

# Digitization and the Music Industry

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Information and Communication Technologies  
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Copyright Protection, Technological Change, and the  
Quality of New Products: Evidence from Recorded  
Music since Napster

AND

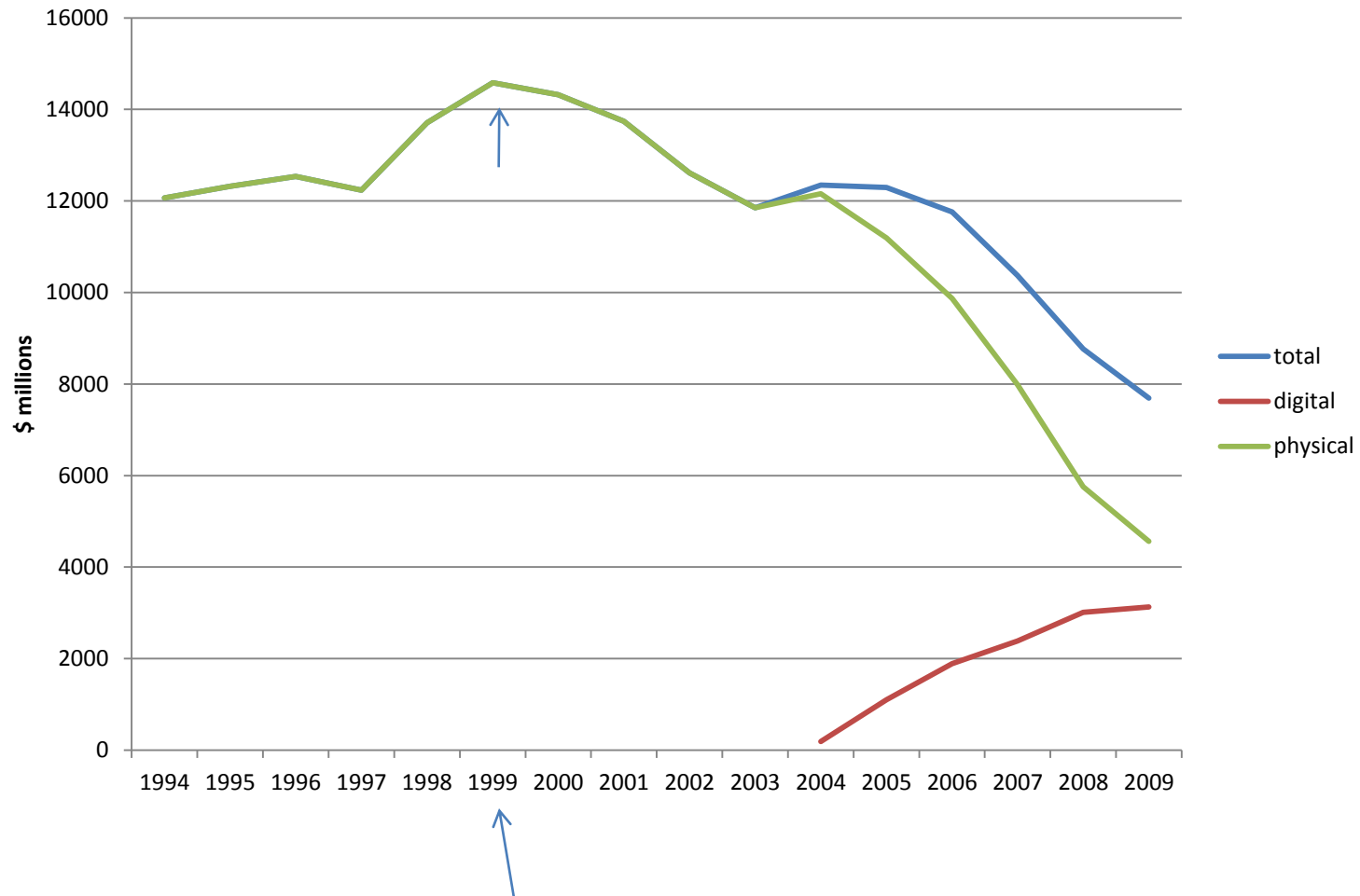
And the Bands Played On:  
Digital Disintermediation and the Quality of New  
Recorded Music

# Intro – assuring flow of creative works

- Appropriability
  - may beget creative works
  - depends on both law and technology
- IP rights are monopolies granted to provide incentives for creation
  - Harms and benefits
- Recent technological changes may have altered the balance
  - ***First, file sharing makes it harder to appropriate revenue...***

# ...and revenue has plunged

RIAA Total Value of US Shipments, 1994-2009



# Ensuing Research

- Mostly a kerfuffle about whether file sharing cannibalizes sales
  - Oberholzer-Gee and Strumpf (2006), Rob and Waldfogel (2006), Blackburn (2004), Zentner (2006), and more
- Most believe that file sharing reduces sales
- ...and this has led to calls for strengthening IP protection

# My Epiphany



- Revenue reduction, interesting for producers, is not the most interesting question
- Instead: *will flow of new products continue?*
- We should worry about both consumers and producers

# Industry view: the sky is falling

- IFPI: “**Music is an investment-intensive business...** Very few sectors have a comparable proportion of sales to R&D investment to the music industry.”
- Warner Music: “**...piracy makes it more difficult for the whole industry to sustain that regular investment in breaking talent.**”
- RIAA: “Our goal with all these anti-piracy efforts is to **protect the ability of the recording industry to invest in new bands** and new music...”
- RIAA: “this theft has hurt the music community, with **thousands of layoffs**, songwriters out of work and **new artists having a harder time getting signed** and breaking into the business.”

# File sharing is not the only innovation

- “Compound experiment”
  - Costs of production, promotion, and distribution may also have fallen
  - Maybe weaker IP protection is enough
- My empirical question: What has happened to the “quality” of new products since Napster?
  - Contribute to an evidence-based discussion on adequacy of IP protection in new economy
- **And if so, why?**



# Hard problem

- Quantifying the volume of high-quality new music released over time is hard
- Some obvious candidates are non-starters
  - # works released (but skew)
  - # works selling  $> X$  copies (moving target)

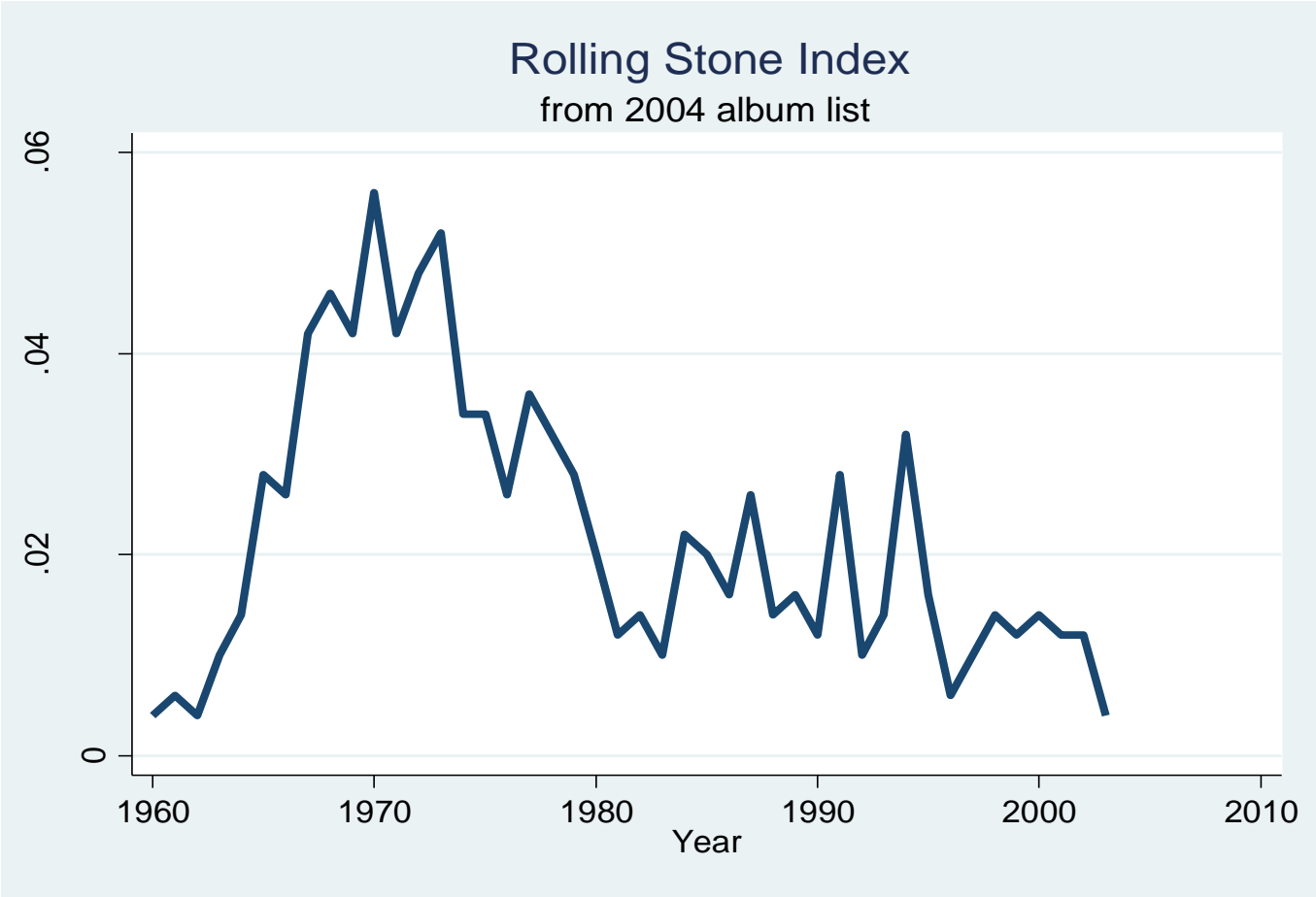
# Two Broad Approaches

- **Quality** index based on critics' best-of lists
- 2 indices based on vintage **service flow**
  - Airplay by time and vintage
  - Sales by time and vintage

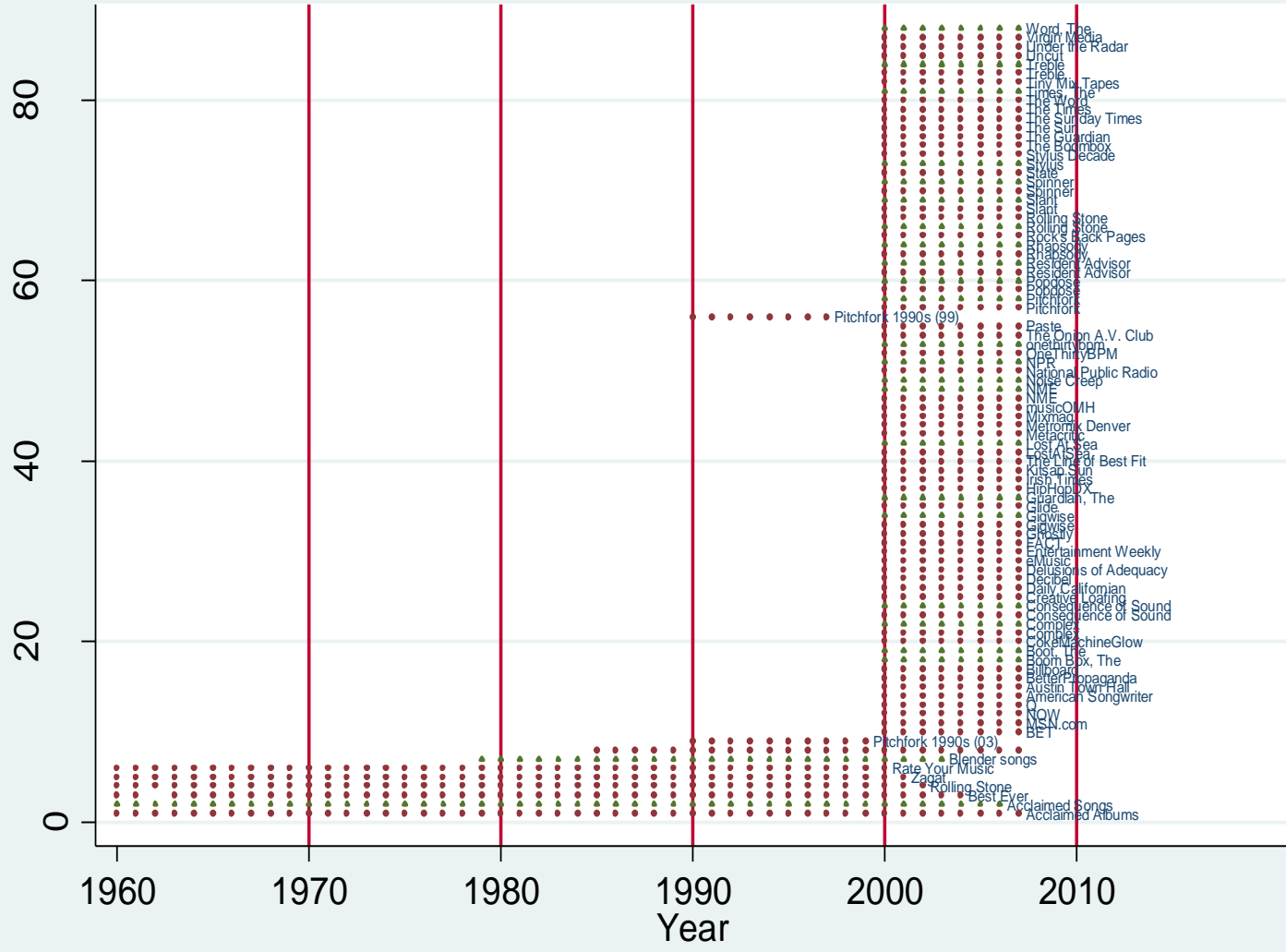
# Approach #1: critics' lists

- Want index of the number of works released each year surpassing a constant threshold
- Use critics' retrospective best-of lists
  - E.g. Number of albums on a best-of-the-decade list from each year
  - Retrospective: to be on list, album's quality must exceed a constant threshold

# Rolling Stone's 500 Best Albums (2004)



# Index Availability



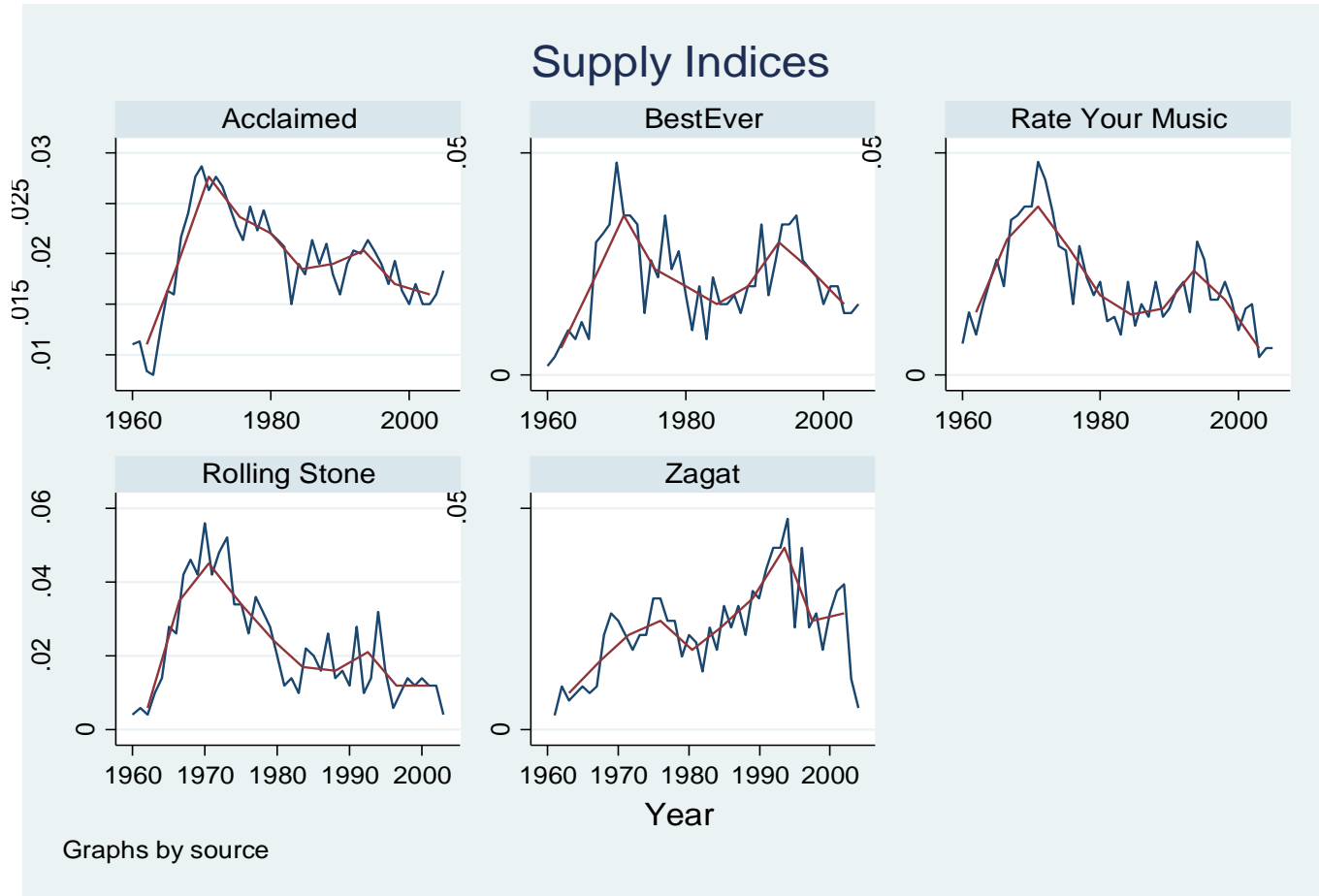
“Splice” together to create overall index, covering pre- and post-Napster era.

# Data Validity

- Do indices pick up major eras?
  - Larkin (2007): “The 60s will remain, probably forever, the single most important decade for popular music.”
- Do indices track each other?
- Are critical responses relevant to demand (and therefore economic welfare)?



# Concordance of Long Term Indices



All correlations exceed 0.7, except with Zagat

# The Most Listed Albums of the 2000s, or *How Cool Are You?*

Lots of concordance

rank	artist	album	number of lists	year	RIAA cert
1	Radiohead	Kid A	32	2000	P
2	Arcade Fire	Funeral	31	2004	
3	Strokes, The	Is This It	29	2001	G
4	OutKast	Stankonia	29	2000	3xP
5	Wilco	Yankee Hotel Foxtrot	28	2002	G
6	Jay-Z	The Blueprint	25	2001	2xP
7	Flaming Lips, The	Yoshimi Battles the Pink Robots	21	2002	G
8	LCD Soundsystem	Sound of Silver	20	2007	
9	West, Kanye	The College Dropout	20	2004	2xP
10	Stevens, Sufjan	Illinois	20	2005	
11	TV on the Radio	Return to Cookie Mountain	19	2006	
12	Modest Mouse	The Moon & Antarctica	19	2000	G
13	White Stripes, The	Elephant	19	2003	P
14	Daft Punk	Discovery	19	2001	G
15	Interpol	Turn On the Bright Lights	18	2002	
16	Eminem	The Marshall Mathers LP	18	2000	9xP
17	Radiohead	In Rainbows	18	2007	G
18	Beck	Sea Change	17	2002	G
19	Bon Iver	For Emma, Forever Ago	17	2007	
20	Broken Social Scene	You Forgot It in People	16	2002	
21	Spoon	Kill the Moonlight	15	2002	
22	Knife, The	Silent Shout	15	2006	
23	White Stripes, The	White Blood Cells	15	2001	G
24	Animal Collective	Merriweather Post Pavillon	15	2009	
25	Madvillain	Madvillainy	15	2004	

Significant sales;  
not economically  
irrelevant



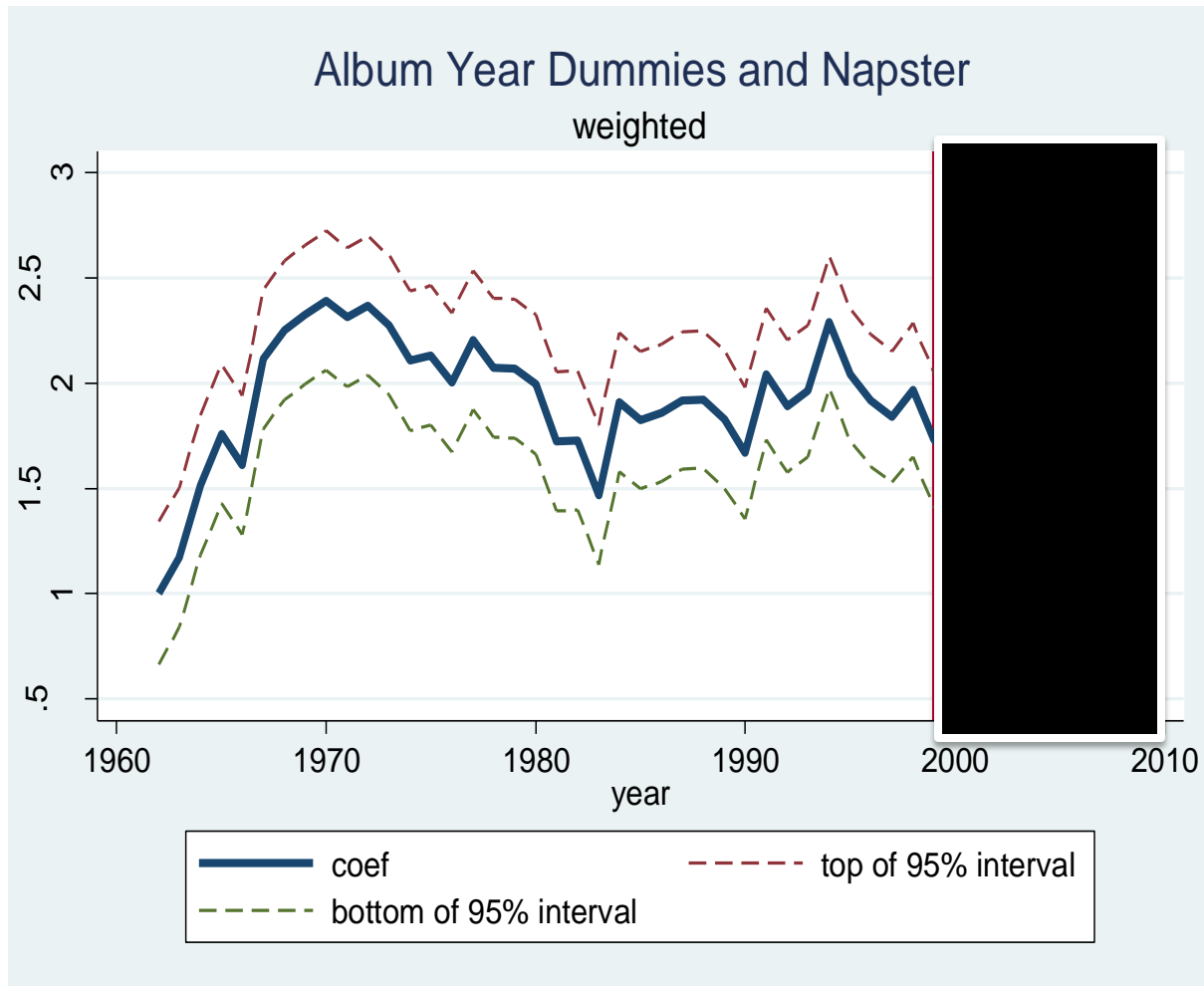
# Splicing via regression

- “Splice” indices

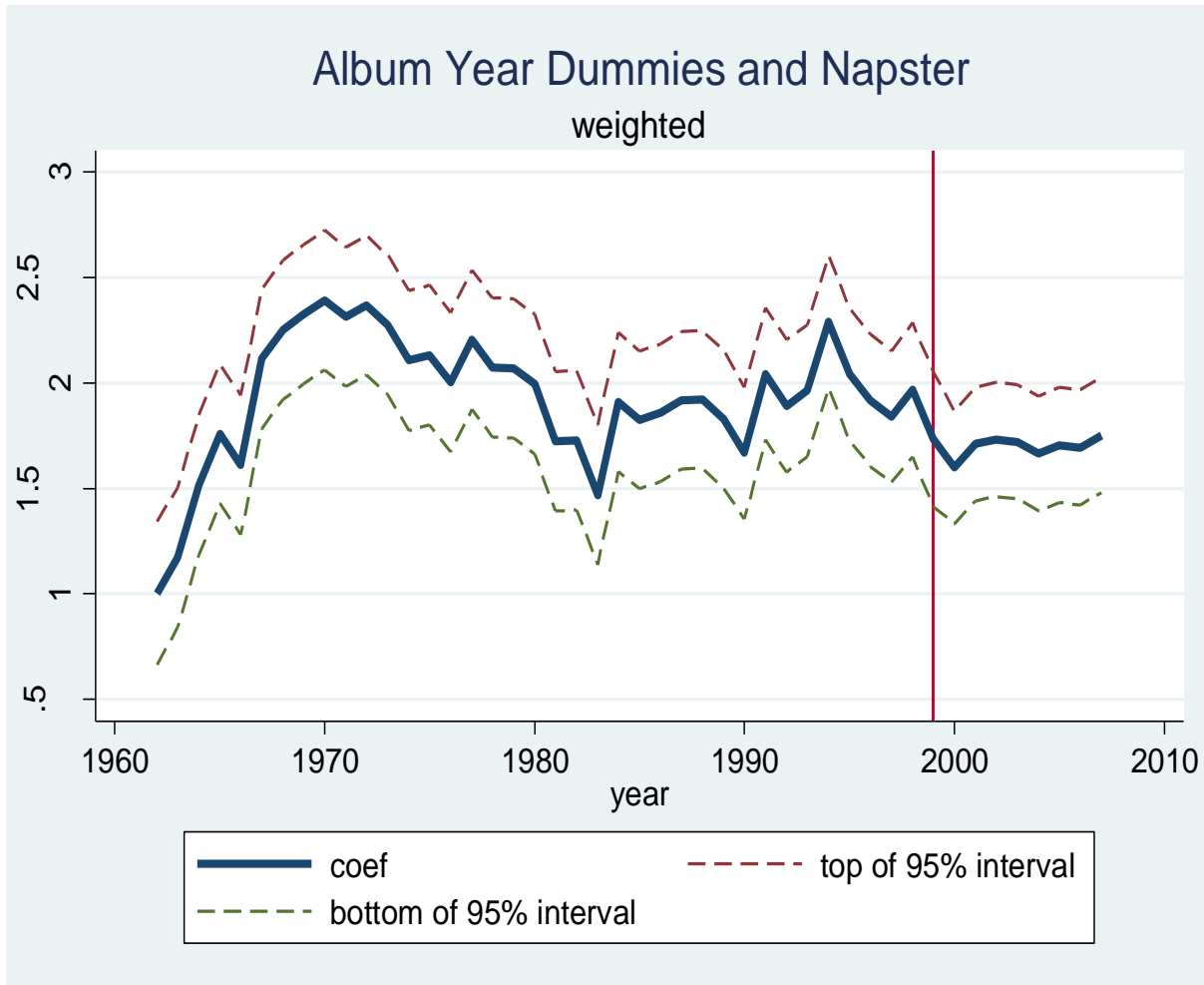
$$\ln(y_{it}) = \mu_i + \theta_t + \epsilon_{it}$$

- Plot  $\theta$ 's

# And voila: Index of vintage quality



# And voila: Index of vintage quality



Index is falling prior to Napster

Post-Napster constancy is, if anything, a relative increase

# Answer #1

- No reduction in quality following Napster
  - Cf “The sky is falling.”
- But:
  - Elites
  - Right tail
  - Not consumption data

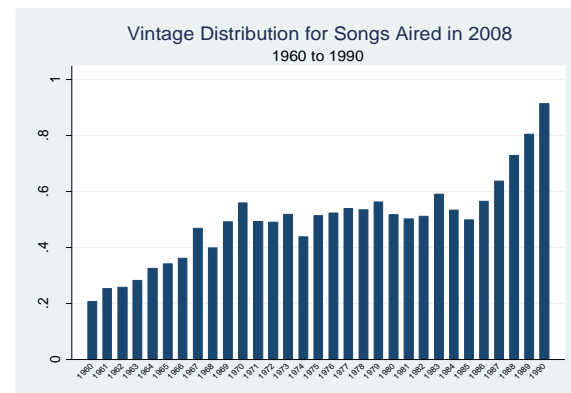
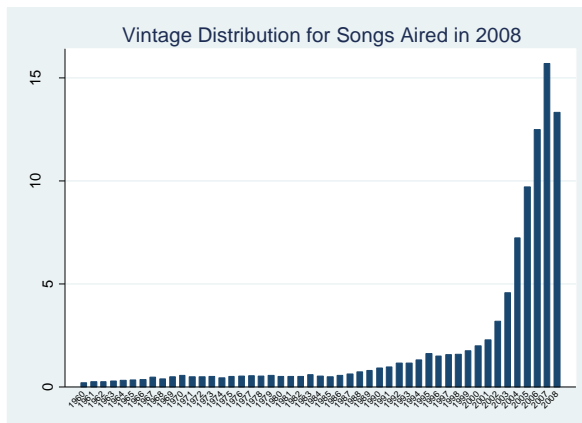
# Approach #2

- Measure of vintage “quality” based on service flow/consumer decision
  - Sales and airplay
- Idea: *if one vintage’s music is “better” than another’s, its greater appeal should generate higher sales or greater airplay through time, after accounting for depreciation*

# Data: Airplay

- (Describing data first makes empirical approach easier to exposit)
- For 2004-2008, observe the annual share of aired songs originally released in each prior year.
- From Mediaguide
  - 2000, over 1 million spins/year
  - Lots of data: smooth, precise

Direct evidence of depreciation

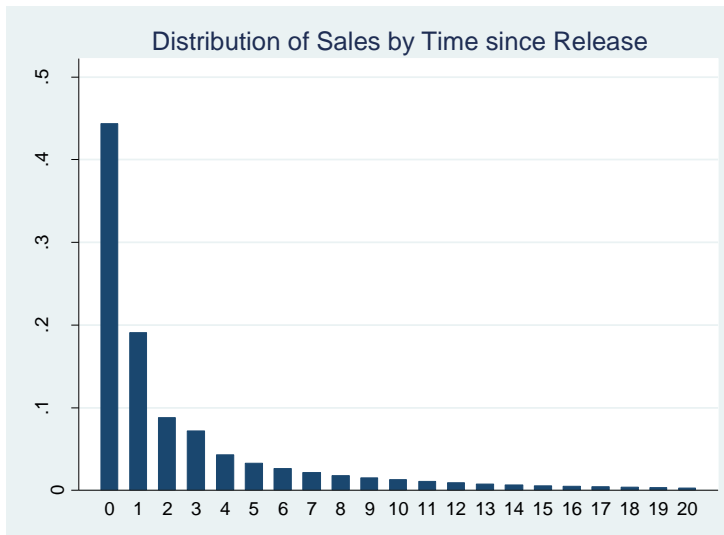


# Data: Sales

- Coarse sales data: RIAA certifications
  - See when sales pass thresholds, know when released
    - Gold=0.5 million, Platinum=1 million, multi-platinum=X million
      - Apportion uniformly
    - 17,935 album certs; 4428 single certs
    - Covers most of music sales
    - Tracks known patterns
    - Eliminate greatest hits

# Depreciation in Sales Data

- Again, older albums sell less



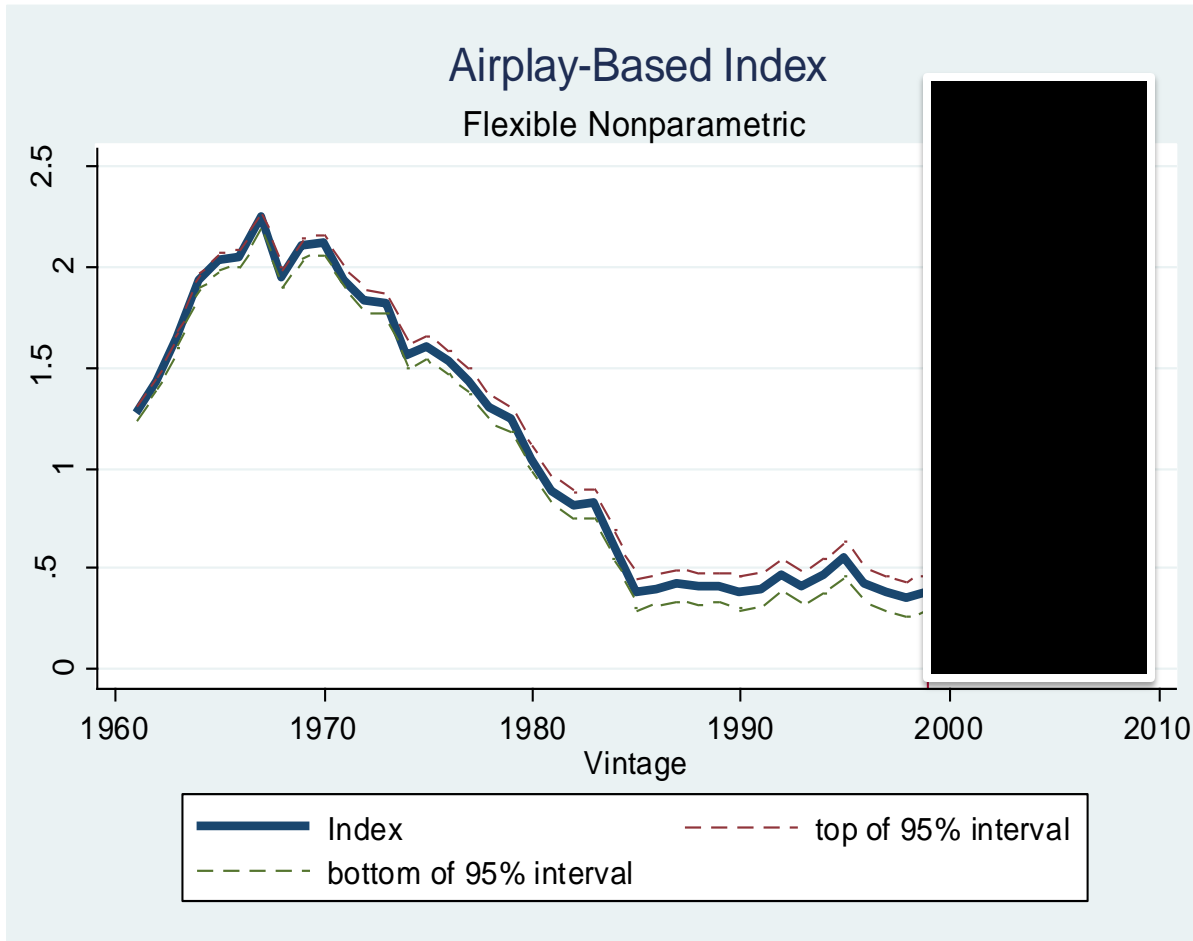
- *Question: after accounting for music age, are particular vintages sold, aired more? Or less?*



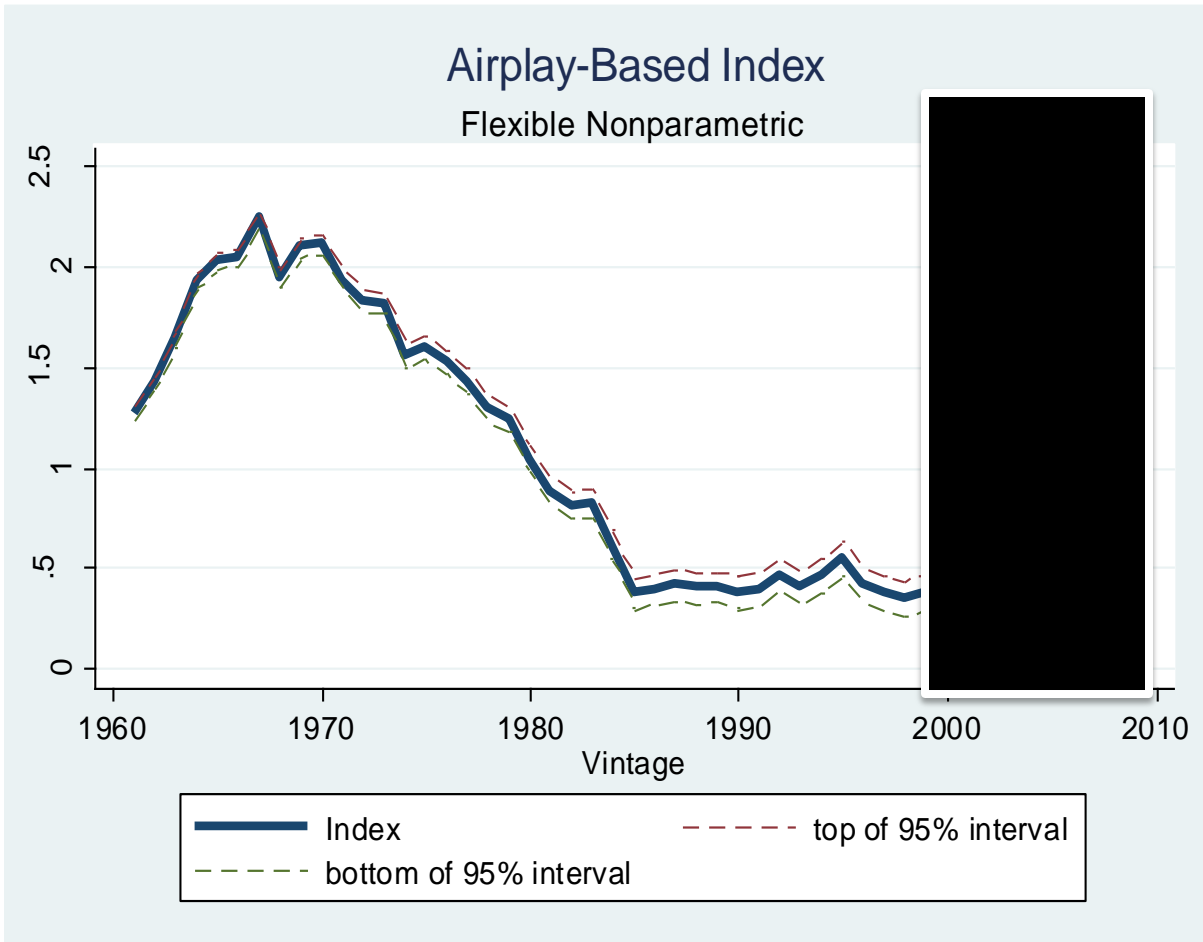
# Regression approach

- Define  $s_{t,v}$  = share of vintage  $v$  music in the sales or airplay of music in period  $t$ .
  - Observe  $s$  for  $V$  vintages and  $T$  years
  - For a given year  $t$ ,  $s$  varies across vintages for two reasons
    - Depreciation and **variation in vintage quality**
- Regress  $\ln(s_{t,v})$  on age dummies, vintage dummies.
  - Allow flexible depreciation pattern
- ***Then: vintage dummies are index of vintage “quality”***

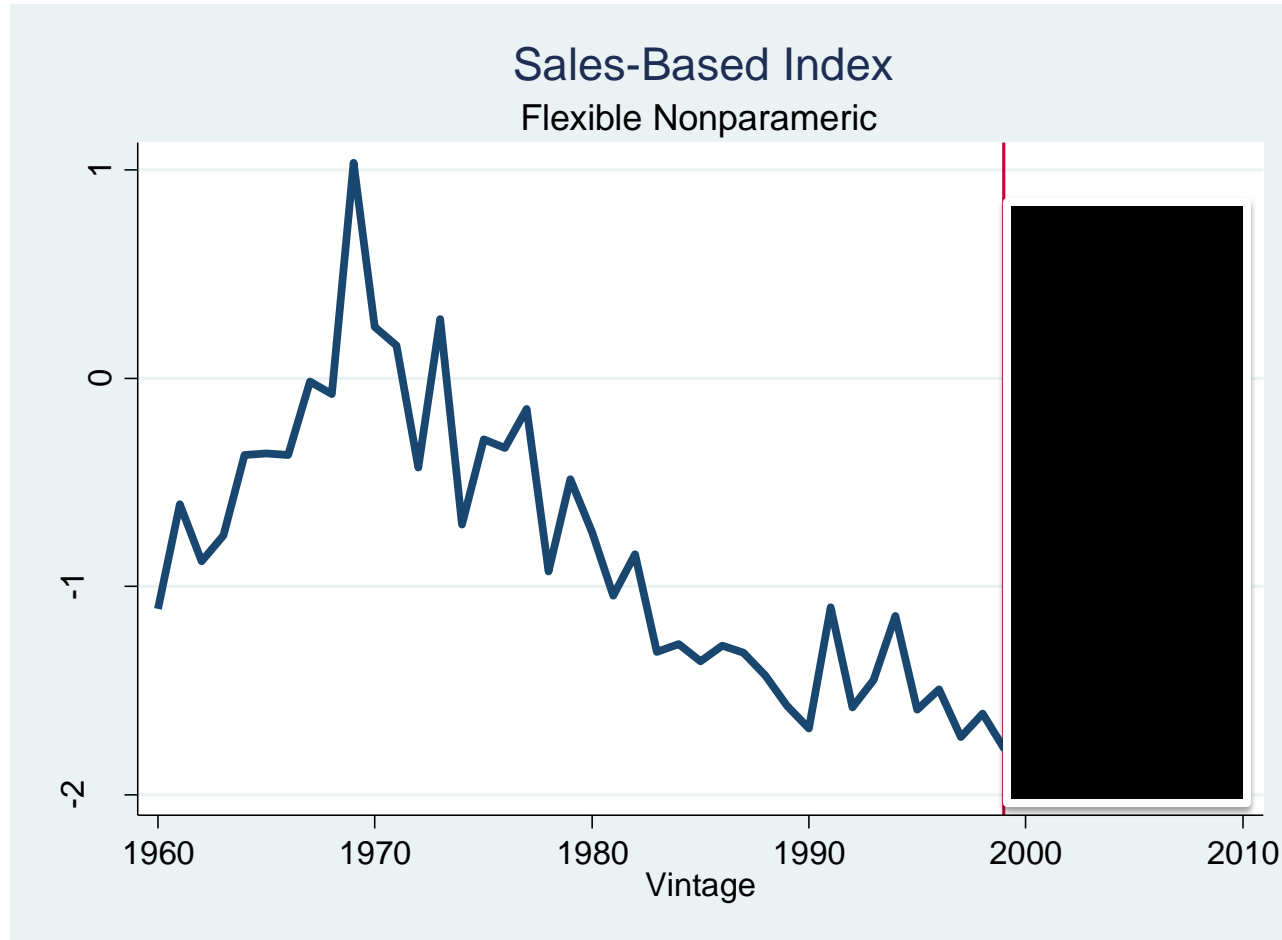
# Resulting Airplay Index



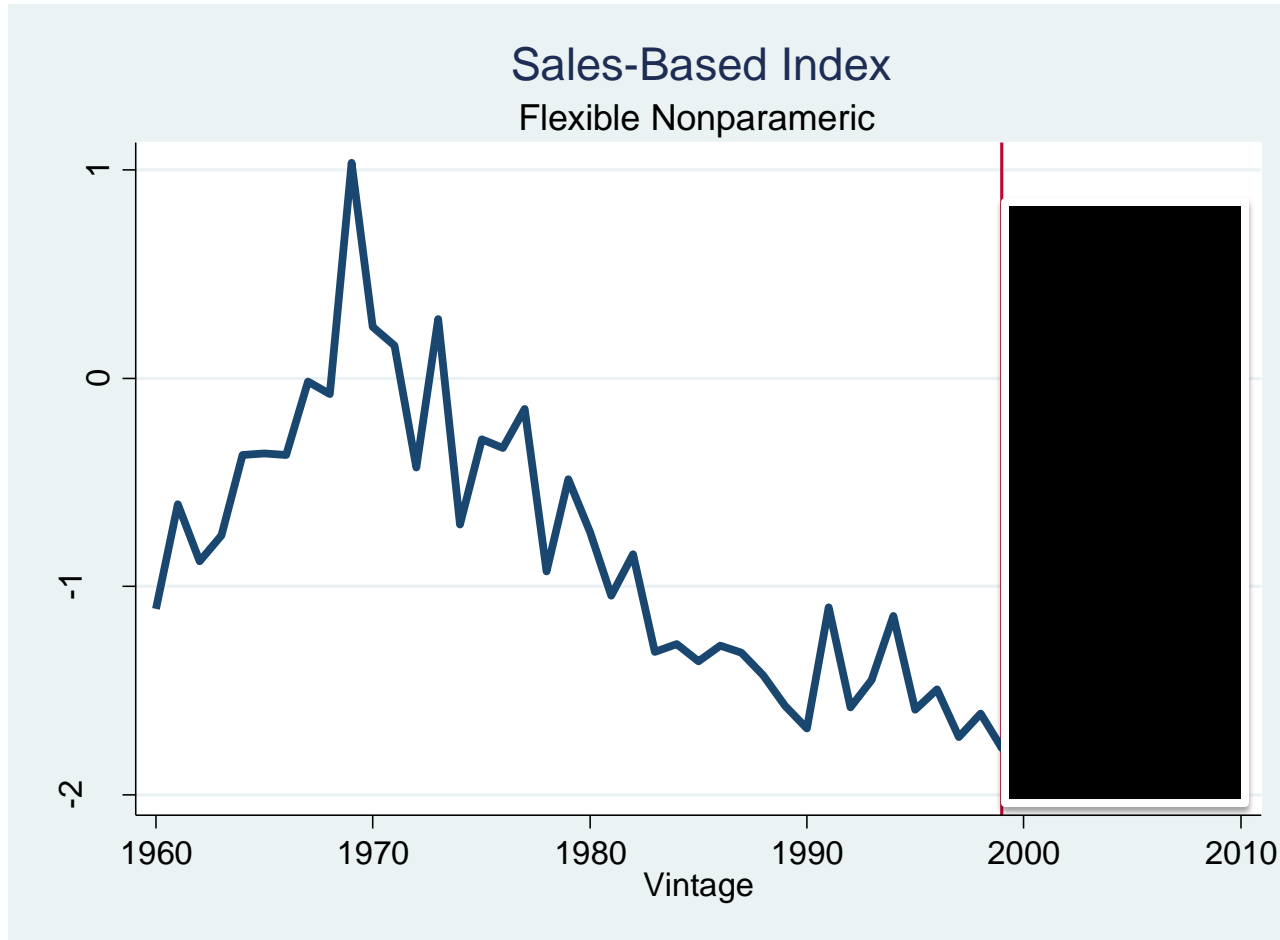
# Any Guesses?



# Sales-Based Index



# Guesses about Sales-Based Index?



# Bottom line

- No evidence that vintage quality has declined
- Some evidence that it has increased
- Hard to know what it might otherwise have been
- Puzzle: *Why is “quality” up despite revenue collapse?*

And the Bands Played On:  
Digital Disintermediation and the  
Quality of New Recorded Music

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# Fundamental features of recorded music

- “nobody knows” (Caves)
  - Hard to predict success at time of investment
  - Perhaps 10 percent succeed
- Traditionally, it has been expensive to “experiment” (Tervio)
  - Must bring a product to market to learn whether it will succeed
  - ≈\$1 million using traditional means
  - So bet on a few artists with ex ante promise
    - Result: “mediocrity”



# Along comes digitization

- (...and demand: piracy)
- ...and supply
  - Obvious effects on production and distribution
    - Recording, distribution are now inexpensive
  - Promotion too?
    - Traditionally, radio is a bottleneck
    - Now Internet radio and online criticism
- It has become cheaper to “experiment”
  - Do we end up discovering more artists with ex post value?

# Plan for Act II

- “model” rationalizing increased quality
- Questions
- Data
- Results

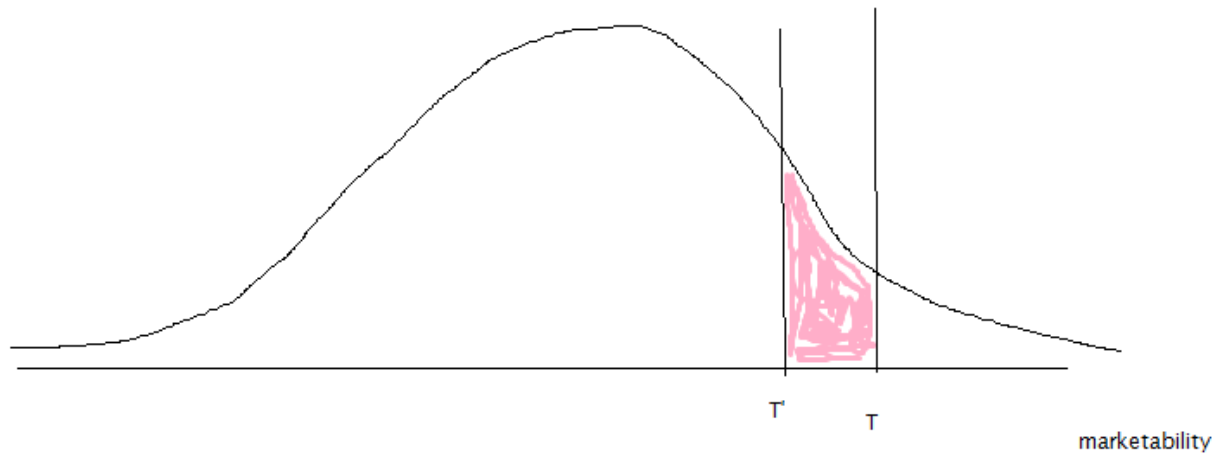
# “Model”

inspired by Caves (“nobody knows”) and Tervio (“mediocrity”)

- Label forms estimate of album marketability  $q'$  as truth + error:  $q' = q + \epsilon$
- Bring a product to market if  $q' > T$ .
- Cost reduction trumps piracy, so that on balance, *digitization reduces  $T$ , raising the number of projects that can be brought to market.*
- Big question: what happens to the volume of “good” work available to consumers?

# Suppose marketability were predictable

- Then reduction in  $T$  brings more products
- But they are of modest quality:  $T' < q < T$



# With unpredictability

- Release all products with expected quality above  $T'$
- Result: more products with quality  $> T$
- *Release of products with less ex ante promise leads to a greater number of products with ex post success/value*

# Is this explanation right?

Some specific empirical questions

- More new products?
- ...including those with less ex ante promise?
  - E.g. independent vs major labels
- A changed information/promotion environment?
  - Do consumers have ways to learn about the proliferation of new music?

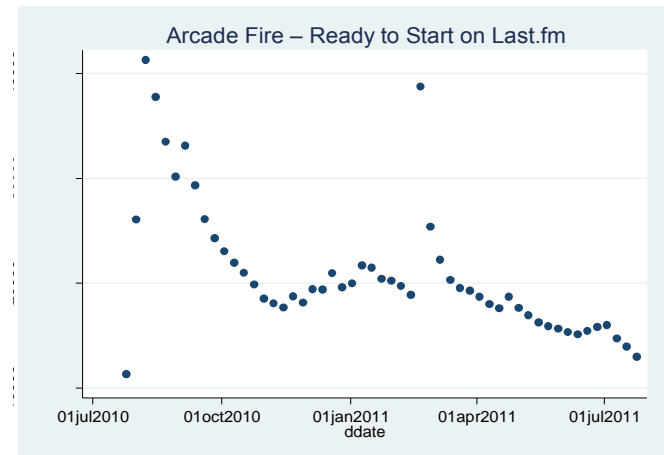
# Questions

- Changed paths to commercial success?
  - Roles of tradition radio, Internet, and critics
- Is sales concentration rising or falling?
  - Do additional products draw share?
- Do the products with less ex ante promise – e.g. indie artists who would not have been released before digitization – account for a rising share of ex post success?

# Illustrative Anecdote: Arcade Fire's *The Suburbs*



- Released by indie Merge Records August, 3, 2011
- Critical acclaim
  - Metascore=87 (top 5%)
- Little conventional airplay
  - Not on BB Airplay Chart
  - But big on Internet radio
- Success
  - Sold >0.5 million copies
  - Best Album Grammy for 2011





# On to more systematic evidence: Two Broad Data Sets

- Albums released in the US 1980-2010
  - By label type
    - major, independent, self-released
  - Physical vs digital
- list of commercially successful albums
  - from top-selling album charts
    - (and my estimates of the albums' actual sales)
  - linked with
    - measures of traditional radio airplay
    - promotion on Internet radio
    - coverage by music critics
    - whether on independent label

# ...from 9 underlying sources

- Recordings
  - Discogs, 1980-2011
    - Albums (including vinyl, CD, “files”)
    - Singles excluded
    - Hand-matching of labels to label codes from Thomson (2010)
      - Plus... “underground”, “independent”,...



# Commercially successful albums

- Billboard 200 – weekly ranking of top 200 selling albums, 1985-2011
- Heatseekers – weekly top 50 albums by emerging artists (2000-2011)
- Billboard Independent album chart – 2001-2011
  - Use for independent designation in dataset 2

# Promotion

- Airplay
  - Billboard 100 – 75 top songs of the week, 1990-2011
  - Top 200 airplay – 2009-2011
  - Last.fm – top 420 songs of the week, 2006-2011
- Critics
  - Metacritic – coverage if 3+ critics review
  - Appeared in 2000; growth to roughly 1000 albums per year in 2010

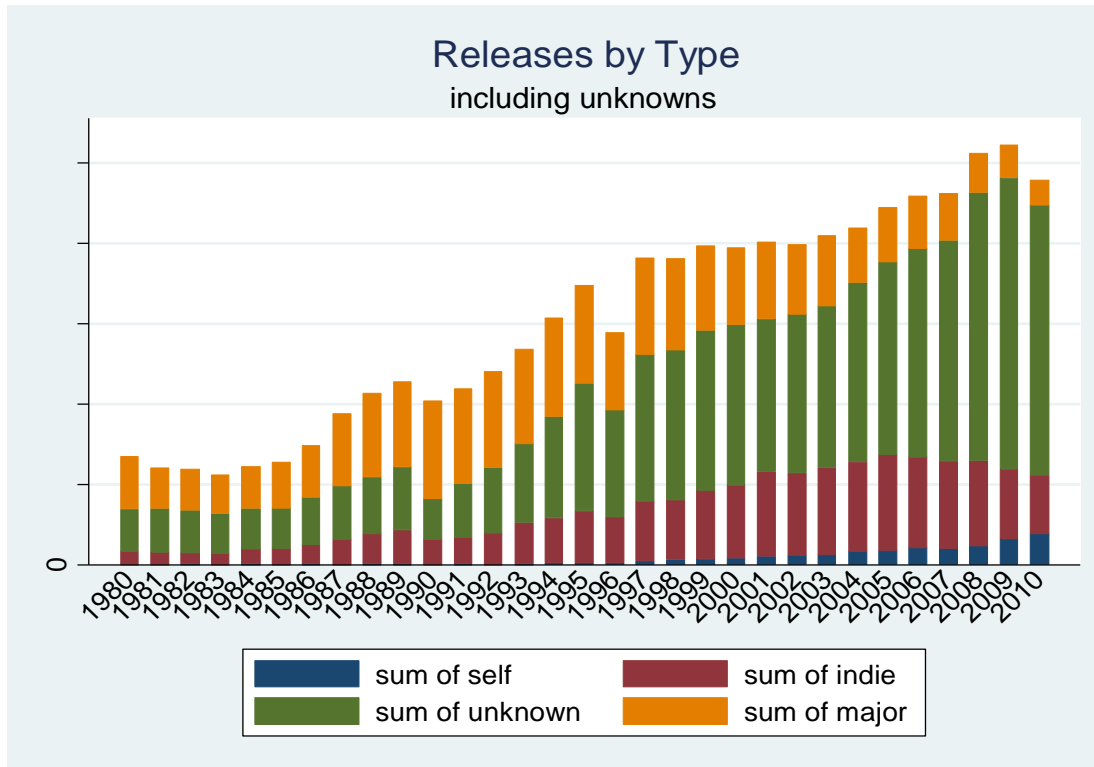
# Sales Certifications

- RIAA – Gold, Platinum database
  - 1970-2010
  - I use to translate BB album rankings into sales estimates

# Answers

- **Growth in releases?**
- Changing information environment
- Evolution of sales concentration
- Success and promotional channels
- Ex ante promise and ex post success

# Growth in releases over time



(Continued)

Nielsen: 30,000 in 2000 to about 100,000 in 2010

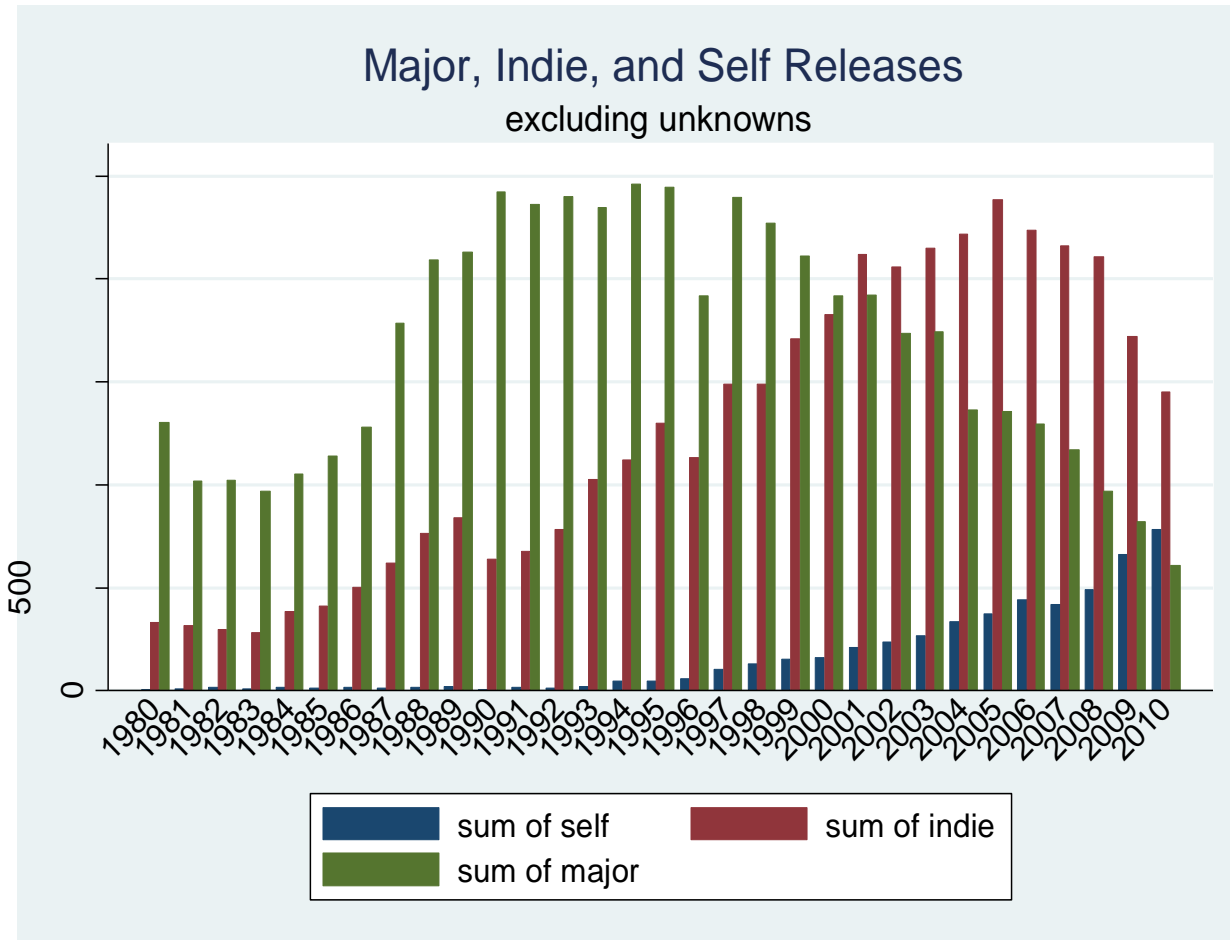
# Interesting, but...



More products doesn't  
mean more good products

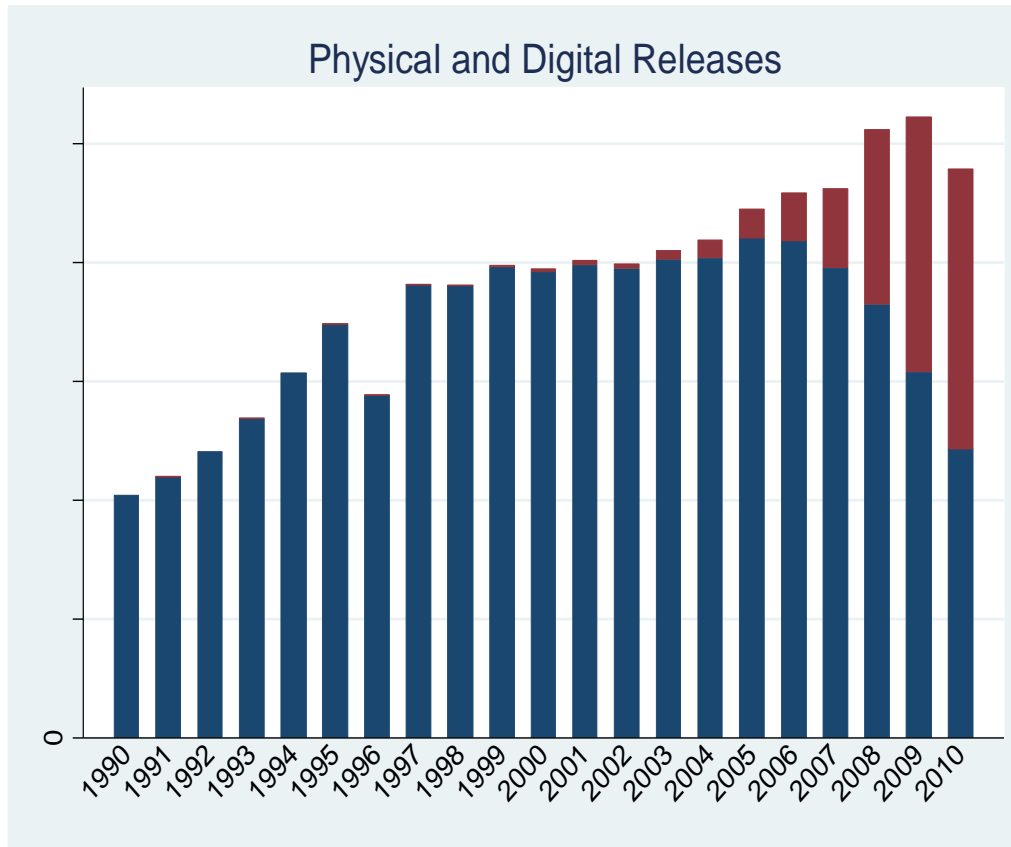


# Indies pass majors



Note also self-releases

# Role of purely digital albums



Consistent with idea of reduced costs facilitating greater product entry

# Answers

- Growth in releases?
- **Changing information environment**
- Evolution of sales concentration
- Success and promotional channels
- Ex ante promise and ex post success

# Changing Information Environment

- Traditional radio
  - BB airplay – top 75 songs by week
    - 3,900 listings per year
  - But only about 300 distinct artists
- Traditional vs Internet radio
  - Compare BB list with last.fm top 420 songs of the week
  - Little overlap – 10 percent

Top 2006 BB Airplay Artists not on  
Last.fm Weekly Top 420

ARTIST	BB airplay index
MARY J. BLIGE	14.3
BEYONCE	12.0
NE-YO	10.3
CASSIE	9.8
CHRIS BROWN	9.8
YUNG JOC	8.2
SHAKIRA	6.9
LUDACRIS	6.0
CHAMILLIONAIRE	5.7
AKON	5.2

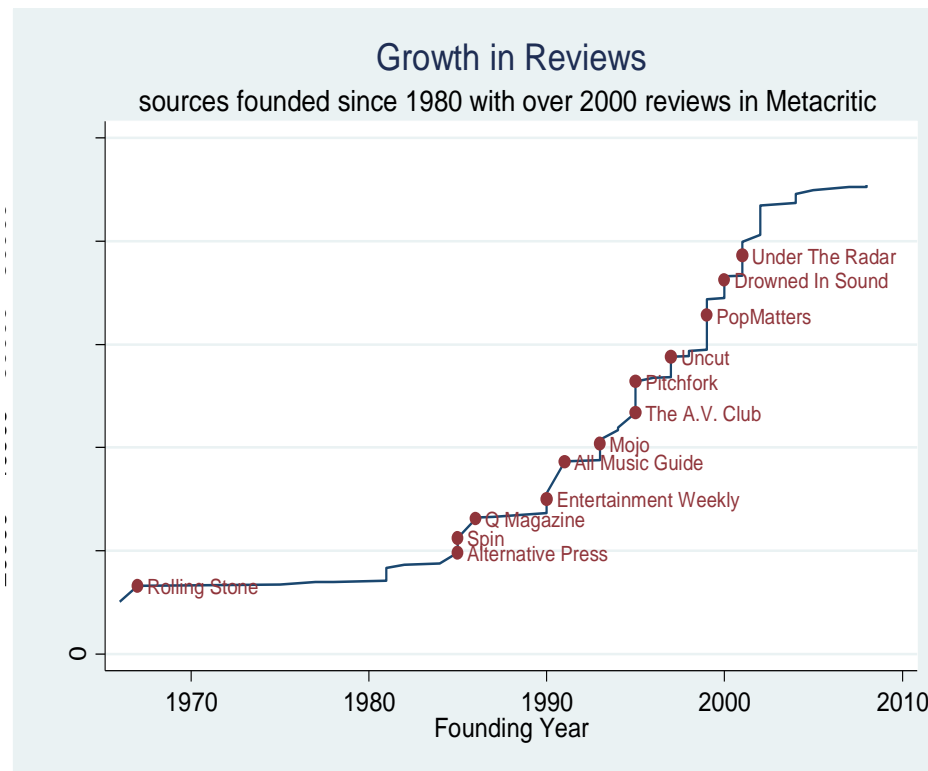
Top Artists on Last.fm in 2006 without BB  
Airplay

ARTIST	listeners
DEATH CAB FOR CUTIE	5,200,000
COLDPLAY	5,200,000
RADIOHEAD	4,700,000
MUSE	3,900,000
ARCTIC MONKEYS	3,000,000
THE POSTAL SERVICE	2,800,000
THE BEATLES	2,400,000
SYSTEM OF A DOWN	2,300,000
BLOC PARTY	2,100,000
NIRVANA	1,900,000
THE ARCADE FIRE	1,900,000

***Takeaway: Internet radio allows promotion for artists with less promotion on traditional radio***

# Second, growth in criticism

- Much of it online



# Answers

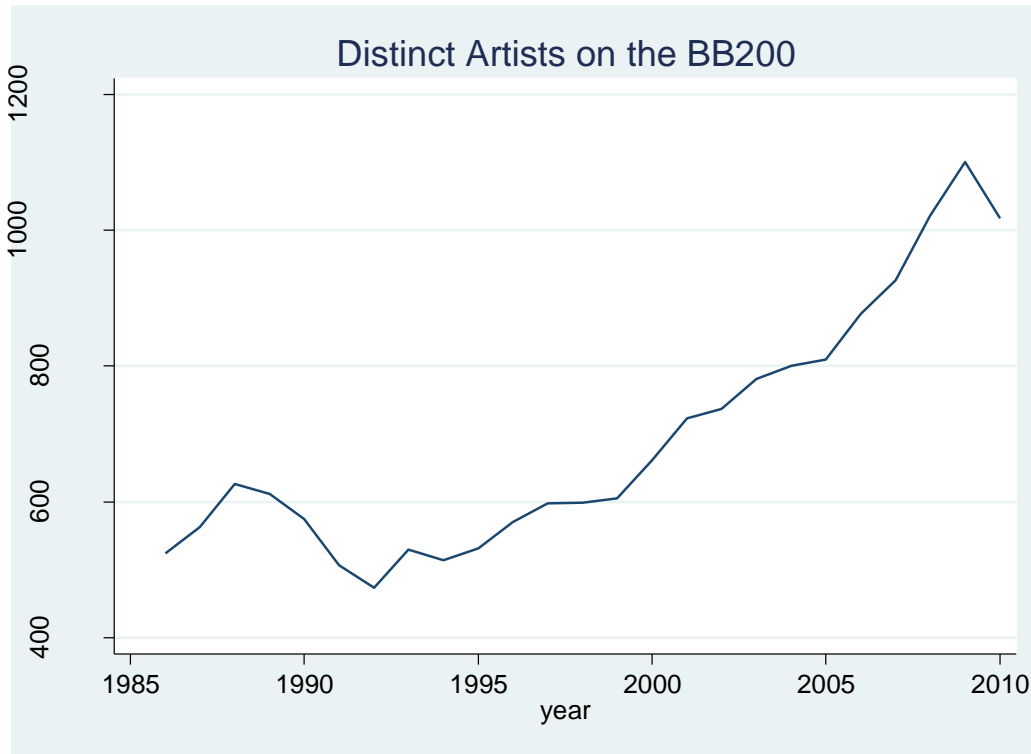
- Growth in releases?
- Changing information environment
- **Evolution of sales concentration**
- Success and promotional channels
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# Evolution of sales concentration

- More products available
- Do more products achieve (relative) commercial success?
  - Do more albums enter the weekly BB200?
  - Not the dumb question it sounds like
    - 200 listings/week x 52 weeks = 10,400 listings/year
    - Could be anywhere between 200 and 10,400 distinct artists per year



# Sales grow less concentrated in top few artists



Suggestive that new products – which would earlier not have existed – take market share from existing products

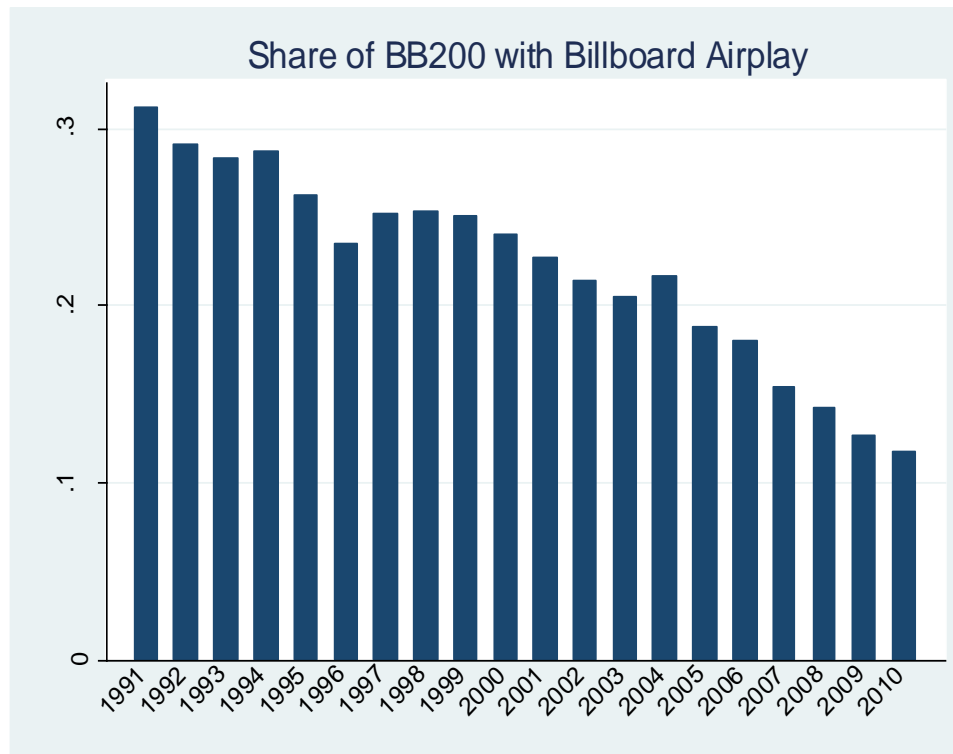
# Answers

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# Success and promotional channels

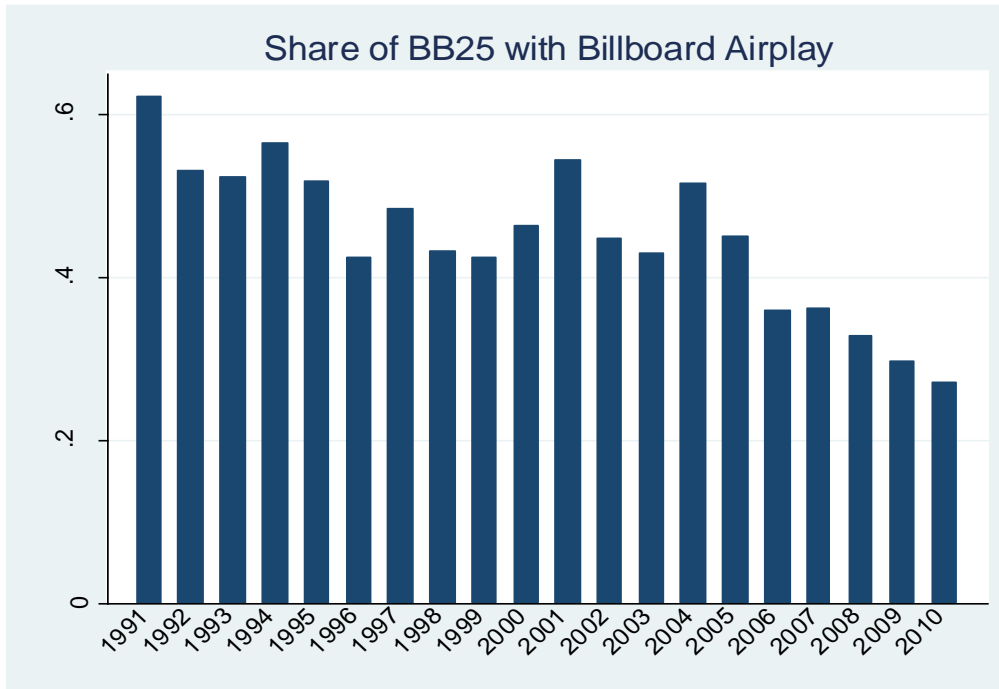
- What's happening to the role of traditional airplay among successful artists?
- What's happening to the role of critics?

# Declining role of traditional radio

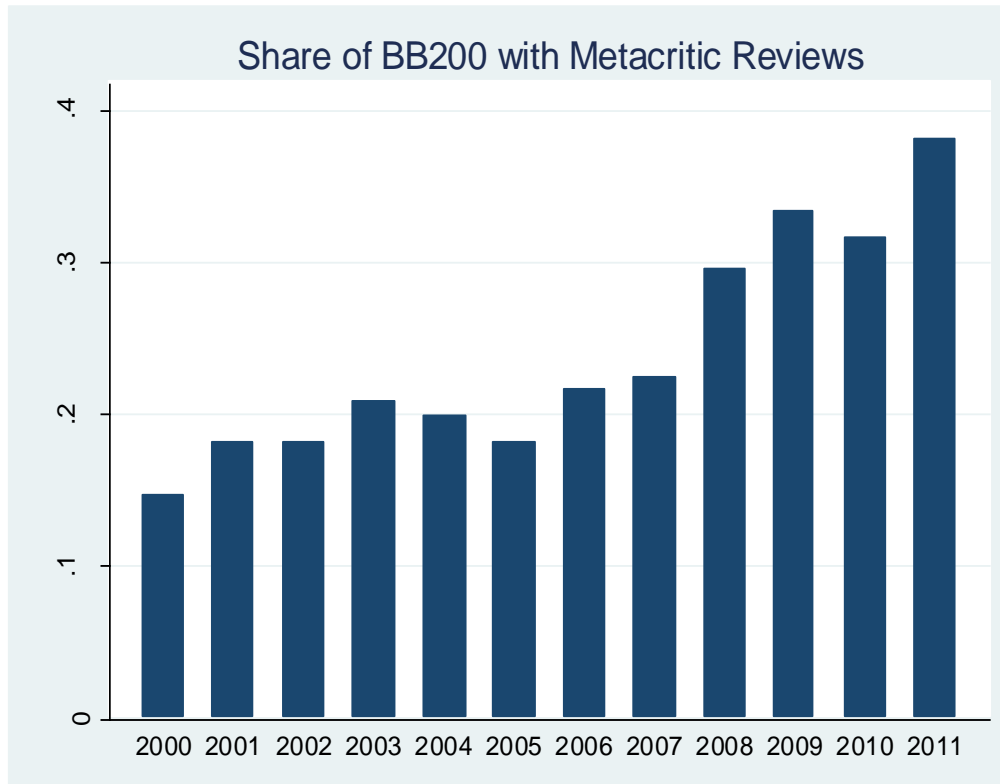


Declining share with airplay, especially since 2000

# Even for top 25



# Contrast: increasing share with critical attention



# Answers

- Growth in releases?
- Changing information environment
- Evolution of sales concentration
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- **Ex ante promise and ex post success**

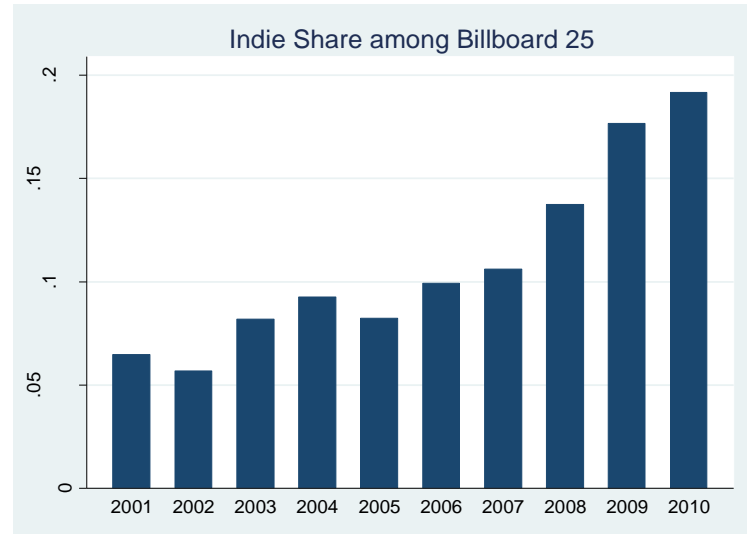
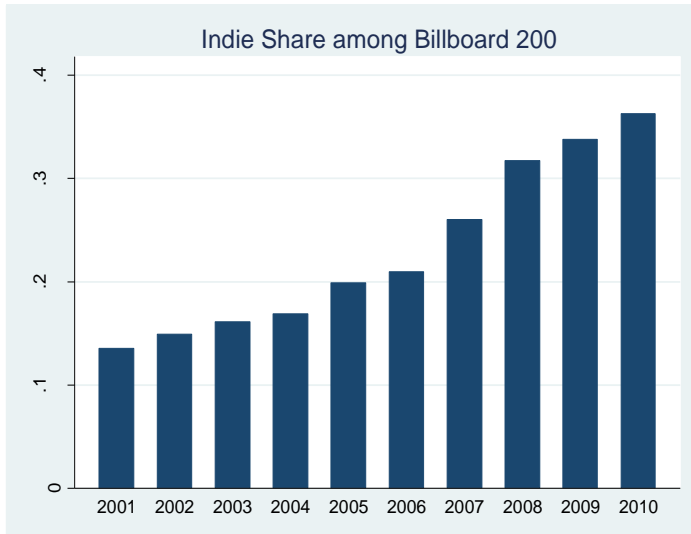
And, finally:

## Ex ante promise and ex post success

- Do artist with less ex ante promise – who would not have made it to market prior to digitization – now achieve sales success?
- Specifically, do indies account for a growing share of sales?



# Yes



# Conclusion

- Despite revenue reduction, “quality” is up
- Digital disintermediation provides possible explanation for increased “quality”
- Given unpredictability, more “experimentation” leads to discovery of additional “good” music
- Much of which would not have come to market before digitization

# The changing face of “digitization”



to

