

Artistic Originals as a Capital Asset

By Rachel Soloveichik

In 2002, I estimate that US artists, studios and publishers produced artistic originals worth \$65.1 billion. By category, production was \$9.8 billion in theatrical movies, \$7.6 billion in original songs and recordings, \$7.1 billion in original books, \$35.6 billion in long-lived television programs and \$5 billion in miscellaneous artwork. My research on television programs and miscellaneous artwork is still incomplete, so those numbers could change significantly in the final paper.

The cost of producing this \$65.1 billion in original artwork could be treated either as a current expense (method 1) or a capital investment (method 2). Under method 1, artistic production costs are treated as intermediate inputs in the same way as advertising costs, manufacturing costs and shipping costs. Final revenue from sales or rentals to households of reproductions of artistic originals is all that matters for measuring gross domestic product (GDP). This is the method BEA currently uses for artistic originals.

On the other hand, under method 2, artistic production costs are treated as private investment and added to the pre-existing capital stock of artistic originals to get the total capital stock of artwork. This capital stock of copyrighted artwork then earns money from the sale of reproductions such as books and DVDs, and from licensing of broadcasts or showings. These payments are counted in GDP as capital services. Finally, the depreciation (which is known as consumption of fixed capital or CFC) is deducted in calculating the total capital stock of copyrighted artwork. The international guidelines for national accounts, the System of National Accounts 2008 (SNA 2008), recommends

that countries use this method. In this paper, I calculate GDP, capital stocks and CFC for the United States when production of artistic originals is treated as an investment activity.

Switching from method 1 to method 2 may change short-term estimates of GDP growth significantly. Suppose that all movie actors go on strike for a single quarter. When artistic production is treated as a current expense, GDP doesn't drop until **sales or rentals** of theatrical movies drop. Theatrical release is typically six to eighteen months after filming, so we don't see the strike in GDP until a year later. On the other hand, the strike reduces GDP immediately if production is treated as an investment.

My research on capitalizing artistic production is part of a broader research project on capitalizing intangible assets. In the 1990's, BEA reclassified computer software production from a current expense to a capital investment and revised the national income and product accounts accordingly (Grimm and Parker 2000). Other researchers at the BEA have developed satellite accounts measuring investment and capital stock of R & D (Robbins and Moylan 2007). These intangible capital stocks have been used to explain growth in productivity (Corrado, Hulten and Sichel 2006).

In order to measure artistic production and capital stocks, I need three separate pieces of data: nominal production, price indexes and depreciation schedules. I can then calculate real production and real capital stock for Year t:

$$\text{Real Production}_t = \text{Nominal Production}_t / \text{Price Index}_t$$

$$\text{Real Capital Stock}_t = \text{Real Capital Stock}_{t-1} - \text{Depreciation}_t + \text{Real Production}_t$$

The first section of this paper reports nominal production for theatrical movies, music, books, television programs and miscellaneous artwork from 1929 to 2006. Price indexes and real production for each category from 1929 to 2006 are then calculated and

reported in section two. Depreciation schedules and aggregate capital stocks are shown in the third section. (For details on the estimation procedures and results, please see Soloveichik 2009a, 2009b, 2010a, 2010b and 2010c).

1. Nominal Production

The primary source of data for this project is the 2002 Economic Census. In 2002, total revenue from all artistic originals was \$186 billion. By category, revenue was \$25 billion from movies; \$14 billion from music; \$25 billion from books; \$89 billion from television and \$33 billion in miscellaneous artwork. I assume that revenue equals production costs plus sales costs such as advertising, printing books, stamping DVDs, etc.¹ I estimate that the cost of producing artistic originals amounted to 39% of industry revenue for theatrical movies; 54% of industry revenue for music; 28% of industry revenue for books; 40% of industry revenue for television and 15% of industry revenue for miscellaneous artwork. Details on the industry literature and datasets used to estimate these production shares are given in my working papers (Soloveichik 2009a, 2009b, 2010a, 2010b and 2010c). Therefore, I calculate that production spending by category was \$9.8 billion in theatrical movies, \$7.6 billion in original songs, \$7.1 billion in original books, \$35.6 billion in television programs and \$5.0 billion in other artistic originals — \$65.1 billion in total.

Figure 1 shows my estimate of annual production spending for theatrical movies, music, books and television programs from 1929 to 2006. The datasets and methodology used to produce each time series are briefly described below. I have not yet collected

¹ I allocate overhead expenses proportionally to non-overhead expenses.

historical data for the miscellaneous artwork category and assume that this category represents a fixed 7.7% (\$5 billion/\$65.1 billion) of the total industry from 1929 to 2006.

Theatrical Movies: I use data on filming dates and production budgets for a stratified sample of movies to estimate quarterly spending from 1929 to 2006. My main data source for this data is the website IMDB.com.² Please see my paper “Theatrical Movies as Capital Assets” (Soloveichik 2009a) for details on the estimation procedures used.

Recorded Music: Unlike theatrical movies, musicians do not generally report how much they spent composing and recording each song. Nevertheless, I can observe the profits earned by a song over time. I assume that unobserved production costs for a song are, on average, equal to the net present value of revenue from that song. These unobserved production costs include the value of time and energy spent composing. Musicians also do not report the dates songs were composed or recorded. I use the song’s release date to impute quarterly production.

I use industry data to estimate music revenue by sales channel from 1985 to 2006. The Recording Industry Association of America tracks revenue from CD’s, (legal) downloads, ringtones, tape cassettes and other purchased products. ASMP and BMI track royalties for radio broadcast, television broadcast and live performances. Pollstar tracks ticket sales for live music concerts. Taken together, these datasets allow me to estimate total revenue earned by musicians in the United States. I then adjust that revenue data to account for advertising and other sales costs; imports and exports of

²IMDB reports this data for most major movies, with better coverage of recent movies and more expensive productions. I impute missing data.

music; and classic songs sold for years after their initial release. I could not find any consistent industry data tracking music revenue before 1985. Instead, I use Census data on the number of musicians and their earnings to extrapolate music revenue back to 1929.

Books: As with music, I cannot observe production spending or writing dates for books. Therefore, I will use similar techniques to estimate quarterly production of books.

I use a combination of industry sources and Census surveys to track book revenue over time. Between 1929 and 1982, I use the Census of Manufacturers to track sales (interpolating between years with missing date).³ Between 1982 and 2003, I use industry data produced by the American Association of Publishers to track sales. Finally, I use the Service Annual Survey to track sales from 2005 to 2008.

Television Programs: The SNA 2008 says that only originals with a service life of more than one year should be treated as capital assets. Dramas and situation comedies meet this criterion, while news and sport programs do not. Game shows and reality television are in the middle. According to SNA 2008, individual reality episodes are too short lived to be counted as capital. However, the game show **format** is long lived, and so should be counted as a capital asset. In order to estimate the market share for long-lived assets, BEA purchased a custom data analysis from Nielsen Media Research. Based on that analysis, I estimate that long-lived programs and formats account for 50% of revenue.

I use a combination of industry sources and Census survey data to estimate total television revenue over time. Between 1998 to 2008, I use the Census Service Annual Survey to track revenues for broadcast and cable networks over time. Before 1998, I use

³ I include revenue from books licensed to magazines as serials. This revenue was substantial before 1945.

data on broadcast advertising, cable advertising and cable fees from book *International Television Almanac* to extrapolate total television revenue back to 1949. Before 1949, television ownership was very rare and television revenues were near zero.

I have not yet been able to estimate quarterly production for television programs. On average, production spending on television programs is 75% of broadcast revenue and 40% of cable revenue.⁴ However, television production has a strong seasonal pattern, with more filming during the fall and spring. In addition, television production is periodically disrupted by strikes or threatened strikes. For now, I will ignore this volatility and assume that production spending is a fixed share of revenue.

2. Prices and Real Production

In this section, I measure the real cost of art production without adjusting for artistic merit. I do not assume that the consumer's experience has remained fixed over time. For example, DVDs and plasma TV's offer a much better viewing experience than 1930s movie theaters. However, I believe that these quality improvements should be attributed to the consumer electronics industry rather than the artistic industry. After all, studios can and do re-release old classics on DVD for modern viewers. These re-releases cost a small fraction of the cost of filming new movies (Epstein 2005).

Figure 2 shows the price indexes for theatrical movies, music and books from 1929 to 2006. Figure 3 uses those price indexes and the nominal production data from Figure 1 to calculate real production from 1929 to 2006. I have not yet been able to

⁴ These numbers are extremely preliminary, and may change significantly in the final paper.

estimate a price index for television programs. In this paper, I will use the BEA's general price deflator for services as a price index for television programs.

I use a labor-based price index for theatrical movies from 1929 to 2006 and music from 1929 to 1984. This procedure assumes that artists produce the same amount of artwork per day of work in 2007 that they did in 1929. This would occur if there has been no technological progress in producing artwork over time and that capital-labor ratios have been constant. My data on labor inputs for movies is drawn from IMDB.com and my data on labor inputs for music is drawn from the US Census.

I use an item-based price index for books and music from 1985 to 2007. This procedure assumes that one book contains the same amount of artistic capital in 2007 as it did in 1929.⁵ My time series for book prices is taken from the Bureau of Labor Statistics pre-existing Producer Price Index from 1980 to 2007, the BEA's own price deflator for books from 1959 to 1979 and industry sources from 1929 to 1958. For the music price index, I track CD prices, concert prices, royalty rates and sheet music prices separately from 1985 to 2007. I then combine those four separate prices to get an aggregate price index for music.⁶

3. Depreciation Schedules and Capital Stocks

I cannot observe market prices for used artistic originals because they are rarely sold in the open market. Instead, I will impute prices for used artistic originals based on

⁵ In other words, a book that sells 1 million copies in 2007 has the same amount of artistic capital as a book that sells 1 million copies in 1929. I do not count the # of title published or copyrighted in either year.

⁶ This price index only covers legal purchases. Because of piracy, consumer spending per song has fallen. I don't think that shoplifting should count as a price cut to zero.

future revenues and sales 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, ρ , the value of a song for each year 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 section, I use a similar technique to estimate depreciation schedule for each artistic category. I start out with industry data that provides sales data by product and date. For example, the website The-numbers.com provides weekly box office for major movies. I use that industry data to estimate revenue by quarter, starting with the first release of the artistic asset and continuing until the revenues are small. I also estimate the sales costs for each quarter and calculate quarterly profits from first release onwards. Finally, I calculate net present value of the asset using the formula described above for each quarter from first release until the asset is fully depreciated. In this paper, I use a discount rate of 10% real per year. I chose a high discount rate because the artistic industry is very risky.⁷

Figure 4 shows my estimates of the depreciation schedule for theatrical movies, books, music and television programs. Figure 5 combines the real production estimates given in Figure 3 with the depreciation schedules given in Figure 4 to get aggregate capital stocks from 1929 to 2006.

⁷For books and music, I use the net present value at release as a proxy for production expenditures by artists. Accordingly, my estimates of annual investment change when I use a different discount rate. For theatrical movies and television programs, I observe production expenditures by studios directly. Therefore, changing the discount rate will not affect my estimate of annual investment

Overall, I find that artistic originals have a long useful lifespan. Ten years after the first release, theatrical movies retain 48% of their initial value, music retains 19% of its initial value, books retain 14% of their initial value and television programs retain 4% of their value. I also find that depreciation schedules are not geometric. In the first year of life, artistic originals lose a substantial proportion of their value. After the first year, depreciation slows dramatically. In my empirical work, I use two geometric curves added together to match the observed patterns.

Conclusion

Classifying artistic production as capital investment would change our measures of GDP and the capital stock. I find that artistic production was \$65.1 billion in 2002, 0.62% of GDP. Between 1929 and 1960, real artistic production fell from 1.12% of GDP to 0.51% of GDP. Accordingly, GDP growth for that period is lower when artistic production is treated as a capital asset. After 1960, artistic production remained steady at 0.5% of GDP, so the measure of GDP growth does not change when artistic production is re-classified as a capital asset.

In a recent paper, Corrado, Hulten and Sichel (2006) studied the production of computer software, scientific R&D, product development, brand equity and other intangible assets. They estimated that the US spends approximately \$1 trillion producing intangible assets — about the same amount as it spends producing tangible assets like houses and factories. In previous papers, BEA researchers have measured production of computer software (Grimm and Parker 2000) and R&D (Robbins and Moylan 2007).

Those assets account for approximately half of the intangible capital production studied in Corrado, Hulten and Sichel's paper. My paper studies a new intangible asset: artistic originals. I show that artistic originals account for another 6% of intangible capital.

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Figure 1: Nominal Production by Art Category

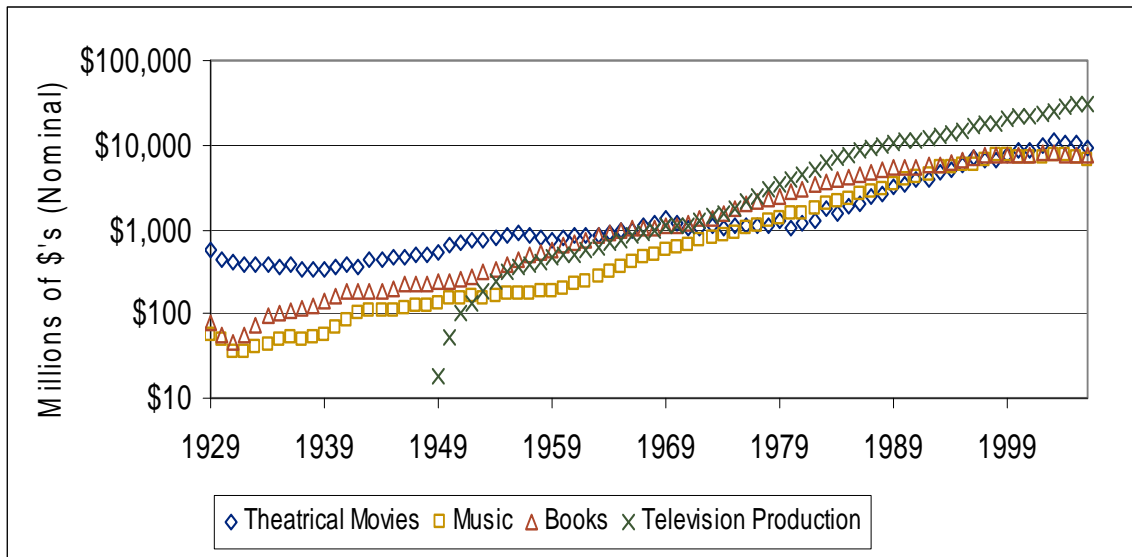


Figure 2: Price Indexes by Art Category

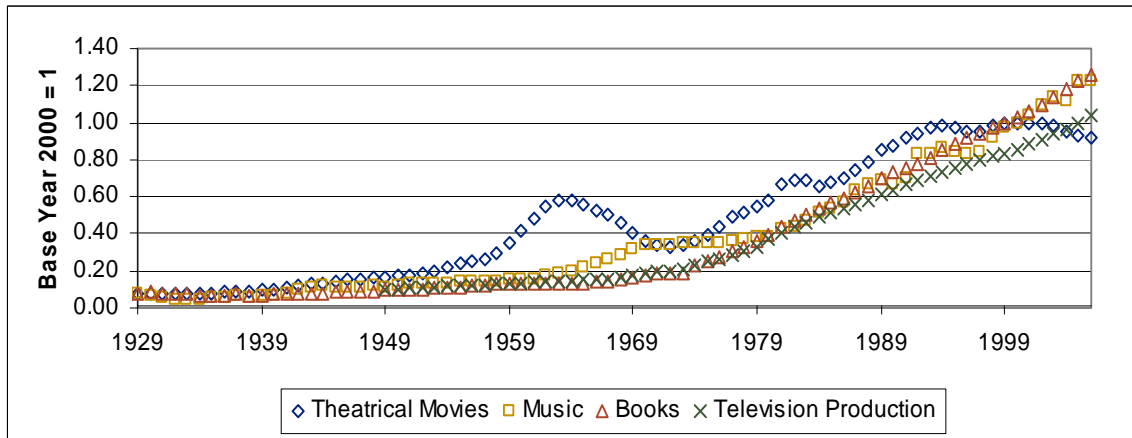


Figure 3: Real Production by Art Category

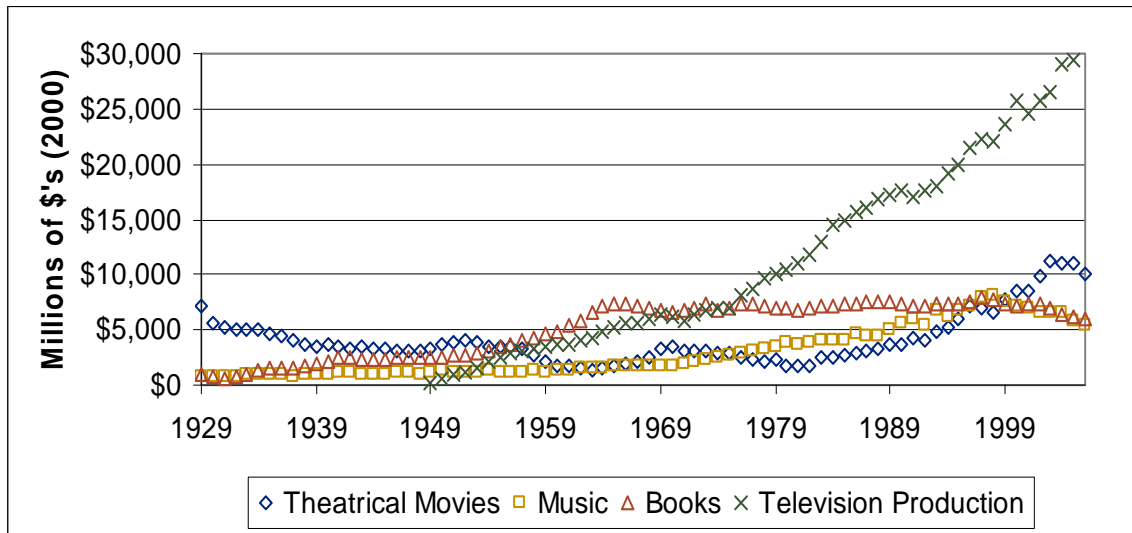


Figure 4: Depreciation Schedules by Art Category

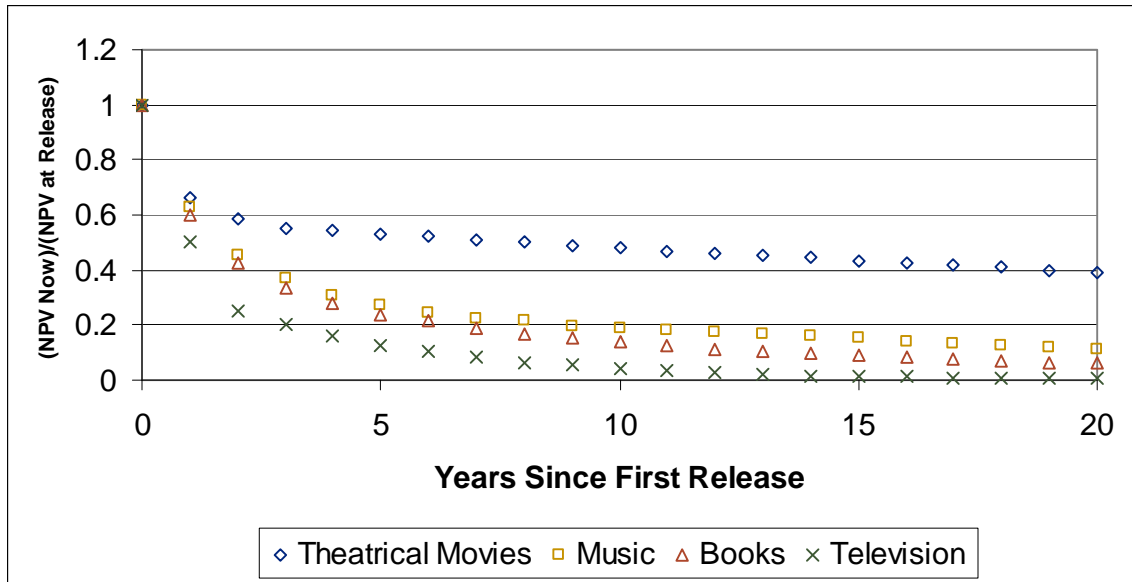


Figure 5: Real Capital Stocks by Art Category

