rate shown in Figure 14. The second scenario used a simple geometric rate of 26.7% per year. As a robustness check, I also experimented with tracking investment in each music category separately and then depreciating that investment with

its own depreciation schedule (Figures 10-13).[27] This final capital stock number is very speculative. Musicians generally sell the same songs in multiple channels – so it is not necessarily meaningful to calculate music investment for each category separately.

The three scenarios in Figure 15 show very different capital growth rates over the past decade. When I use a simple geometric rate, real capital stock fell by 2% from 2000 to 2010. When I use the combined depreciation schedule from Figure 14, real capital stock grew by 10% over the same time period. If I use the four separate depreciation schedules, then real capital stock grew by 20% from 2000 to 2010. The difference between the simple geometric rate and the combined depreciation schedule is driven by the slowdown in depreciation once a song is a few years old. Real production of music has fallen in the past decade, so older songs account for an increasingly large percentage of capital stock. The geometric rate gives the least weight to older songs, the combined depreciation schedule gives an intermediate rate and the four separate depreciation schedules give the highest weight. Therefore, real capital stock growth is lowest when I use a geometric depreciation rate and highest when I use four separate schedules.

**Comparing My Estimate of Depreciation Rates with Market Transactions**

I can check the depreciation schedule show in Figure 14 by comparing it to known market transactions. My dataset of music catalog sales is primarily taken from the book "The Business of Music" (Krasilovsky and Shemel 2007). That book describes a number of acquisitions in the music industry from 1988 to 2002. I also include the multiple sales of the Beatle catalog, as described in a New York Times article about Michael Jackson (O'Brien 2006). Finally, I used the book 'American Popular Music and Its Business' (Sanjek 1988) to get a sale

[27] It is possible that depreciation schedules for each category are also changing over time. For example, sheet music is now targeted towards professional musicians and serious amateurs. These individuals often purchase older music. In the past, sheet music was targeted toward a broader market and focused on recent releases.

price for the MGM music catalog in 1939. I then used the depreciation schedules given in Figure 14 to predict prices for each catalog.[28] Table 2 gives more details about each transaction.

It is important to note that a recording studio might sell for more or less than the value of its music. On the one hand, recording studios only own partial rights to most songs in their catalog. For example, the recording studio might own the right to sell records of a song – but they are required to pay a fee to the musician for every copy they sell. Furthermore, musicians generally keep the right to perform their songs in concert without paying any royalties to the recording studio. The exact ownership of each song depends on the contract between studios and musicians, and is often kept private. On the other hand, recording studios own many more assets than just music catalogs. For example, a studio might have pre-existing relationships with popular artists, a well-developed brand image, and general industry experience.

Overall, I find that my predicted prices are similar to actual catalogue prices, but there is enormous variation. This variation cannot be explained by unobservable quality differences over time. Michael Jackson was involved in three separate transactions for the same Beatles catalogue. In Table 2, I find that the Beatles music sold for significantly less than the predicted price in 1985, slightly less than the predicted price in 1995 and significantly more than the predicted price in 2005. That suggests that the Beatles songs depreciate slower than average. In this paper, I will not attempt to match my depreciation schedule to the actual catalogue prices in Table 2. Nevertheless, I am reassured by the fact that the prices are in the same general ballpark.

[28]I use RIAA award data and total production data to proxy for aggregate production. For example, Beatles songs earned 56% of all gold awards in 1969. I therefore assume that Beatles songs accounted for 56% of the aggregate value released in 1969. I do not adjust for imports or exports.

# Conclusion

In this paper, I constructed estimates of investment, prices, depreciation and capital stock of music. This change helps bring the NIPAs in line with SNA 2008, which recommends that entertainment originals be treated as capital assets. To review, my empirical results were:

1) In 2007, musicians and record studios created original music with a nominal value of $7.8 billion, approximately 0.06% of nominal GDP;

2) Real music production fell from $9.2 billion in 2000 to only $7.8 billion in 2010 (2005 $'s). As a result, real GDP growth falls slightly if music is treated as a capital asset;

3) Original music remains valuable for decades after it is first produced. I calculate that the aggregate value of all music capital was $31 billion in 2007.

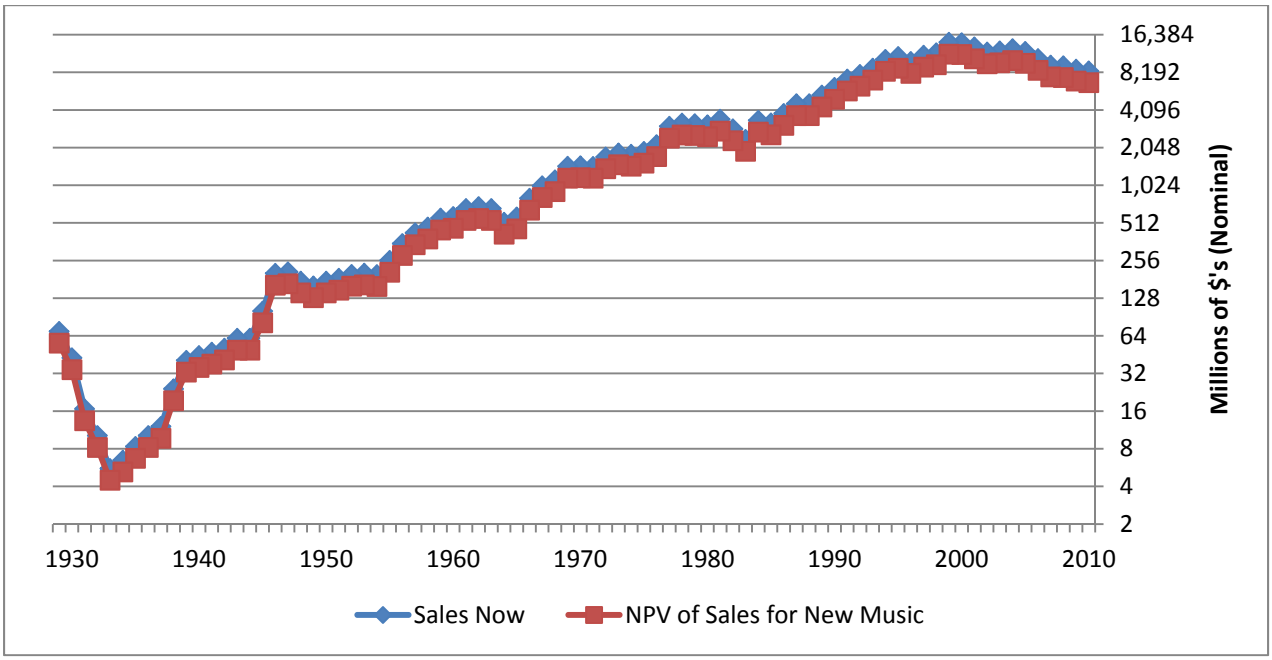
Table 1: **List of Datasets Used and How They Are Used**

| Dataset | Description of Dataset | Used to Create |
|---|---|---|
| 1997, 2002 and 2007 Economic Census | The Economic Census is conducted every 5 years by the Census Department. It surveys businesses in the United States. All my revenue is calibrated to the 2007 survey | Nominal Music Revenue, Nominal Music Production & Depreciation Schedules |
| Service Annual Survey | The Service Annual Survey is conducted annually by the Census. | Nominal Music Revenue |
| Census of Manufactures | The Census of Manufacturers was conducted periodically between 1900 and 1992. After that, it switched to the Economic Census | Nominal Music Revenue over time, Price Indexes for Purchased Songs |
| Allmusic.com | This website lists the release date, number of tracks, original source, and other information for albums & singles. It also lists the nationality for musicians. | Nominal Music Production, Price Index for Purchased Songs |
| Billboard.biz | This website ranks songs by weekly popularity. It also provides sales rank, title, musician, recording studio and suggested retail price for all major songs since 1985. In addition, I also found summarized Billboard information for earlier songs. | Nominal Music Production, Price Index for Purchased Songs & Depreciation Schedules |
| MusicMonitor | This company tracks radio airplay for a wide variety of songs across the United States. In particular, they list % Airplay by year of first release | Depreciation Schedules |
| Setlist.com | This website reports the songs play (sets) at individual concerts for selected musicians. | Depreciation Schedules |
| Arbitron Radio Surveys | Arbitron tracks radio listening time across the United States. | Price Index for Royalties |
| American Time Use Survey & TVB | The ATUS tracks all time use in the US, included television watching time. The TVB tracks only television watching | Price Index for Royalties |

Table 2: **Selected Music Catalog Sales**

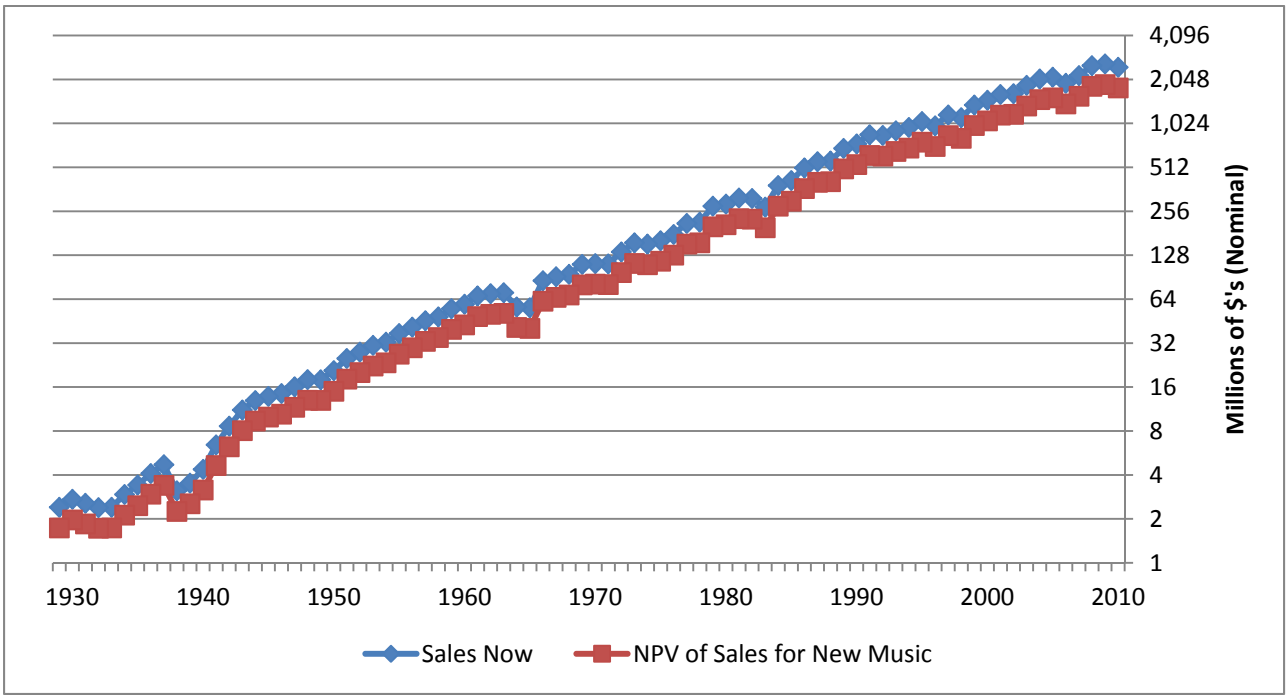
| | | Predicted Price | | |
|---|---|---|---|---|
| Year | Description of Deal | Without Concerts | Including Concert | Actual Sales Price |
| 1939 | A group of broadcasters planned to buy the MGM big 3 catalog. That catalog accounted for about (1/7th) of the music industry | $4.1 million | $4.6 million | $4.5 million was offered, but legal barriers stopped the deal |
| 1985 | Michael Jackson bought the Beatles catalog | $525 million | $650 million | $47 million |
| 1988 | Sony acquired Columbia Records | $2.68 billion | $3.55 billion | $2 billion |
| 1989 | A consortium led by MCA acquired Motown records | $203 million | $266 million | $61 million |
| 1990 | EMI acquired Virgin Records | $245 million | $312 million | $872 million |
| 1990 | MCA acquired Geffen Records | $518 million | $685 million | $550 million |
| 1992 | Polygram acquired Motown records. | $228 million | $311 million | $301 million |
| 1995 | Michael Jackson sold a 50% stake in the Beatles catalog to Sony | $393 million | $507 million | $200 million+ ($100 million+ for 50% stake) |
| 2002 | BMG acquired Jive | $2.64 billion | $3.19 billion | $3 billion |
| 2005 | Michael Jackson sold a 25% stake in the Beatle catalog to Citibank | $253 million | $335 million | $1 billion ($250 million for a 25% stake) |

# Figure 1: Revenue from Purchased Music



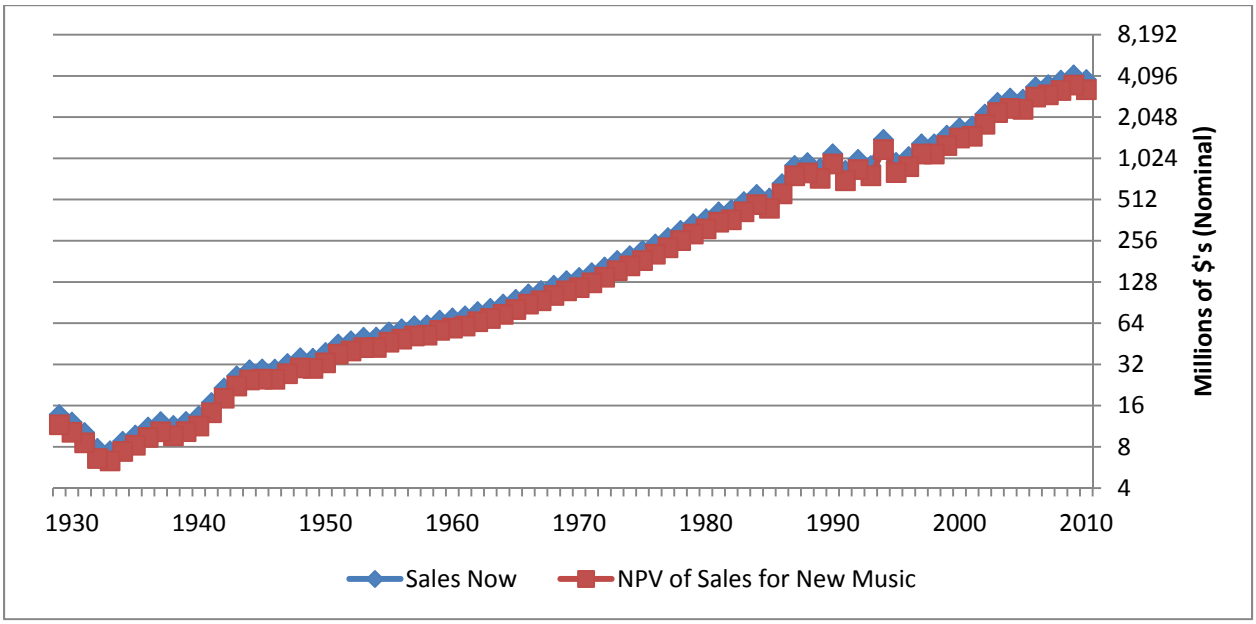

Source Data: RIAA Annual Reports 1973-2009; Billboard Charts, IFPI Music Charts and Gronow (1983)

# Figure 2: Royalty Revenue



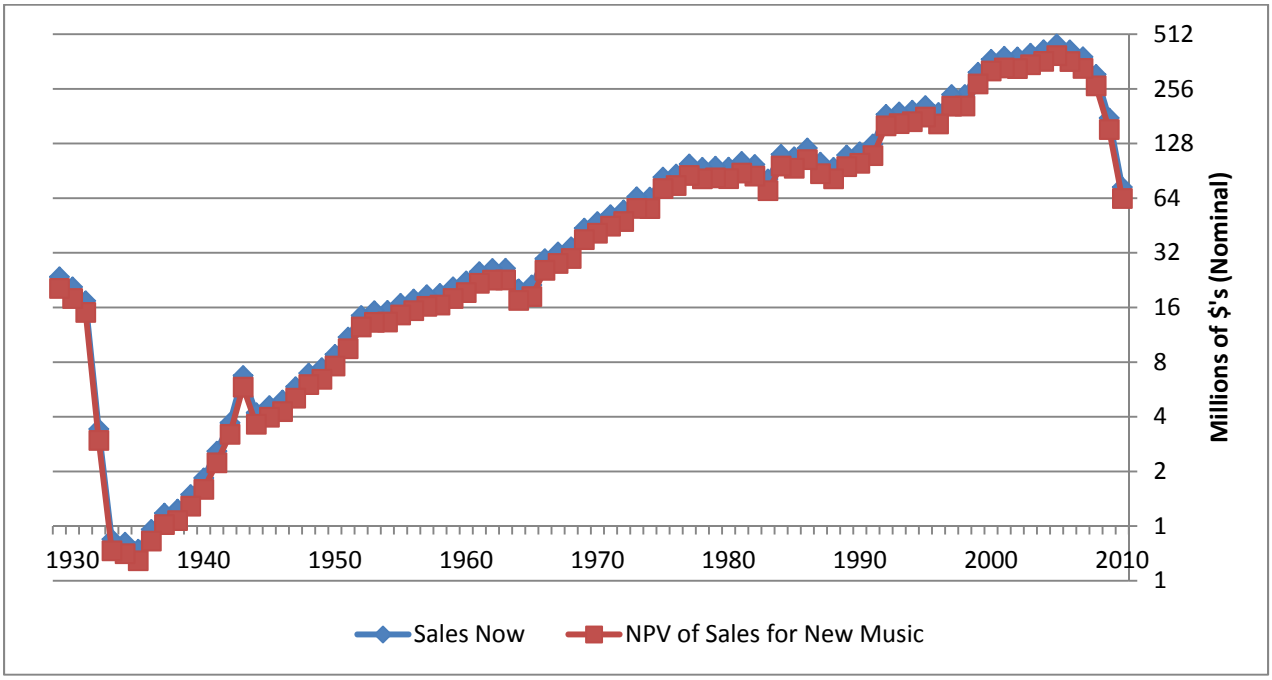

Source Data: BMI and ASCAP Annual Reports (Brabec and Brabec 2008), Billboard Charts, IFPI Charts, and (Sanjek 1988).

## Figure 3: Live Concert Revenue



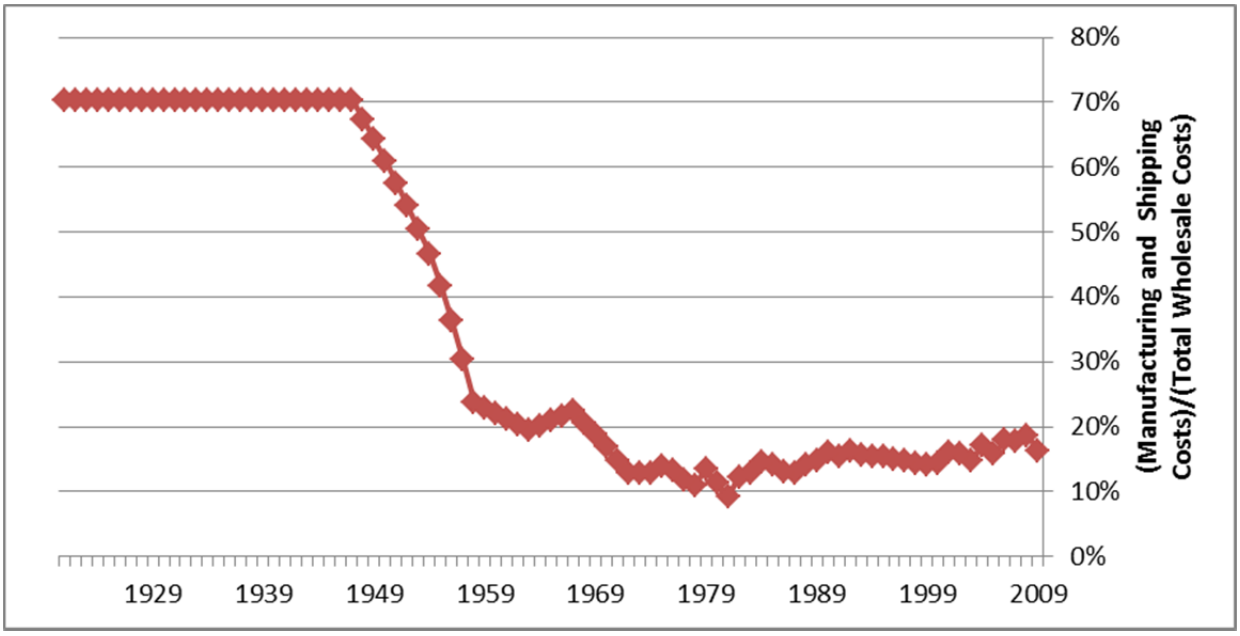

Source Data: Pollstar ticket data (Connolly and Krueger 2005 and media reports)

## Figure 4: Printed Music Revenue



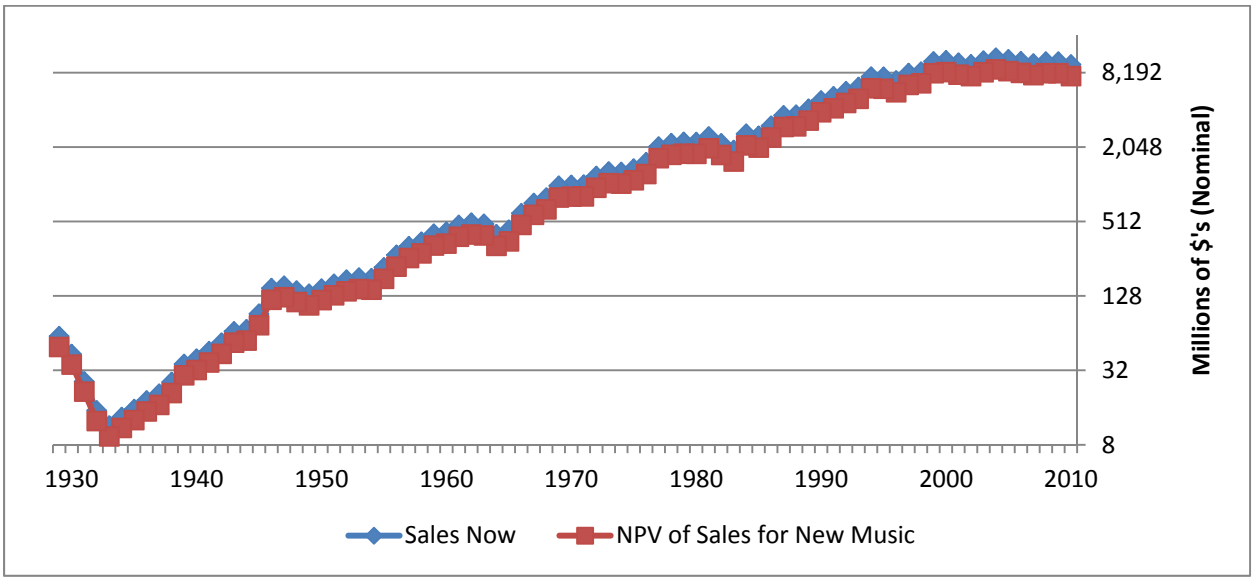

Source Data: National Music Publishers Association, Sanjek 1988 and industry literature

## Figure 5: Manufacturing % for Purchased Music



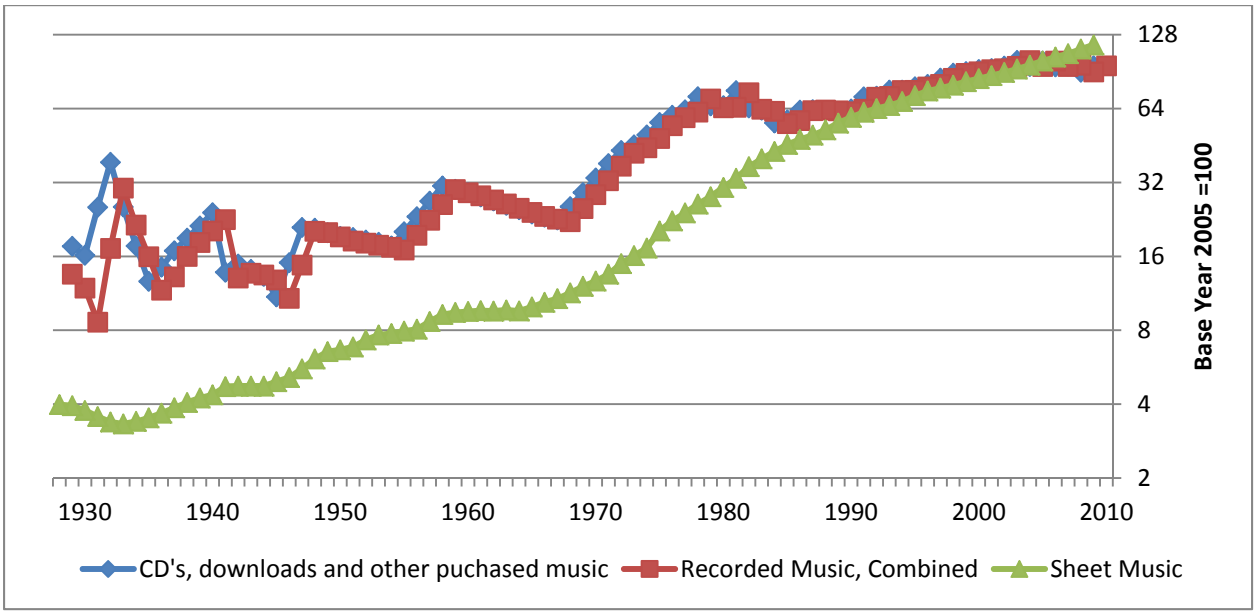

Source Data: RIAA annual reports 1973-2009, Census of Manufactures 1954-1972

## Figure 6: Music Revenue Minus Non-Music Costs



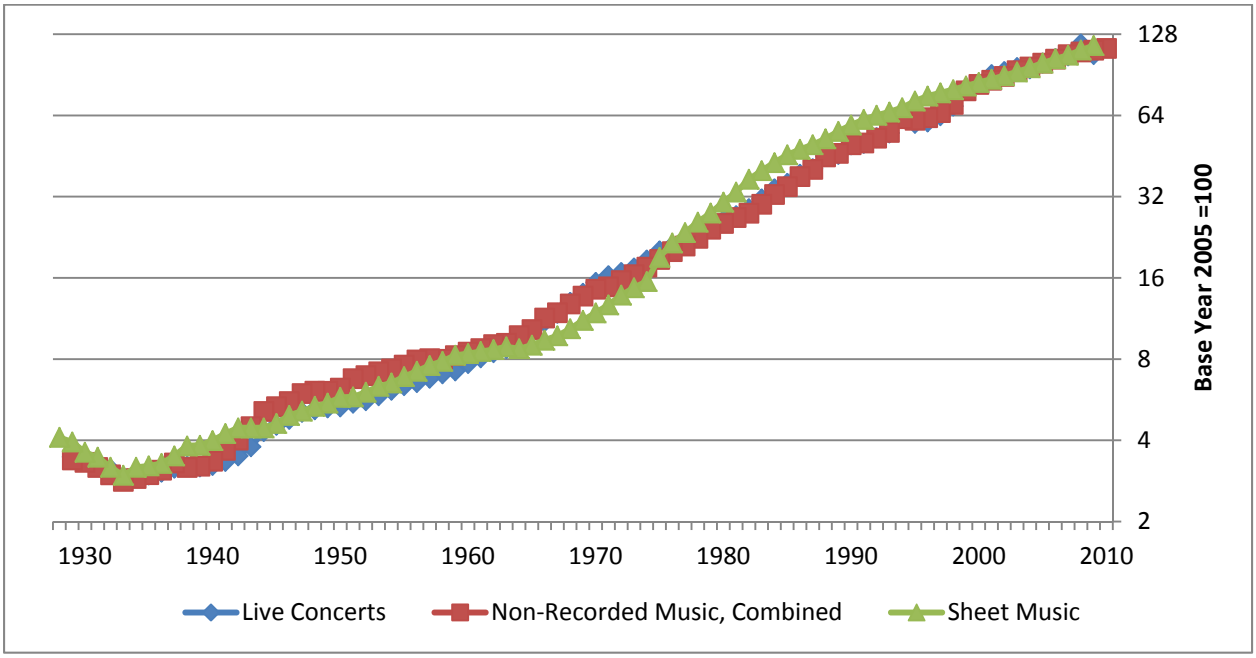

Source Data: Figures 1-5 and industry literature.

## Figure 7: Prices Indexes for Recorded Music



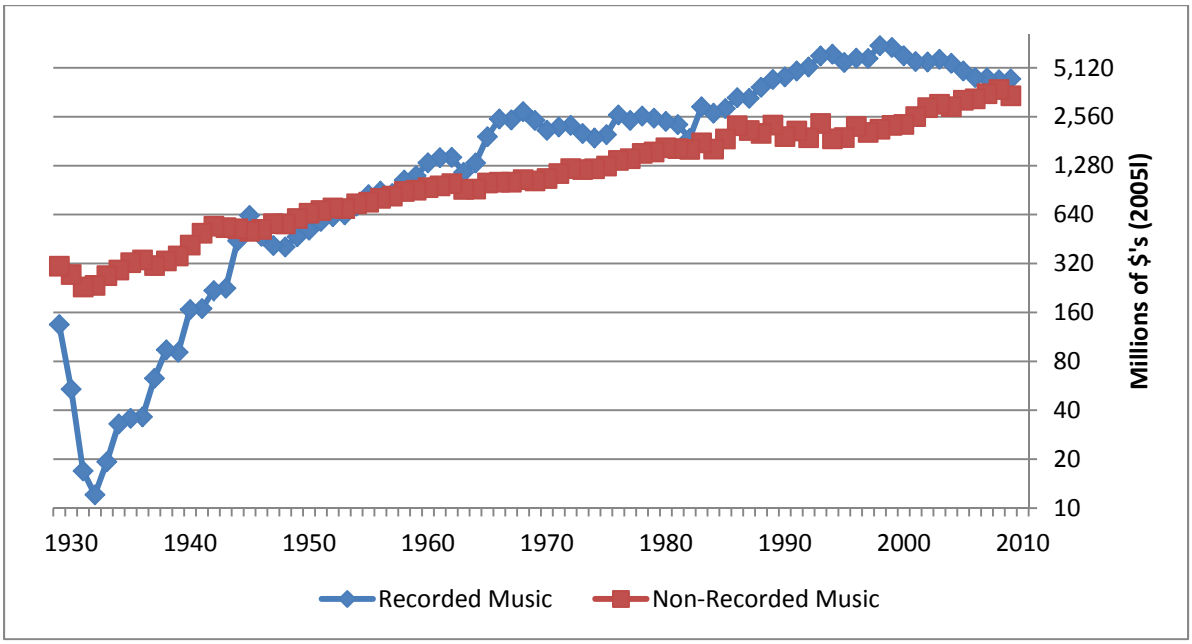

Source Data: Figure 1, RIAA Annual Reports 1973-2009, Census of 1954-1972, Gronow (1983) and Sanjek (1988); Price Index from 'Books as a Capital Asset'

## Figure 8: Price Index for Broadcast Royalties



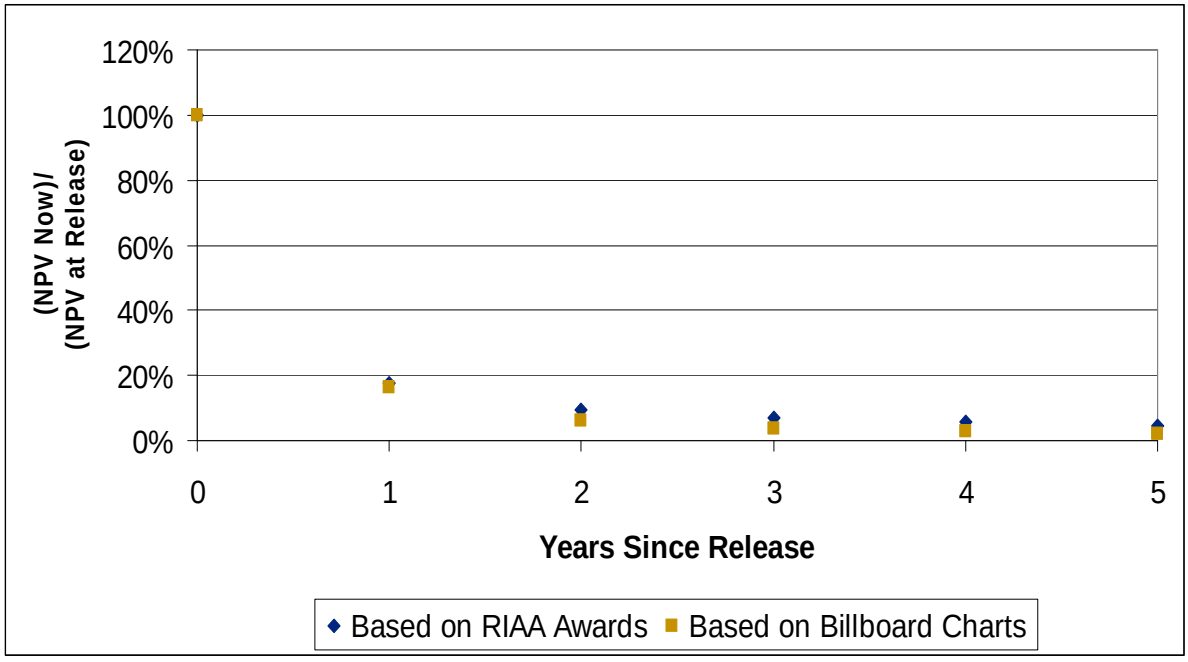

Source Data: Figure 2, TVB data on television viewership, Arbitron data on radio listenership, Sterling and Kittross (1978), CD Ad Expenditure Dataset; Connolly and Krueger 2005, Pollstar Reports, BEA's pre-existing PCE for live entertainment and industry literature.

## Figure 9: Real Music Production



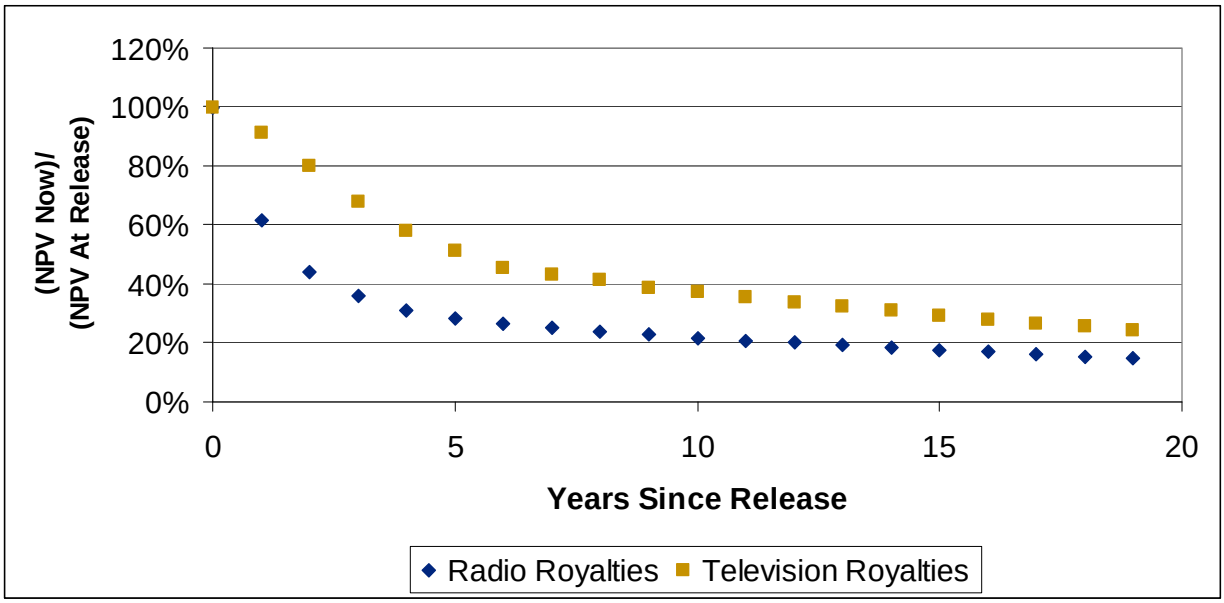

Source Data: Figure 1-8

## Figure 10: Depreciation Schedule for Purchased Music



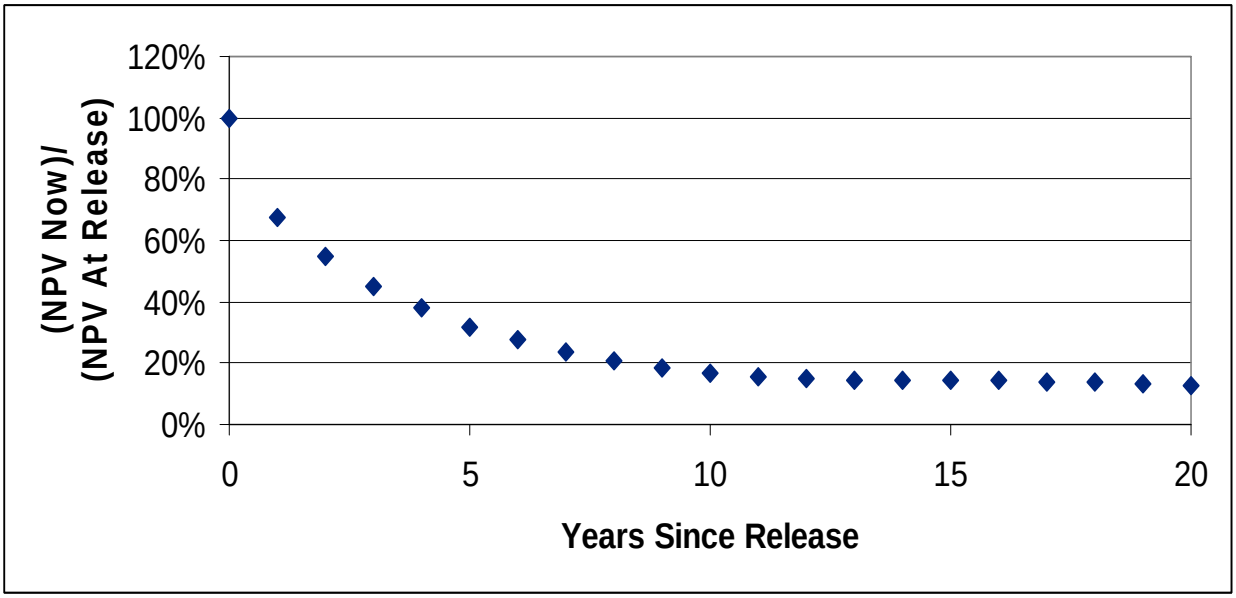

Source Data: Billboard Charts, RIAA awards from RIAA.com

## Figure 11: Depreciation Schedule for Royalties



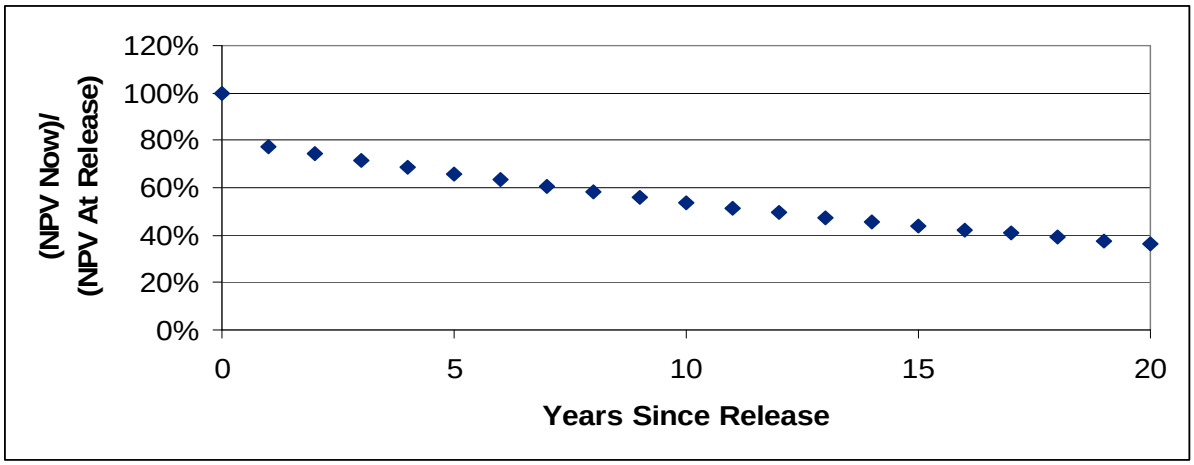

Source Data: Radio Royalties from Music Monitor and Television Royalties from tvtunefinder.com

## Figure 12: Depreciation Schedule for Concerts



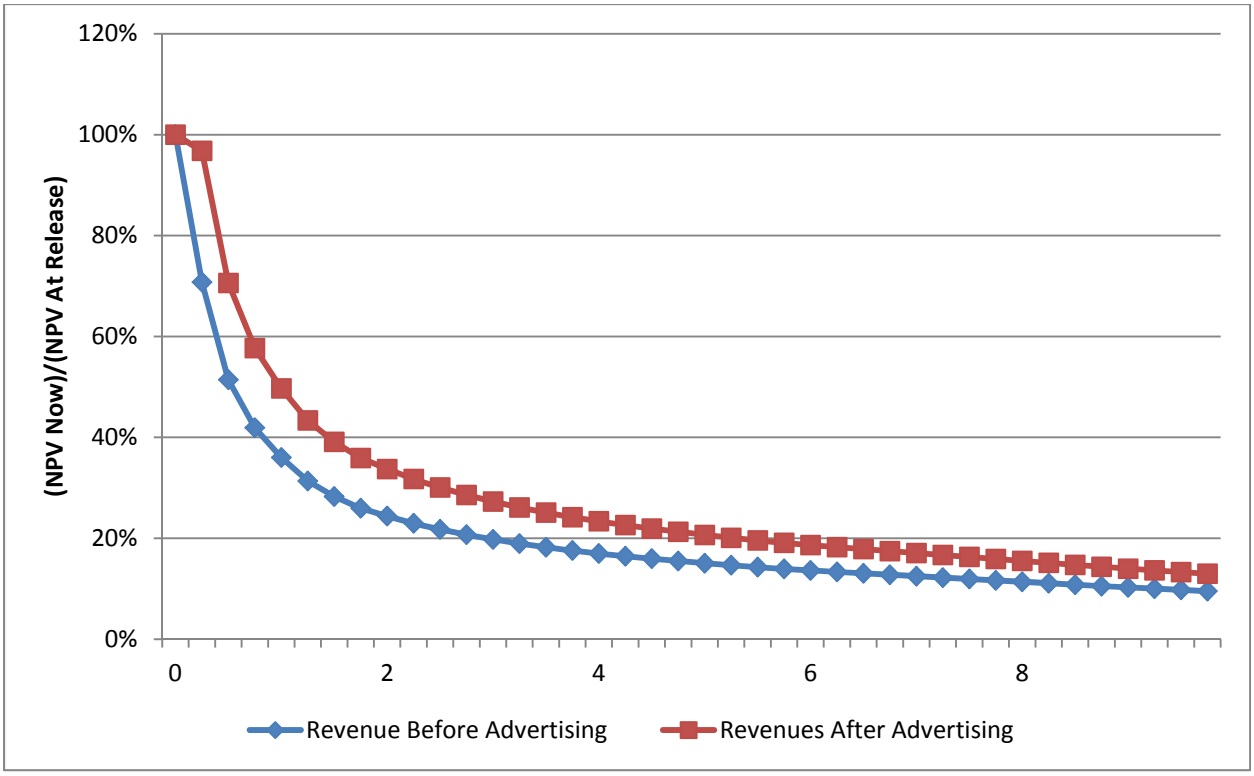

Source Data: Setlist.com

## Figure 13: Depreciation Schedule for Printed Music



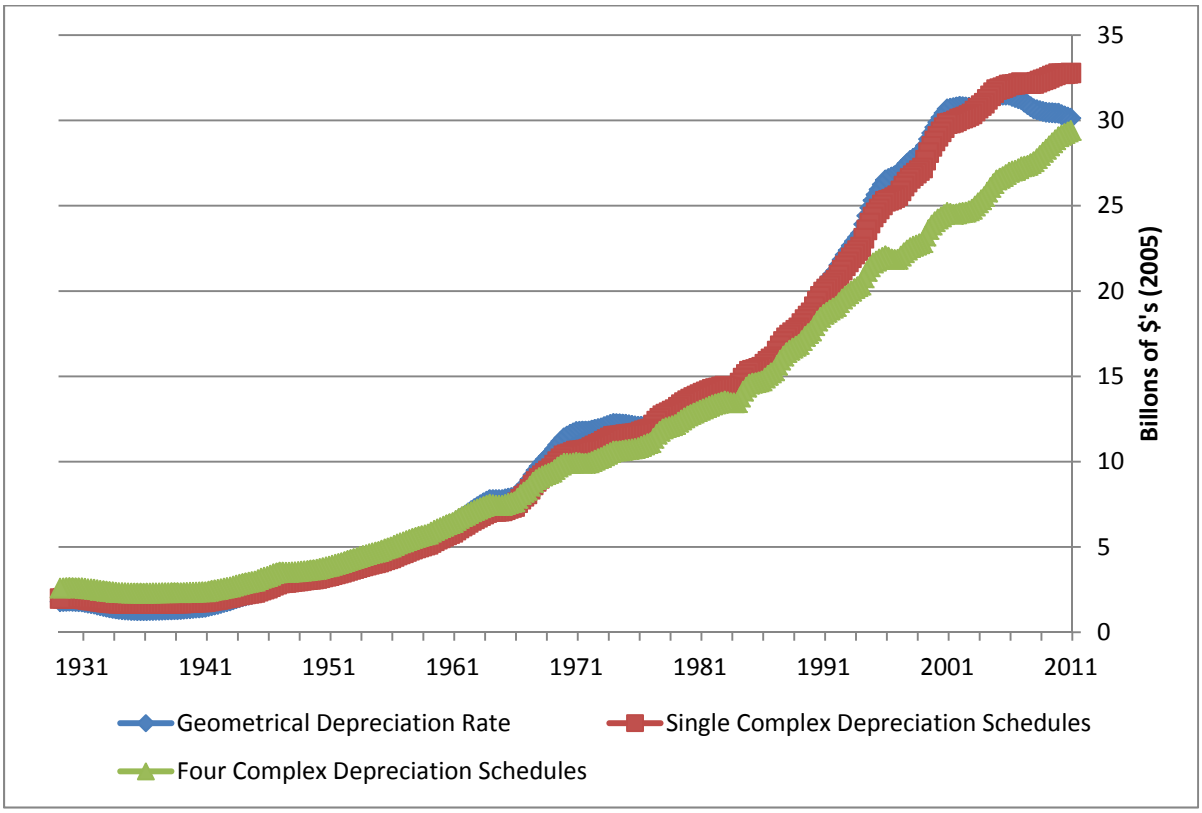

Source Data: MusicNotes.com, smoothed

## Figure 14: Combined Depreciation Schedule




Source Data: Figures 10-13, Revenue Shares from 2007 Economic Census

# Figure 15: Real Capital Stock




Source Data: Figures 1-6 for nominal production, Figure 7-8 for price indexes and Figures 10-14 for depreciation schedules

# Bibliography

Allmusic.com: Online database accessed 9/2008-3/2009

Andersen, Birgitte, Kozul-Wright, Richard and Kozul-Wright, Zeljka. (2007). Rents, Rights N'Rhythm: Cooperation, Conflict and Capabilities in the Music Industry. *Industry & Innovation* 14, 513-540

Billboard.biz: Online database accessed 9/2008-11/2008

Blonigen, Bruce and Soderbery, Anson. (2009). Measuring the Benefits of Product Variety With An Accurate Variety Set. NBER Working Paper 14956

Bowden, Sue and Offer, Avner. (1994). Household appliances and the use of time: the United States and Britain since the 1920's. *Economic History Review* 67, 725-748

Brabec, Jeffrey and Brabec, Todd. (2008). *Music, Money and Success* Schrimer Trade Books

Bridgman, Benjamin. (2008). Do Intangible Assets Explain High U.S. Foreign Direct Investment Returns? BEA Working Paper 2008-06

Cohan, Jillian. (2008). The Show Must Go On. *The American.* March-April. Accessed May 21, 2013. http://www.american.com/archive/2008/march-april-magazine-contents

Cohen, Warren. (2004). Wal-Mart Wants $10 CDs. *Rolling Stone Magazine.* October 12. Accessed May 21, 2013. http://www.rollingstone.com/music/news/wal-mart-wants-10-cds-20041012

Connolly, Marie and Krueger, Alan. (2005). Rockonomics: The Economics of Popular Music. NBER Working Paper 11282

Einhorn, Michael. (2006). Transaction Costs and Administered Markets: License Contracts for Music Performance Rights. *Review of Economic Research on Copyright Issues* 3, 61-74

Ferreira, Fernando and Waldfogel, Joel. (2010). Pop Internationalism: Has A Half Century of World Music Trade Displaced Local Culture. NBER Working Paper 15964

Fraumeni, Barbara, Robinson, Brooks, Reinsdorf, Marshall and Williams, Matthew. (2008). Price and Real Output Measures for the Education Function of Government: Exploratory Estimates for Primary and Secondary Education. NBER Working Paper 14099.

Galbi, Douglas. (2008). U.S. Advertising expenditure data. Accessed in 2009. http://purplemotes.net/2008/09/14/us-advertising-expenditure-data/

Greco, Albert. (2005). *The Book Publishing Industry, Second Edition* Lawrence Erlbaum Associates

Gronow, Pekka. (1983). The Record Industry: The Growth of a Mass Medium. *Popular Music* 3, 53-75

Hiatt, Brian and Serpick, Evan. (2007). The Recording Industry's Decline. *Rolling Stone Magazine.* June 19, 2007. Accessed May 21, 2013. online post http://www.rollingstone.com/news/story/15137581/the_record_industrys_decline

Hong, Seung-Hyun. (2004). The Effect of Napster on Recorded Music Sales: Evidence from the Consumer Expenditure Survey. SIEPR Discussion Paper No 03-18

IFPI.org. Recorded Music Sales 2000-2007. Accessed January 2009

Krasilovsky, M. William and Shemel, Sydney. (2007). *This Business of Music* Watson-Guptil Publications

Krueger, Alan. (2004). The Economics of Real Superstars: The Market for Rock Concerts in the Material World. manuscript

LaPolt, Dina. (2008). Taking a Glance at New Media Deals in the Music Industry. Accessed May 21, 2013. http://www.addicted-to-songwriting.com/article-new-media.html

Lichty, Lawrence and Topping, Malachi. (1975). *A Source Book On the History of Radio and Television*. Hasting House Publishers

Liebowitz, Stan. (2006). File-Sharing: Creative Destruction or just Plain Destruction. Center for Analysis of Property Rights Working Paper 04-03

Leibowitz, Stan. (2007). Don't Play it Again Sam: Radio Play, Record Sales and Property Rights. manuscript

Mortimer, Julie and Sorensen, Alan. (2005). Supply Responses to Digital Distribution: Recorded Music and Live Performances. manuscript

O'Brien, Timothy. (2006). What Happened to the Fortune Michael Jackson Made? *New York Times*. May 14. Accessed May 21, 2013. http://www.nytimes.com/2006/05/14/business/yourmoney/14michael.html

Oberholzer-Gee, Felix and Strumph, Koleman. (2005). The Effect of File Sharing on Record Sales, An Empirical Analysis. manuscript

Orbach, Barak and Einav, Liran. (2007). Uniform Prices for Differentiated Goods: The Case of the Movie-Theater Industry. manuscript

Pollstar. (2010). Year End Business Analysis. Available online to subscribers

Recording Industry Association of American. (2008). 1990-2010 Year End Statistics and online database on Gold and Platinum awards & reports. Accessed 9/2008-6/2011

Robbins, Carol and Moylan, Carol. (2007). Research and Development Satellite Account Update. *Survey of Current Business* October 2007, 16-27

Ruggles, Steven, Sobeck, Matthew, Alexander, Trend, Fitch, Catherine, Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. (2008). Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database. 1920-2000 Censuses and 2000-2007 American Community Survey. Minneapolis, MN: Minnesota Population Center

Sanjek, Russell. (1988). *American Popular Music and its Business: The First Four Hundred Years*. Oxford University Press

Schankerman, Mark and Pakes, Ariel. (1986). Estimates of the value of patent rights in European countries during the post-1950 period. *The Economic Journal* 95 (384). 1052-1076

Setlist.com. Online database Accessed 9/2008-3/2009

Soloveichik, Rachel. (2013a). Theatrical Movies as Capital Assets. manuscript

Soloveichik, Rachel. (2013b). Books As Capital Assets. manuscript

Soloveichik, Rachel. (2013c). Miscellaneous Artwork As Capital Assets. manuscript

Soloveichik, Rachel. (2013d). Long-Lived Television Programs As Capital Assets. manuscript

Sterling, Christopher and Kittross, John. (1978 and 2002). *Stay Tuned: A History of American Broadcasting* Wadsworth Publishing Company

Thall, Peter. (2006). *What They'll Never Tell You About the Music Business*. Watson-Guptil Publications

United Nations Statistics Division. (2008). Updated System of National Accounts 2008. Accessed May 20 2013. http://unstats.un.org/unsd/nationalaccount/sna2008.asp

Vogel, Harold. (2004). *Entertainment Industry Economics*. Cambridge University Press

Waldfogel, Joel. (2011). Bye, Bye Miss American Pie? The Supply of New Recorded Music Since Napster. NBER Worker Paper 16882

Young, William and Young, Nancy. (2007). *The Great Depression in America: A Cultural Encyclopedia*. Greenwood Press