

Cinematic Explosion: Movies, Gatekeepers, and Product Discovery in the Digital Era

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While file sharing has undermined firms' ability to generate revenue for their products, other technological change has reduced entry barriers in cultural industries, with substantial positive impacts on the availability of new books and recorded music. Many of the newly available products are popular with consumers. The motion picture industry has seemed immune to these forces, chiefly because of the higher investment required to produce a movie. Yet, technological change has reduced the costs of producing, distributing, and promoting new movies, raising that possibility that new movies that might benefit both consumers and film makers operating outside of the major Hollywood studios. I explore these possibilities with evidence on the production, distribution, and promotion of new movies. Since 1990 the annual number of US features and documentaries produced has increased by more than five and ten times, respectively. Thousands of movies are now available digitally, and a growing cadre of reviewers available online cover the expanding body of new work. Independent movies – those produced outside the major Hollywood studios – make up large and growing shares of what succeeds in the market. The new vintages of movies are appealing to audiences and critics. These developments stand in contrast to industry claims that continued movie production is jeopardized by new technologies.

The spread of the Internet has brought challenges and opportunities to media industries. First, the appearance of Napster, BitTorrent, and other file-sharing technologies undermined firms' ability to charge for their products, with large depressing impacts on recorded music revenue and implicit and explicit threats to other industries.¹ But technological change has also had a second effect, reducing entry barriers in cultural industries, with substantial positive impacts on the production of music and books.² New technologies for both creation and, more importantly, distribution have enabled significant growth in the number of new books and recorded music products available to consumers.³ While it is not surprising that lower costs of bringing books and music to market would result in more new products becoming available, it is surprising that the profusion of new products includes many that become popular with consumers. For example, about a third of the most commercially successful recordings are produced by independent record labels, and about a sixth of best-selling book titles in 2012 were originally self-published. It seems fair to say that the explosion of new products made possible by digitization has had revolutionary impacts on music and books.

The motion picture industry has seemed different, chiefly because of the much higher investment required to produce a movie. While writing a work of fiction requires the time of one individual, and creating recorded music requires an individual or small group, movie making is a great deal more complicated, requiring coordination among a large group of actors and behind-the-scenes personnel (directors, camera operators, sound engineers, editors, etc.) Putting aside these coordination issues, the capital alone has been prohibitively expensive: The cameras traditionally required to film movies cost roughly a quarter of a million dollars, making it

¹ See the empirical piracy literature: Oberholzer-Gee and Strumpf (2007), Leibowitz (2006), Rob and Waldfogel (2006), and Zentner (2006), among others.

² See Waldfogel (2013) and Waldfogel and Reimers (2013).

³ See also Handke (2006, 2012) and Oberholzer-Gee and Strumpf (2011).

difficult for creators without financial backing to actually make movies. In recent years the major Hollywood motion picture studios reported an average production budget of \$100 million to make a movie.

Technological change has reduced the costs of producing, distributing, and promoting new movies. Beginning around 2000, camera makers introduced digital cameras of sufficient quality so that in 2002 George Lucas could shoot “Attack of the Clones” on digital. In 2008 Canon introduced the EOS 5D, a still camera which also shot moving images in HD. Priced around \$2,000, this put high quality movie making in reach of low-budget film makers. The last decade has also seen the development of new distribution channels – cable television, onDemand, Netflix, Hulu, iTunes, Amazon – that could in principle provide commercial outlets for new movies. Finally, the Internet has supported an explosion in film criticism such that more movies now get formally reviewed and – related – more movies get rated publicly by viewers. The availability of low-cost technology for movie making, along with new distribution channels, provide no guarantee either that independent individuals would make movies, nor – if they did – that the movies would have significant appeal to audiences. But the development of production and distribution channels raises the possibility of growth in new movies that might benefit consumers as well as film makers operating outside of the major Hollywood studios.

Cost reduction that raises the number of new products can have significant impact on the well being of market participants. Screenwriter William Goldman famously wrote that “nobody knows anything” about which movies will succeed.⁴ Statistics bear out his observation. While higher-investment movies tend to attract larger audiences, the predictive power of the

⁴ See Goldman, William (1989). *Adventures in the Screen Trade: A Personal View of Hollywood and Screenwriting (reissue ed.)*. Grand Central Publishing.

relationship is weak. Industry sources acknowledge that perhaps a tenth of projects generate enough revenue to pay for themselves.⁵ High-budget features can flop, and low-budget films can generate large revenues. The unpredictability of movies' appeal raises the possibility that a growth in the number of movies brought to market might substantially increase the surplus generated by movies. More draws from the urn could result in more winners (see Tervio, 2009).

Anecdotal evidence substantiates the idea that low-cost draws can generate surplus. Actor and film maker Ed Burns (who has appeared in *Saving Private Ryan* and many other movies) has produced a series of movies independent of the studio system. Burns argued in 2011 that,

“there is a major bright spot for indie films with recent emergence of video-on-demand and iTunes as new venues to watch movies. In 2007, I tested this model with the release of “Purple Violets,” which was the first film to be released exclusively through iTunes. This was before it became commonplace for people to watch a film on their computer, let alone their phones and tablets, but we saw something promising from this experiment—a genuine appetite to consume movies in this fashion, which was reflected in shockingly robust numbers.”

Burns released another film, “Nice Guy Johnny” in 2010

“via an all-digital platform on iTunes and VOD - completely bypassing theatrical distribution. The audience response was fantastic. With a simple click of the remote or mouse, movie fans could watch the film anywhere they wanted. I was able to make the film on a small budget all while having complete creative control. Of equal importance, I wasn't giving a chunk of my profits away to a studio; my team and I were the ones to reap the financial rewards.”⁶

The main goal of this paper is investigate this sort of independent film production more systematically.

To explore these possibilities this paper assembles evidence on the following questions:

First, are we taking more draws from the creative urn? That is, what has happened to the number

⁵ See Caves (2000) and Vogel (2008) for background on the movie industry.

⁶ <http://www.thedailybeast.com/articles/2011/12/26/edward-burns-director-of-newlyweds-on-the-changing-face-of-indie-film-distribution.html>

of movies produced by various sorts of entities – major studios vs independent filmmakers – over time? Second, how are new movies promoted and distributed? That is, how many are theatrically distributed, available via other distribution platforms, and /or reviewed by critics over time? Third, are the newly available products successful? That is, do movies produced outside the traditional major studios account for a growing share of commercially successful fare? Fourth, how do the “quality” and appeal of recent vintages compare with earlier vintages?

The paper proceeds in five sections after the introduction. Section 1 provides some background on the movie industry, technological change, and how this change could affect the fortunes of both consumers and different kinds of film makers. Section 2 describes the various data sources used in the study. Section 3 provides evidence of new products. First, I provide evidence on the growth in movie production over time – and particularly since the development of low-cost production and distribution channels. Second, I document the changes in distribution and promotion of movies over time. In section 4, I show that independent film makes up a growing share of what consumers and critics find valuable in the movie industry’s output. I then turn, in section 5, to evidence on the evolving quality – and service flow – of new movies.

I find enormous growth in the number of movies produced and brought to market. Since 1990 the annual number of US features produced has increased by more than five times; the number of documentaries has increased by more than ten. Literally thousands of movies are available to audiences through digital subscription (e.g. Netflix, Hulu) and a la carte (iTunes, Amazon Instant Video, Vudu) services. The number of movies released each year vastly exceeds the number shown in theaters or reviewed in mainstream outlets, but a growing number of review outlets available online cover the expanding body of new work. In 1990 the top 100 movies were guaranteed to be widely reviewed while, say, movies outside the top 250 according

to revenue were far less likely to be reviewed. Since 2005, over half of movies ranked 750-1,000 are reviewed in outlets online. Independent movies – those produced outside the major Hollywood studios – make up large and growing shares of what succeeds in the market: between 2000 and 2012 the independent share of theatrical box office revenue rose from 20 to 40 percent, while the independent share of top DVD rental rose from 20 to 50 percent. The independent share of titles in the iTunes top100 has exceeded 50 percent since 2009, and the independent share of the top 50 titles by release vintage at Vudu, roughly 10 percent from 1980 to 2005, reached 40 percent in 2010. Recent vintages are appealing to both critics and users.

The motion picture industry, in its statements to policy makers about new technology, has focused on threats to revenue arising from piracy. Hollywood studios have viewed technological change largely for its potential threat to intellectual property, raising the spectre of lost jobs and reduced movie production unless policies are enacted to strengthen effective copyright protection. Amid these concerns there has been a large increase in non-MPAA movie production of interest to audiences. Representatives of the motion picture industry express concern about whether effective intellectual property rights are strong enough to provide rewards adequate to ensure continued supply of new motion pictures. The record of recent years suggests that it is unlikely that the supply of new movies is in danger of drying up.

I. Background

1. Movie Production

Profitable movie making has traditionally required at least three capabilities: production, distribution, and promotion. In this context, “production” entails both the literary capabilities to

write scripts, the creative capabilities of acting, directing, cinematography, and editing, as well as various technical capabilities related to literally producing movies on film. Distribution has traditionally entailed both the ability to make and distribute reels of film, as well as the contractual arrangements with theater owners to exhibit the films. Finally, promotion includes both the ability to communicate to audiences through advertising as well as through critics. The need to have all, or at least many, of these capabilities under one roof has made tended to keep movie making concentrated in a small number of “major” film studios. These are the member studios of the Motion Picture Association of America (MPAA).

Traditionally, the major studios produced movies which they released widely into theaters, generally on 500 screens or more. At release, these movies were generally reviewed by critics associated with major media outlets. The studios also advertised their new movies, chiefly on television.⁷

Digitization has changed many features of the environment. First, digitization has revolutionized production. Cameras capable of recording high fidelity video have fallen substantially in price over the past few years. Prior to 2000, movies were shot on film using cameras that were very expensive. While Hollywood studios tended to rent their cameras from Panavision, sources indicate that such cameras cost roughly a quarter of a million dollars. Daily rentals of professional-quality cameras averaged \$1,000. After 2000, digital motion picture cameras began to appear that were substantially less expensive than the film cameras film makers had previously been using. Between 2002 and 2005, various firms including Sony, Red, Arri, and others introduced digital motion picture cameras targeted at professionals. These

⁷ According to Marich (2011), “the centerpiece of ad campaigns remains TV, which gobbled up 73% of movie advertising dollars in 2010.” (<http://variety.com/2011/film/news/tube-ties-up-studio-bucks-1118041256/>)

cameras cost roughly a quarter as much as film cameras of comparable quality. Some innovative film makers began to shoot movies with digital cameras. These cameras, priced around \$25,000, were still out of the reach of many independent filmmakers.⁸

In 2000 the Sony F900 camera appears, offering HD. Within two years – in 2002 – George Lucas shot the first major in HD digital, the “Attack of the Clones.” Other film makers followed: Michael Mann shot “Collateral” using a Thompson Viper digital camera in 2004. In 2005 Panavision, the major provider of film cameras in Hollywood, introduced the Genesis digital camera in a partnership with Sony. A major virtue of this camera was its compatibility with existing Panavision lenses.

In 2008 Canon introduced the EOS 5D. While mainly a still camera, it used interchangeable lenses and was also capable of shooting professionally quality high definition video. Priced at \$2,000, this camera made it possible for independent film makers to get professional-quality results. Ed Burns “produced 2011’s “Newlyweds” for \$9,000 using a Canon 5D Mark II and three lenses: 24mm, 50mm and 85mm.”⁹ The availability of high-quality cameras at low-cost put the technical possibility of film making into the reach of many people outside the major studios.

2. Distribution

Home video and television existed alongside theatrical distribution long prior to digitization. As early as 1985, theatrical box office accounted for only a quarter of Hollywood

⁸ See Kenneally(2012) and <http://www.technologyreview.com/news/426387/red-the-camera-that-changed-hollywood/>.

⁹ <http://www.usaweekend.com/article/20130201/TECH/302010013/Talking-tech-actor-director-Edward-Burns>

revenue.¹⁰ Yet, the more recent wave of digitization with development of the Internet has brought new channels of distribution.

There are essentially two sales arrangements for the digital distribution of movies to consumers, a la carte sales and subscriptions. Some of the major outlets selling movies a la carte include cable operators such as Comcast (through their On Demand service), Apple's iTunes, Wal-Mart's Vudu, and Amazon's Instant Video. Apple began selling movies through iTunes in September 2006 and started renting titles in January 2008 (according to Wikipedia's iTunes entry). Vudu began distributing movies to consumers in 2007 and was acquired by Wal-Mart in February 2010. Amazon's Instant Video service began as Amazon Unbox in 2006. Prices for new-to-video digital movie rental vary, but most are \$2.99.

Major streaming services include Netflix and Hulu. Netflix, which began its streaming service in 1999, charges \$7.99 per month for unlimited videos among its collection of television shows and movies.¹¹ Hulu also charges \$7.99 per month for its premium service. The movies selections at these services exclude most recent Hollywood releases.

Filmmakers can release movies direct to video, available through such platforms as Netflix, iTunes, onDemand, and Amazon itself. These platforms differ in their degree of curation. Amazon is unfiltered and offers the simplest avenue to distribution. Distribution through Netflix or iTunes is more difficult to obtain. For example, in order to distribute a movie through the iTunes Movie store, one must submit "5 feature-length movies or documentaries that were released theatrically (or) 100 feature-length movies or documentaries that were either

¹⁰ <http://www.edwardjayepstein.com/MPA2007.htm>

¹¹ See <http://en.wikipedia.org/wiki/Netflix> .

released theatrically or direct-to-video.”¹² As Apple indicates, “[i]f you do not meet all of these requirements, you can work with an Apple-approved aggregator instead. Aggregators are third parties that can help you meet technical requirements, deliver and manage your content, and assist with marketing efforts.”

One such aggregator is Distribber.com. Distribber charges filmmakers a flat \$1,295 (\$1,595 if HD) to attempt to get their films onto the iTunes platform. All but \$39 is refunded if iTunes does not accept the film. The success rate is not clear or easily discerned. Distribber also sells attempted distribution to other channels that are not guaranteed to accept movies, Netflix, Hulu, and Cable/Satellite/Telco VOD, as well as Amazon, which accepts essentially anything that is not pornographic.¹³ At Amazon, the least restrictive channel, a user simply uploads a file that conforms to basic specification. Then the movie is available for digital purchase from Amazon.

3. Promotion

Making a movie available to consumers without also promoting awareness of the movie does little to generate revenue. Getting a movie reviewed by mainstream media outlets has traditionally required a theatrical release, and the traditional journey of highly successful movies has begun with theatrical release. One approach – for conventional major-studio movies – is large-scale theatrical release in 500 or more screens, accompanied by television advertising. A second theatrical approach is limited release, on as few as a single theater screen. These movies are often reviewed in some mainstream outlet. *The New York Times* has among the most extensive movie reviews of any US general interest publication and produces about as many

¹² See <https://itunesconnect.apple.com/WebObjects/iTunesConnect.woa/wo/2.0> .

¹³ See <http://www.distribber.com/faqs> .

movie reviews as movie released into theaters per year. The specialized entertainment publication *Variety* reviews over 1,000 movies per year.¹⁴ Once theatrically released and reviewed, many movies are released quickly – sometimes simultaneously – to one or more channels for a la carte sale, either video on demand distribution on cable, iTunes, or Amazon, among others.

In these cases theatrical release is meant to generate consumer interest in home distribution. For example, the 2008 crime drama “Flawless” (with Michael Caine and Demi Moore) earned

“more than \$1 million in its on-demand window during a contemporaneous theatrical run. In 2010, “The Killer Inside Me,” an ultra-violent adaptation of a pulp novel by Jim Thompson, earned around \$4 million from people who watched it on demand. That same year, “All Good Things,” a true-crime drama starring Ryan Gosling and Kirsten Dunst, earned a whopping \$6 million. (By contrast, the film earned around \$600,000 in theaters.) Last year, “Margin Call,” J.C. Chandor’s taut Wall Street thriller, made its VOD debut day-and-date with theaters. The film wound up earning about half its \$10 million total returns in video on demand.”¹⁵

Without theatrical release movies are not likely to be reviewed in mainstream publications. That said, the Internet has supported the dissemination of reviews by bloggers and out-of-the mainstream publications. Film viewers are also able to rate movies they see in prominent places. The site IMDb links to reviews by hundreds of critics, ranging from critics at *The New York Times* and *The New Yorker* to obscure bloggers. IMDb users also can review movies, as well as rate movies on a 10-point scale. Thousands of users do this.

4. “Independent” Film

¹⁴ In 1999, the New York Times produced 424 reviews, and 385 movies generated box office revenue. See http://movies.nytimes.com/ref/movies/reviews/years/rev_year_1999/index.html?srw=101 and <http://www.boxofficemojo.com/yearly/chart/?yr=1999&p=.htm> . See <http://variety.com/v/film/reviews/> .

¹⁵ See http://articles.washingtonpost.com/2012-08-17/lifestyle/35490193_1_magnolia-pictures-screens-and-sound-systems-hdnet-movies.

Cost reductions would seem to make it easier for independent film to succeed. But what is “independent” film?

While it’s clear what the “major” studios are, the definition of independent film is less clear. Some people define independent film according to the source of financing. The Independent Film and Television Alliance (IFTA) is a lobbying group for entities making movies outside of the MPAA studios. According to IFTA, “[e]very industry has majors and independents. The same is true in the entertainment industry. An independent film or TV program is financed primarily from sources outside the six major U.S. studios. Independent product is made at every budget range and is seen side-by-side with major studio releases.”¹⁶

The other major definition of independence is more subjective and concerns the appeal of a movie. For example, Film Independent, the organization that sponsors the Film Independent Spirit Awards, a major award for independent film, defines independence according to the following criteria: “uniqueness of vision, original, provocative subject matter, economy of means, and percentage of financing from independent sources.” According to their website, “[f]ilms that are made with an ‘economy of means’ AND are fully financed by a studio or an ‘indie’ studio division may still be considered independent if the subject matter is original and provocative.”¹⁷

Indiewire, a major online source of news about independent film defines independence in yet a third way, according to the breadth of film release. Thus, for example, their list of the top indie films of year-to-date 2013 (as of August, 16) “includes North American grosses for specialty films that opened in limited release (initially under 500 screens) in 2013.” By the time

¹⁶ See <http://www.ifta-online.org/>

¹⁷ See <http://www.spiritawards.com/about-2/faq> .

a movie is to be released theatrically, its prospects are predictable, if not actually known. By limiting independence to movies predicted to have limited appeal, the indiewire definition of independent film is inherently biased away from finding significant impact of independent film on box office. The indiewire definition recalls the joke about the hipster who burned his tongue by sipping it before it was cool.¹⁸ If the movie is expected to be commercially successful at the time of theatrical release, then it is no longer “indie.”

Because I need a measure of independence that I can employ systematically, I define independence according to the identity of the firm producing the movie. IMDb allows me to easily identify whether one of eight major studios is a producer of a movie. If so, then I define a movie as a major studio movie. Otherwise I define the film as independent. This approach has the virtue of feasibility but will include many movies that indiewire does not list and that would not be eligible for the Spirit Awards.

5. How More Draws Could Raise Quality

A reduction in entry costs raises the number of products that can profitably – in expectation – enter the market. In a context with many products, it’s not a priori obvious that additional products will have substantial effects on welfare, given substitutability among products and diminishing marginal utility. That is, if the 500 best new products are already available, then the benefit of another 500 new products might be small. But given the unpredictability of movie appeal at the time of investment, it is possible that many attempts at movie making will generate movies that are economically important. The great growth in the

¹⁸ <http://weknowmemes.com/2012/09/how-did-the-hipster-burn-his-tongue/>

number of movies produced may have significant consequences for both entrant film makers and consumers.¹⁹

Technological change has made it easier in principle for film makers outside of the major studios to make movies and get them known by, and available to, consumers. Has this actually happened? We turn now to an attempt to answer these questions, beginning with a discussion of the many and disparate data sources we employ.

II. Data

The data for this project are drawn from a variety of sources. Data on the number of new products created each year are drawn from The Internet Movie Database, or IMDb. The IMDb database is a user-generated but authoritative source of data on movies.²⁰ In 2005 IMDb's "users submitted information to the database 16 million times... Those submissions are then monitored by a team of editors who take their entertainment geekdom seriously. Any factual mistakes they may not find on their own are usually brought to their attention by users, who also make frequent accusations that some Hollywood aspirants who submit their biographies to the site are padding their résumés."²¹

Using IMDb's advanced title search tool, one can obtain lists of, say, the US-origin features (or all documentaries) produced each year. This source also includes the number of IMDb users rating a film, the average rating from users (on a 10-point scale), US box office revenue, the MPAA rating, genre, and of course title and year of release for each film. I have

¹⁹ See Tervio (2009) for a model that embodies this logic.

²⁰ *The New York Times* refers to IMDb as "a de facto directory of most everyone from key grips to producers, actors and directors." <http://www.nytimes.com/2006/05/28/business/yourmoney/28frenzy.html>

²¹ See <http://www.nytimes.com/2006/05/29/technology/29iht-IMDB.1839178.html?pagewanted=all>.

created a database with all US-origin feature films and documentaries produced between 1980 and 2013. For each movie I observe the year of release, the number of users rating the movie and the average user rating on a ten-point scale (for 43,704 movies with user ratings), the movie's MPAA rating (if it has one), the IMDb-reported US box office revenue (for 10,163 movies), whether it was produced by one of eight major studios, and whether the movie is available for streaming from Amazon. This dataset includes 81,032 US-origin feature or documentary movies.

Data on the information environment for new products – in this case movie reviews - come from three sources. First, Metacritic summarizes professional critics' views about movies released into theaters. I have the Metacritic rating, and the number of reviews it is based on, for 6,890 movies released between 2000 and 2012. Second, Rotten Tomatoes provides a similar service, although only their top 100 movies per year 1993-2012 are readily available. For each movie I observe the RT rating, and this dataset includes 2,000 observations. Finally, the detail page on each film at IMDb provides includes the list of critics reviewing the film. This list includes both professional critics of the sort covered in Metacritic and Rotten Tomatoes, as well as a large number of lower-profile bloggers.

Movies can generate revenue through theatrical box office revenue, DVD rental, digital a la carte sales (as at iTunes, Amazon, or Vudu), digital subscription sales (as at Netflix or hulu), and airing on basic or premium television (as at HBO, Starz, or TNT). Ideally, I would observe the consumption and revenue for each movie through each of these distribution channels. I do not, but I do observe which movies are aired through these channels, and in some cases revenue or rankings based on sales. I describe these sources by distribution channel.

1. Box office revenue

I obtain US box office revenue for all movies released into theaters from Box Office Mojo, for 1980-2012. Box Office Mojo also reports the number of screens the movie is released. The dataset includes 11,567 movies released in the US over this period. I also observe the number of users rating each movie at IMDb, and this turns out to be highly correlated with box office revenue for movies released theatrically, suggesting that the number of users can serve as a proxy for box office revenue for many (43,704) movies.

2. A la carte digital sales

I have three sources of information on a la carte digital sales. First, I obtain occasional iTunes top 100 movie rankings, 2009-2013. iTunes creates an hourly ranking, although they make on the current hour's ranking publicly available. I have at least one of these per month since mid-2009, from the Wayback Machine. This results in a total of 4,902 movie listings. Second, I obtain data on the movies in the IMDb data that are available through Amazon from IMDb itself, an authoritative source since Amazon owns IMDb (13,812 US-origin features or documentaries are available at Amazon Instant Video or Prime Instant Video). Third, I observe the full list of movies for sales at Vudu in August 2013, one of the major services selling movies a la carte. Fourth – and related – I have information on the availability of nearly 10,000 movies through six digital distribution channels as of August 14, 2013 (iTunes, Netflix streaming, Amazon Instant, Amazon Prime, Vudu, and Hulu) from yidio.com.

3. Movies available through Subscription Streaming Services

I obtain the full list of movies available on streaming Netflix (as of August 2013) from instantwatcher.com. This dataset includes 9,658 movies.

4. A la carte physical rentals

I have the top 20 DVD weekly rentals (from Home Media Magazine via IMDb), for a total of 13,468 listings between 2000 and 2012.

5. Movies on television

I observe a large sample (82,000 broadcasts) of movies aired on broadcast and cable television, 2009-2013 from zap2it television listings archived at the Wayback Machine. I know when each movie was aired, on which channel, and how many times (it appears in my sample).

III. New Products and their Availability

The movies that are most salient for US audiences are those released by the “major” studios that are members of the Motion Picture Association of America (MPAA). As Figure 1 shows, the number of movies released by MPAA members has fluctuated between about 100 and 250 since 1980. Recently the number of MPAA releases has been falling, and 2012 saw the fewest releases since the late 1980s. Yet, releases by the majors are a very small share of the movies made.

The IMDb database query tool (at www.imdb.com/search/) allows tabulation of the number of movies released each year, by various categories (for example by country of origin and by whether the movie is a feature or a documentary). Figure 2a shows the number of new US-origin features released each year from 1960 to 2012. The number stood at a few hundred in 1960 and rose steadily to about 500 in 1990. Between 1990 and 2000, the number roughly doubled, to about 1250. After 2005 the number of new releases began to increase quickly, reaching nearly 3,000 in 2012. Growth in the number of US-origin documentaries, in Figure 2b,

is even more rapid. While it stood at a few hundred per year in the 1960s, it passed 4,000 in 2010. Worldwide patterns, in figures 2c and 2d, are similar in shape but are more than double the totals identified as “US-origin.” It seems not to be an exaggeration to say that the number of movies released exploded between 2005 and 2010.

One might worry that growth in the number of movies listed in IMDb could confound actual growth in creative effort with growth in coverage. As one check against this possibility, I obtained another measure of creative output, submissions of films to the Sundance Film Festival. Sundance submissions have a modest fee (\$50 in 2014). Submissions rise from 1,285 in 2004 to 2,021 in 2008. This provides some outside confirmation of an actual increase in movie production during the 2000-2010 decade rather than a reporting anomaly. Of course anecdotal accounts also confirm an explosion of movie making in the latter part of the 2000-2009 decade, driven in large part by the new availability of inexpensive, high quality digital movie cameras like the Canon 5D and the Canon 7D.

“Release” has many possible meanings. Two ends of the spectrum are a) having an IMDb page and b) wide theatrical release, e.g. more than 1000 screens. If one made a movie and wanted to publicize its existence, one would likely post a page on the film at IMDb since it costs little to do so. Hence, the existence of an IMDb page on a movie provides an inclusive indicator of commercially-oriented creation. Moving along the spectrum, a second measure of product availability would be whether the movie is available for sale in a manner that is broadly available. Because Amazon has the least restrictive policy for making products available through their site, the number of movies available at Amazon provides an inclusive measure of product availability, at least for movies that have finished their theatrical runs. Being available through a curated platform (Netflix, iTunes, etc.) provides a more restrictive measure of

available products. Next in line would be limited theatrical release, followed by wide theatrical release.

We can examine the time patterns of many of these sorts of “releases.” Figure 3 compares MPAA releases to wide and overall US theatrical releases (based on Box Office Mojo data), where wide release indicates 500+ screens. Over the entire period, MPAA releases are similar to the number of movies in wide release. From 1990 until 1997, MPAA releases and overall theatrical releases grew in tandem. Afterwards, the number of movies released in US theaters continued to grow, passing 400 in 2002 and reaching 660 in 2012.

Given our definition of independent film as anything produced by a studio that’s not a major studio, the share of independent movie titles available to consumers through theaters has grown substantially, from 25 percent in 1990 to 81 percent in 2012. To be sure, major-studio releases continued to dominate screens. But being in the theater *at all* seems very important to being reviewed by mainstream media. Figure 3 also reports the number of movies included at Metacritic, a site that includes “a page for virtually every new movie released each week... ..as long as they are reviewed in at least a few” of the publications they use for source reviews but which does not “currently cover straight-to-video titles.”²² Perhaps not surprisingly, then, Metacritic-reviewed movies mirror theatrical releases.

As we know from Figures 2a-2d, movies released in theaters are a small fraction of new movie production. Figure 4 compares total theatrical releases to two other measures of available new products, movies available for streaming at Netflix and movies sold through Amazon. The Netflix and Amazon figures show the availability by release vintage as of August 2013. Of the

²² <http://www.metacritic.com/faq#item20>

movies made in 2010, for example, 1,230 were available for purchase at Amazon, and 1,058 were available for streaming on Netflix through their subscription service, while 534 had been released in theaters. It is clear that a broader range of products from each vintage is eventually available for home video than was available in theaters.

Movies are available online through services selling movies a la carte as well as services selling access to movies through subscriptions. Amazon, iTunes, and Vudu sell movies a la carte. (Amazon Prime gives subscription access to a bundle of movies, but the selection is small compared with the overall selection of the Amazon Instant Video option). By contrast, the Netflix streaming service and Hulu provide access to bundles of movies by for a flat subscription rate. The a la carte services tend to include more recent, and more popular movies.

Yidio.com (short for “your Internet video”) provides a portal which shows which platforms (including streaming Netflix, Amazon Instant Video, Vudu, and Hulu) carry each of 9,908 movies as of August 2013. While large, the list is not the full superset of movies available at any platform; but it does include all but the more obscure titles. Of this list, Amazon and iTunes have the largest coverage, 73 and 72 percent, respectively. Vudu is next, with 60 percent of these titles. The streaming services have fewer of these movies, 28 percent at streaming Netflix and 12 percent at Hulu.

Figure 4 clearly shows that consumers now have access to far more movies than are reviewed by traditional, mainstream outlets. This begs the question of how consumers learn about these additional movies. As it turns out, there is a large group of movie critics providing criticism of movies that are not theatrically released. IMDb follows hundreds of these nontraditional critics. The IMDb source list is far broader than Metacritic’s, including both

formal reviewers such as those included in Metacritic, as well as movie bloggers. This has two consequences. First, movies tend to have far more reviews by critics listed at IMDb. Second, many movies lacking reviews from traditional outlets have reviews from IMDb-listed reviewers.

The range of critics included in IMDb is broad. For example the 2012 movie “Argo” (which won the Best Picture Academy Award), has 588 critic reviews at IMDb. The sources for these reviews run the gamut from high-profile general-interest publications such as *The New York Times* to obscure blogs. One way to characterize these sources is by the Internet traffic of their web sites. Alexa provides a traffic rank for most of the domain names on the web. I obtained the Alexa traffic ranks (as of August 6, 2013) for all of the sites that IMDb lists with “Argo” reviews.²³ For example, the *NYT* site is ranked 143 among world sites, the Washington Post is ranked 405, and Entertainment Weekly is ranked 1651. But the median ranking of the sources providing critical reviews of “Argo” is 1.6 million. These are blogs maintained by individuals. See Figure 5.

Having additional reviews for the same movies provides limited additional information. But perhaps more important is that, with the inclusion of the informal critics, more movies have review information. To explore this I obtained the number of critics listed at IMDb for the movies across a range of popularities (as measured by IMDb users), 1990-2012. In particular, I obtained the number of critic reviews for the movies ranked 1, 51, 101, ..., 1001 from each year according to the number of IMDb users. Figure 6 shows the probability that movies in four popularity groups $\{(1,51,101); (151,201,\dots,501); (551,601,\dots,751); \text{ and } (801,851,\dots,1001)\}$ have critic reviews over time. Movies in the top 101 have essentially complete review coverage over the entire period. Movies in the next 400 have 70 percent coverage in the period 1990-

²³ See http://www.imdb.com/title/tt1024648/externalreviews?ref=tt_ov_rt.

1994, and coverage rises to about 90 percent later. Movies in the next group (551-751) experience dramatic increase in coverage, from about 20 percent in 1990-1994 to about over 80 percent since 2005. Finally, movies in the 801-1001 group also experience dramatic increases in coverage, from 0 in 1990-1994 to about 60 percent since 2005. It is clear that movies farther down the distribution now receive attention from critics, where they previously did not. See Figures 6a and 6b.

A look at the full distribution of critical reviews for the 2,900 US-origin features released in 2012 confirms this. Of these releases, 325 were reviewed at Metacritic. By contrast, 916 of these movies have at least one critical review in IMDb, 760 have at least two critical reviews, 681 have at least three, 572 have five or more, 417 have over ten, 286 have over 25, 206 have over 50, 171 have over 75, and 152 have over 100 critical reviews.

Opinions of lay moviegoers have also become more widely available. IMDb reports a rating for each movie with 5 or more user votes (a rating on a 10-point scale). Figure 7 reports the number of US feature and documentary movies with ratings – as of August 2013 – by vintage of release since 2000. The number of movies with user ratings grows from 1,500 for 2000 to about 2,400 for movies released in each year since 2005.²⁴

It seems clear that consumers have ways to obtain information about the appeal of many more movies than they could have a decade or two earlier.

IV. Success of the New Movies

²⁴ I include only releases since 2000, the period when IMDb users have been most active.

Ideally we would observe revenue from theatrical box office, home video, digital distribution on various platforms, and television over multiple years after the initial release of movies to determine whether released movies had become successful. In addition, we would know which of these movies is “independent,” so that we could determine whether the independent movies make up a growing share of the commercially successful movies. This is a tall order simply because many sorts of movie revenue are essentially unobservable. Revenue from video on demand is available only sporadically, as is revenue from television deals (e.g. with premium cable movie channels).

Still, we can make some progress. While we cannot observe all revenue sources comprehensively, I have obtained the following measures of commercial success. First, I observe which movies are released in theaters, the number of screens, and their revenue, from Box Office Mojo, 1980-2013. Second, I observe the full lists of movies available for a la carte streaming through Amazon Instant Video and Vudu in August, 2013. For iTunes’ Movie Store, I observe the hourly top 100 movie downloads for selected hours – essentially once per month - 2009-2013. Third, I observe the top 20 DVD rentals by week, 2000-2013. Fourth, I observe a large sample of movies on basic and premium television, 2009-2013 (August). Finally, I observe an indirect measure of usage for a wide group of movies, the number of IMDb users rating each US-origin feature movie at the IMDb database, 2001-2013.

In cases where I have quantitative usage data – box office revenue or Amazon users rating a movie – I can calculate the share of usage for independent vs major-studio movies. In the other cases, where I have lists of movies that have achieved some measure of success (e.g. being available on a service, or appearing in a weekly top 20), I can calculate the share of movies achieving the success that are produced by major studios.

1. Independent Share of Box Office Revenue

We have already seen above that a growing – and now dominant – share of movies released into theaters (over 80 percent) are not produced by MPAA member studios and therefore are “independent.” How about box office revenue?

I can merge the Box Office Mojo revenue data with the IMDb list of movies from major studios to determine which movies are major and which are their complement and therefore independent. Figure 8 shows the evolution of the independent share of box office revenue, 1990-2012. Between 1990 and 1995 the independent share fluctuated between 25 and 30 percent, then fell to about 20 percent until 2005. Since 2005 the independent share measured in this way has risen sharply, topping 40 percent in 2012.

2. Independent Movies among a la Carte Digital Offerings

The iTunes store sells movies, and as the Ed Burns anecdote suggests, it provides an outlet for independent movies. While the current top 100 iTunes movies are available at their site, Apple does not provide data on past rankings, nor do they provide a longer list. Using data from the Wayback Machine, I have at least one hourly top 100 ranking from each month between July 2009 and July 2013. Over this period, independent movies (non-majors, according to the IMDb approach) make up a steady 50 percent of the top-100 listings. See Figure 9.

Amazon has 13,898 US-origin feature or documentary movie titles available through its Amazon Instant Video service originally released 1980-2012. Figure 10 shows the independent share of these movies by vintage, and it rises from 40 percent for 1980 to about 90 percent in 2010.

As of August 2013, Vudu offered 19,133 movies through its streaming service.²⁵ Their Wal-mart interface shows the list, ostensibly ranked by sales. Hence, I have the list of movies available in August 2013 ordered by Wal-Mart's measure of popularity. I merge this list with the IMDb major studio list (which I have back to 1980-vintage movies). I can then calculate the share of Vudu-available movies of each vintage produced by independent studios. To make each year's share comparable, I restrict attention to the (currently) 50 top-rated movies from each vintage. See Figure 11. For movies originally released between 1980 and 2005 (and currently available at Vudu), the independent share hovers around 15 percent. For Vudu-available movies originally released since 2005, the independent share rises: reaching 40 percent in 2010. This is significant because the independent share among the top 50 from each vintage is rising. (It is also the case that the independent share of movies available overall is rising, simply because major-studio movie production is constant, while independent movie production has risen).

3. Independent Movies among Physical DVD Rentals

DVD sales have the potential to show the growth in independent movies more clearly than box office revenue. Many more movies are released on DVD than in the theaters. On the other hand, my DVD revenue is only the top 20 by week. While it is over 1,000 listings, it translates to about 200 titles per year. It is not obvious whether the independent movies would be prominent on such a list. Still, we can merge the IMDb major variable the DVD list to see. As Figure 12 shows, the non-major share of listings rises fairly steadily from 0.2 in 2000 to 0.5 in 2012.

²⁵ I obtained the list of movies at Vudu using the Wal-Mart interface: <http://www.walmart.com/cp/Top-VUDU-Rentals/1087908>.

4. Independent Movies among Streaming Offerings

The Netflix streaming service carries thousands of movies. It is well known that Netflix does not carry many recent box office hits. Hence we expect independent fare to make up a large share of the Netflix streaming library. And, as Figure 13 shows, it does. The Figure shows the share of Netflix fare, by vintage, that is among the IMDb major studio output. About half of the 1980-vintage films on Netflix are from the major studios. The non-major share rises steadily across vintages, to over 90 percent for movies released since 2000. While the independent share of box office revenue reflects consumers choosing indie fare over major studio fare, the share here has a different interpretation. Netflix avoids recent high-cost major studio movies, but they are able to exhibit recent movies by obtaining rights to films from outside the major studios.

5. Independent Movies on Television

One of the major revenue-generating outlets for movies is television. To see how independent studio movies fare on television, I obtained data on television schedules 2009-2013. Zap2it.com is a website that posts television schedules for about 100 distinct channels. While past schedules are unavailable through zap2it, they are archived at the Wayback Machine. Roughly once a day since 2009, the Wayback Machine has taken a snapshot of the television schedule grid. These snapshots cover three-hour periods. Movies are identifiable in these grids because they are listed with a title, followed by their vintage in parentheses. Using the archived zap2it pages available at the Wayback Machine, I am able to obtain 82,517 movie listings for 2009-2013 (August). The channels covered include broadcast networks, basic cable, and premium cable channels. Across these years, I see 13,779 distinct movies aired on television. Movie listings remain a constant share (about 10 percent) of the overall listings that I observe.

I can merge the movies aired on television with the IMDb major studio data to see what share of televised movies are from the major studios. Figure 14 shows the complement, the independent share of televised movies. I report this by vintage of movie release, pooling all five years of television airing data. The independent share is 25 percent for 1980-released movies and rises steadily thereafter, to about 40 percent for movies released in 2000. For movies released since 2000, the increase is more substantial. Of the televised movies released in 2006-2009, two thirds are from independent studios.

6. Independent Share of Movie “Users” at IMDb

Many IMDb users rate movies. For popular movies, the number of users rating the movie can number in the hundreds of thousands. For example, “The Shawshank Redemption” and the “Dark Knight” have 1,020,155 and 995,077 user ratings, respectively at IMDb (as of August 16, 2013). While not every movie listed at IMDb has users, we observe users for far more movies than we observe box office revenue. Across the 2012 films with box office revenue, the correlation of users and box office revenue is 0.86. Correlations are similarly high for other years, indicating that the users measure is a reasonable proxy for box office revenue.

Presumably because of growth in IMDb’s popularity over time, the number of user ratings is higher for more recent movies. (The sum of the user measure across movies rises from about 5 million for 1990 movies to 15 million for 2000 movies). To avoid a measure that mechanically makes new movies appear more popular, I construct a measure of success for each movie based on its share of users among all movies released in that year. That is, if $u_{i(t)}$ is the number of users rating movie i (which was released in year t), then my success measure for the movie is the share of total ratings for movies in release year t : $s_{i(t)} = \frac{u_{i(t)}}{\sum_{i \in t} u_{i(t)}}$. By

merging this movie-level measure with the IMDb measure of whether the movie is released by a major studio, I can construct a proxy for the market share of independent movies. Figure 15 reports this time series: it fluctuates substantially – between .4 and about 0.15 – and falls between 1990 and 2000, then rises steadily from 2002-2012, passing 30 percent in 2012.

V. Are Recent Vintages Good?

That movies from non-major studios make up a growing share of consumption in recent years shows that independent movies of each vintage are important relative to the major studios' moves of the same vintages. But this evidence does not indicate whether the recent vintages – containing the explosion of new work – are good compared to earlier vintages. Cross-vintage comparisons require a different sort of evidence.

I have two sorts of evidence that speak to the evolution of vintage “quality.” First, I have critical assessments of large numbers of movies from Rotten Tomatoes and Metacritic. These outlets translate underlying critics' reviews into scalar measures that are comparable across movies (and therefore over time as well). Second, from the television listing data I have measures of movie usage by viewing year and release vintage, allowing me to infer the service flow of each underlying vintage.

Rotten Tomatoes lists their top 100 movies of each year for each year since 1993.²⁶ With some modification, I can use these lists to construct an index of high quality movies by vintage. Rotten Tomatoes rates movies on a 100-point scale. The 100th best movie from 2011, “George Harrison: Living in the Material World,” earned a score of 85. The 100th best movie of 2010, “Made in Dagenham,” earned an 80. Because I only observe the top 100 movies of each

²⁶ They list top movies for earlier years, but the earlier lists include fewer than 100 titles per year.

vintage, I don't know how many 2011 titles earned between 80 and 85; but I can see that 77 titles from 2010 earned at least an 85. Hence, I can say that the number of titles earning at least an 85 grew from 77 in 2010 to 100 in 2011.

I can use this idea across all of the years since 1993. First, I find the highest 100th-best rating across all of the years. The highest score of a 100th-ranked movie over this period is 87. I include all movies with this rating or higher, for a total of 1,279 titles. Figure 16 shows the evolution of the resulting index. Between 1993 and 1999 it averages about 35 titles per year. Between 1999 and 2003 it doubles. It has averaged about 80 per year since 2003, reaching 100 in 2012.

How many of the good movies at RT are major? As Figure 17 shows major studios accounted for the lion's share of the 1980s movies deemed best by Rotten Tomatoes. For movies released between 1980 and 1990, roughly two thirds were from major studios. Between 1990 and 2000 the share of the Rotten Tomatoes best movies from independent studios rose from 40 percent to about 80 percent. The independent share of the RT best has fluctuated between about 80 and 85 percent since 2000.

That critics like a set of movies may say more about aesthetics than commercial appeal. It would be useful to know whether movies that appeal to critics also appeal to consumers. The Metacritic dataset includes both summaries of critics' reviews (the "Metascore," which is a number between 0 and 100), as well as average user ratings (on a 10-point scale). Figure 18 shows a scatter relating user to critic ratings at Metacritic for the 6,890 movies released 2000-2012. There is a clear positive relationship: movies with higher critic scores have higher user scores. A regression of the user score on the Metascore shows a highly statistically significant

relationship: an additional Metascore point is associated with a 0.04 point higher user score, and the t-statistic is 43. Yet, there is some unpredictability, and the regression R-squared is 28 percent. Still, an improvement in the quality of movies in the eyes of critics – as we see in the RT data – would seem to be appreciated by lay filmgoers as well.

We can draw inferences about the service flow of each vintage from consumption data. Ideally, we would observe consumption by calendar year and film release vintage. That is, we would observe sales or rentals of movies originally released in, say, 2008 during, say, calendar year 2010. If we had data on consumption by year and vintage for multiple years and many vintages, then we could determine which vintages are used more, after accounting for their ages and therefore depreciation. The high-use vintages are those generating more service flow.

We do not have detailed consumption data, but the television listing data resemble the ideal. In each year, 2009-2013 (partial) we observe thousands of movie listings for movies originally released in various (mostly) earlier years. Take calendar 2012. We have 7,917 movie listings. Of these, 168 are for movies originally released in 2012, 407 are for movies released in 2011, 528 for 2010, 511 for 2009, and so on. That older movies are used less reflects depreciation. But after accounting for depreciation, which vintages have higher use?

We can assess this systematically. Define $s_{t,v}$ as the share of year t listings originally released in year v . We can regress $\ln(s_{t,v})$ on age dummies – to flexibly account for depreciation – as well as vintage dummies. The coefficients on vintage dummies provide an index of vintage service flow. This is the approach I adopt for assessing the evolution of music “quality” (really, service flow) in Waldfoegel (2012). Figure 19 reports the resulting vintage service flow index. It

falls from 1960 to 1975, then rises fairly steadily from 1975 to 2006. Although the index falls after 2006, it remains above its level prior to the mid-1990s.

Movies of the 1960s and 1970s continue to air on television a lot relative to their age, while movies from the mid-1970s through 1990 are aired less, given their ages. Movies from the vintages since 1990 air substantially more than their mere age would imply. The recent period – with its large growth in titles – seems to be a period of high annual service flow.

Conclusion

While representatives of the major studios have raised concerns that technological change would threaten movie industry revenues, employment, and continued production, the major effects of technological change seem different. Technological change during the past few decades has facilitated production, promotion, and distribution of a large number of new movies originating outside the major Hollywood studios. These movies make up a growing and now substantial share of movie consumption in the box office, home video, and television.

Figure 1

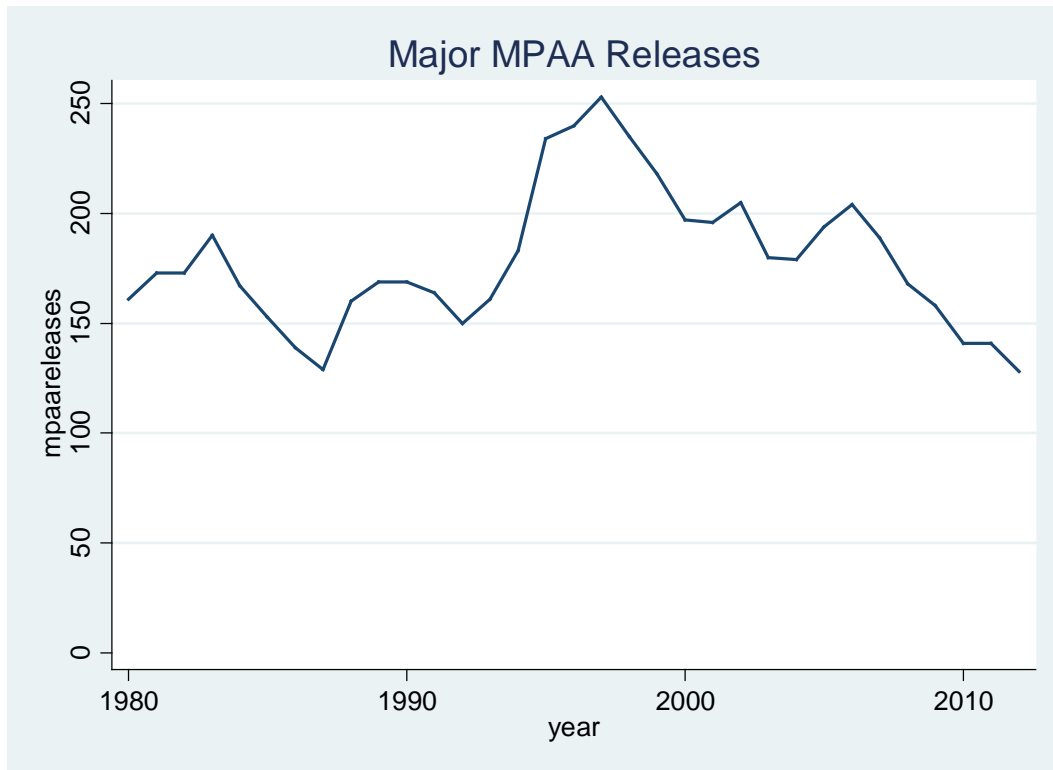


Figure 2

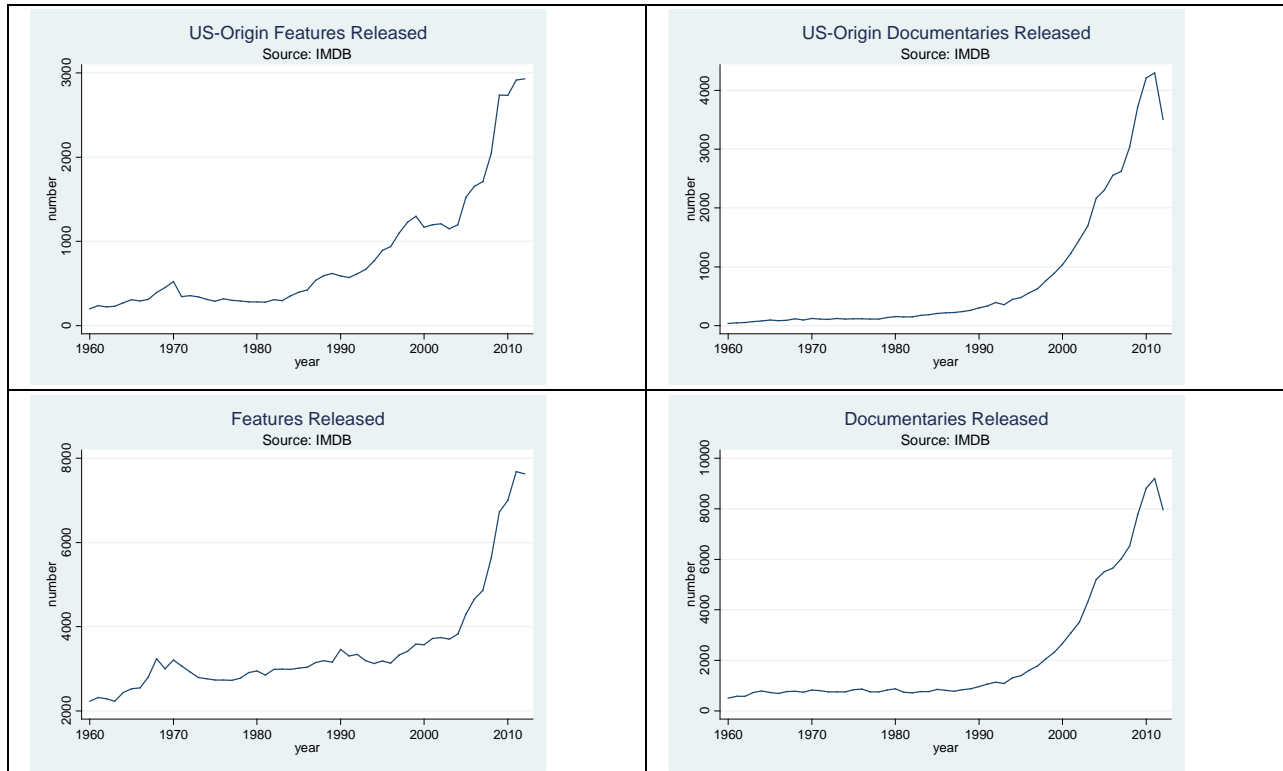


Figure 3

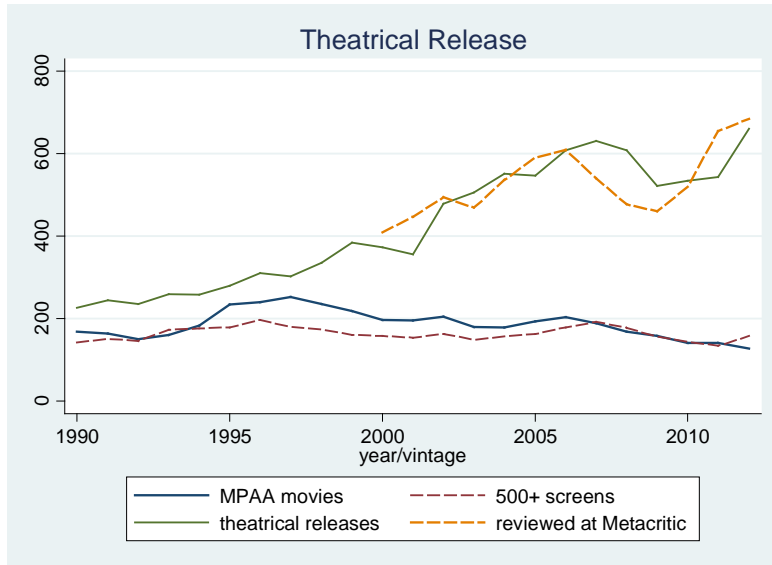


Figure 4

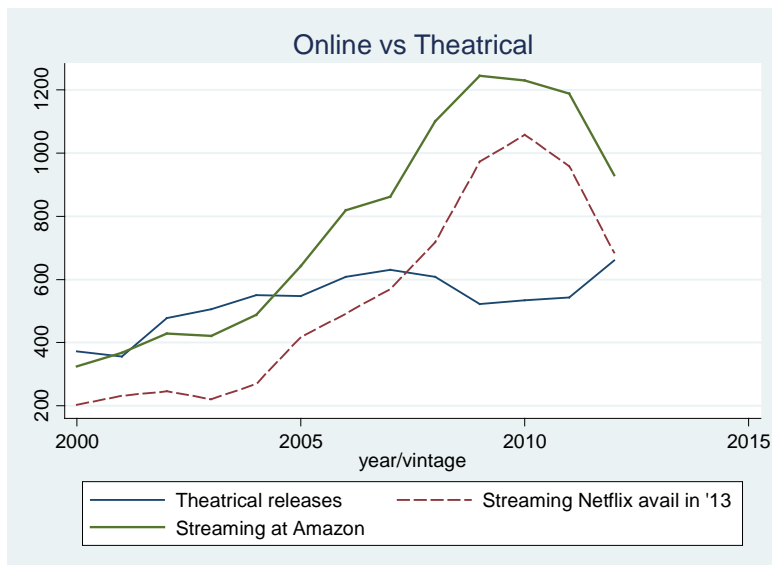


Figure 5

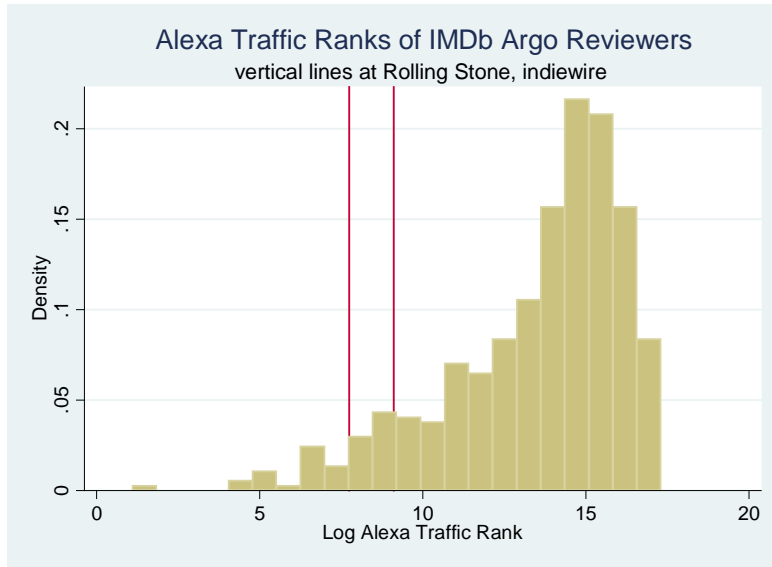


Figure 6a

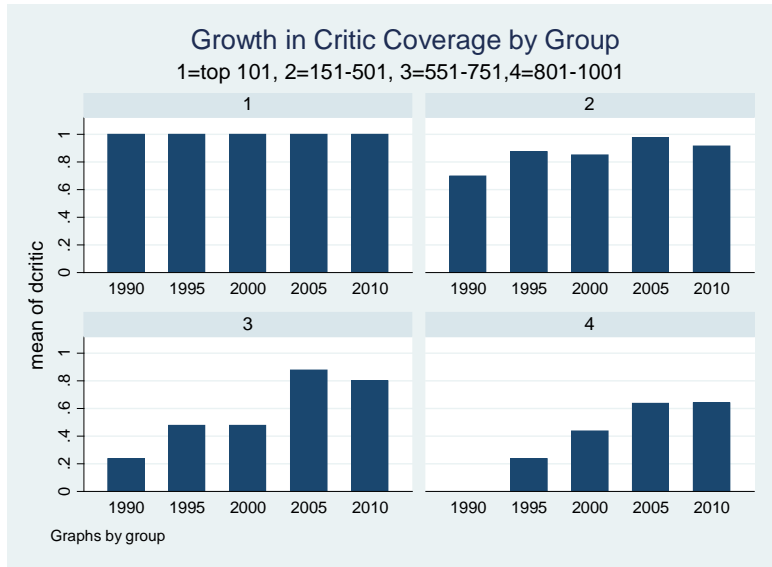


Figure 6b

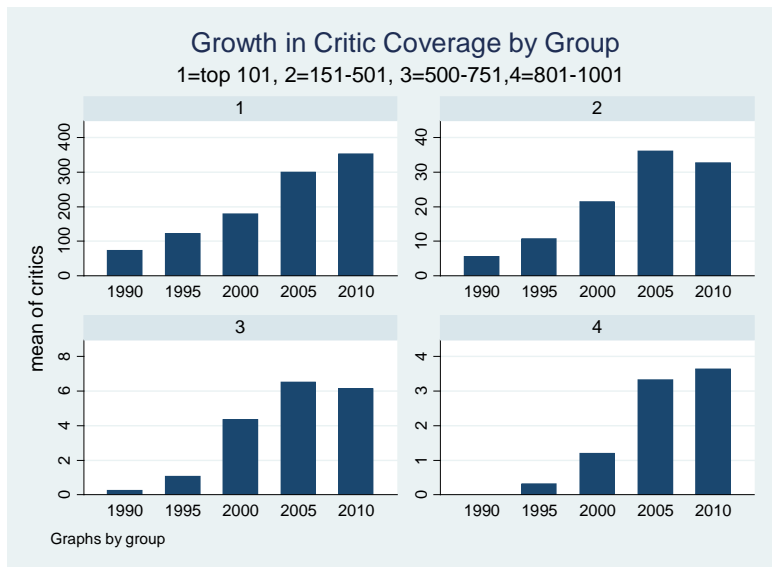


Figure 7

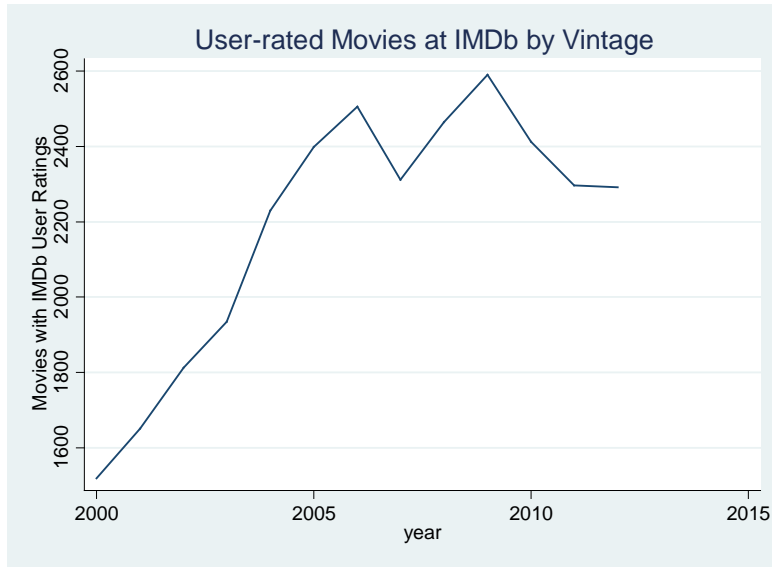


Figure 8

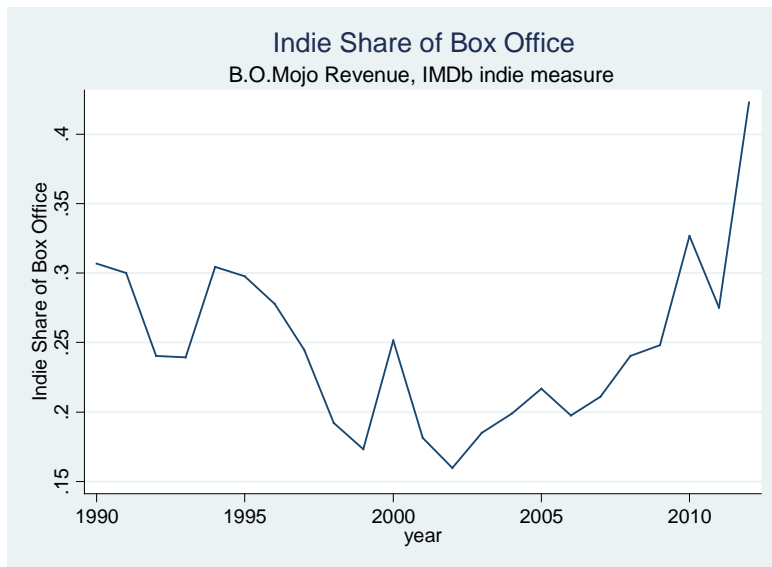


Figure 9

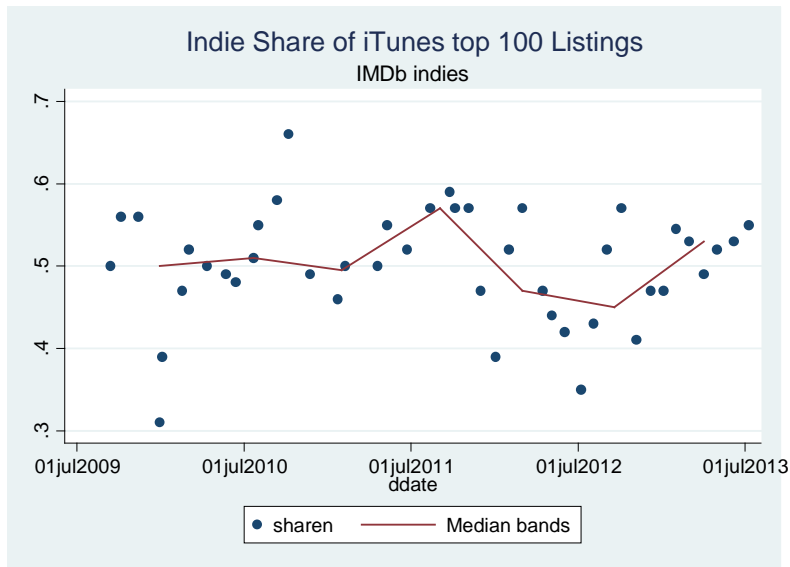


Figure 10

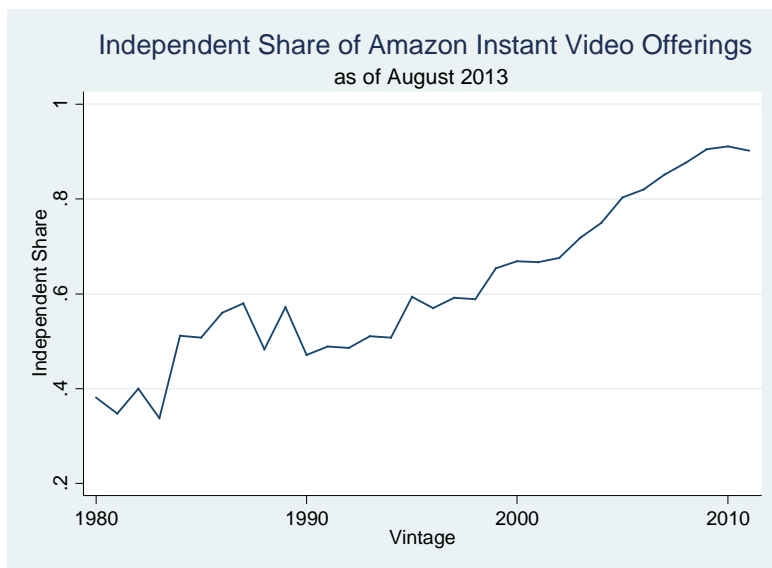


Figure 11

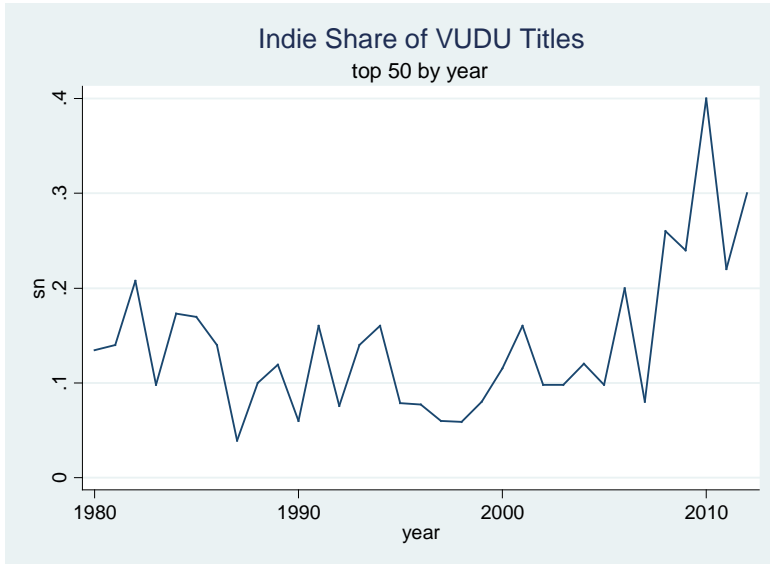


Figure 12

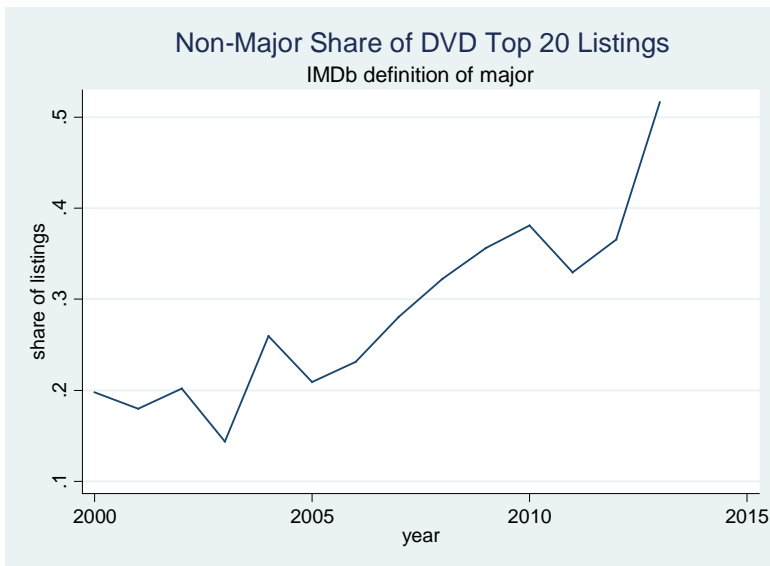


Figure 13

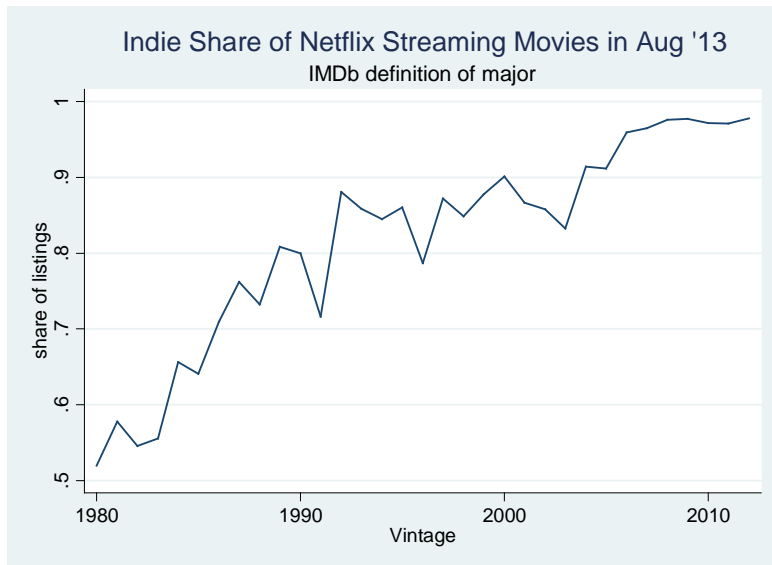


Figure 14

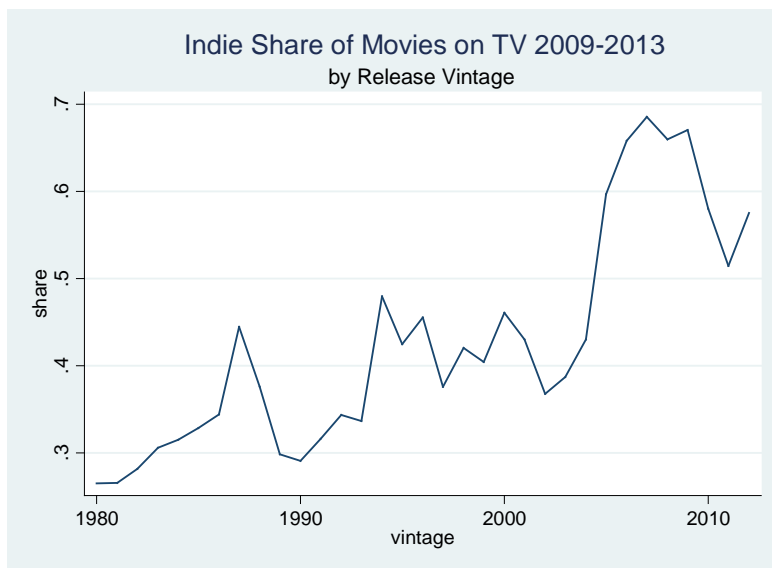


Figure 15

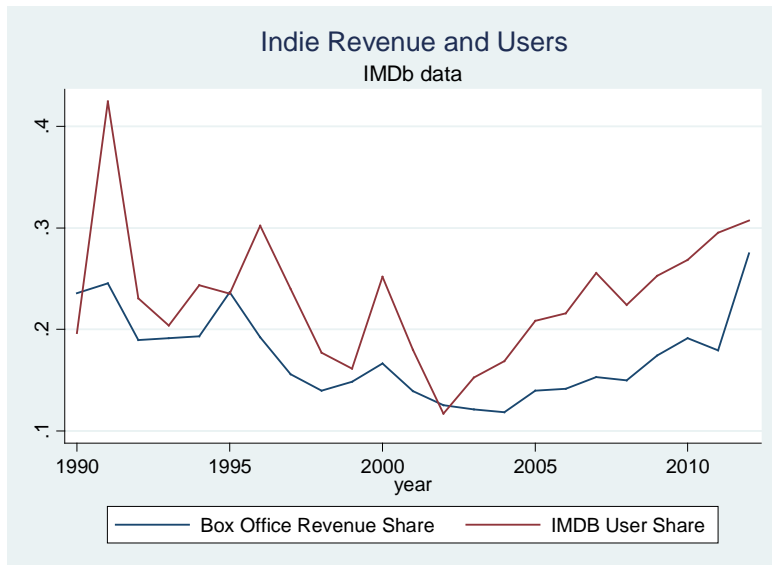


Figure 16

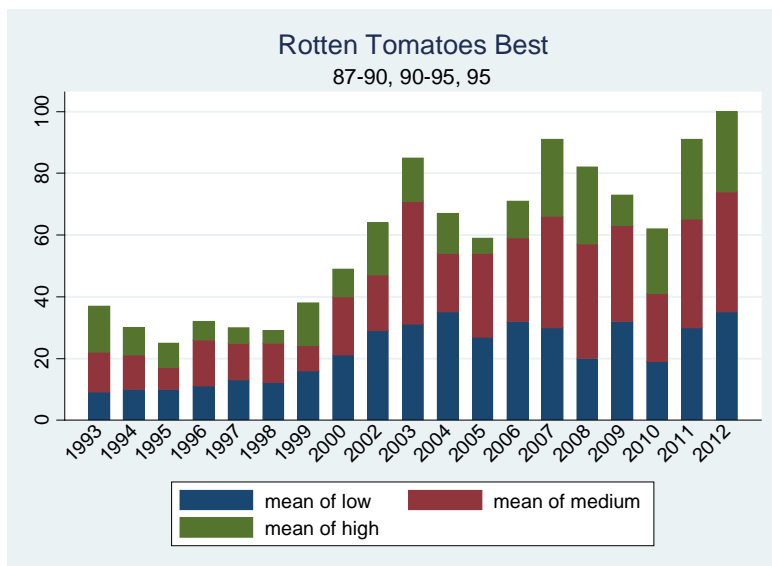


Figure 17

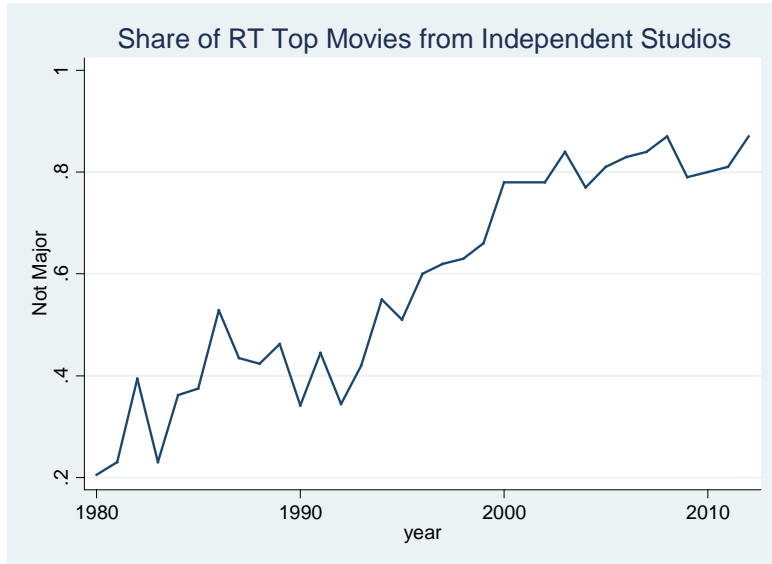


Figure 18

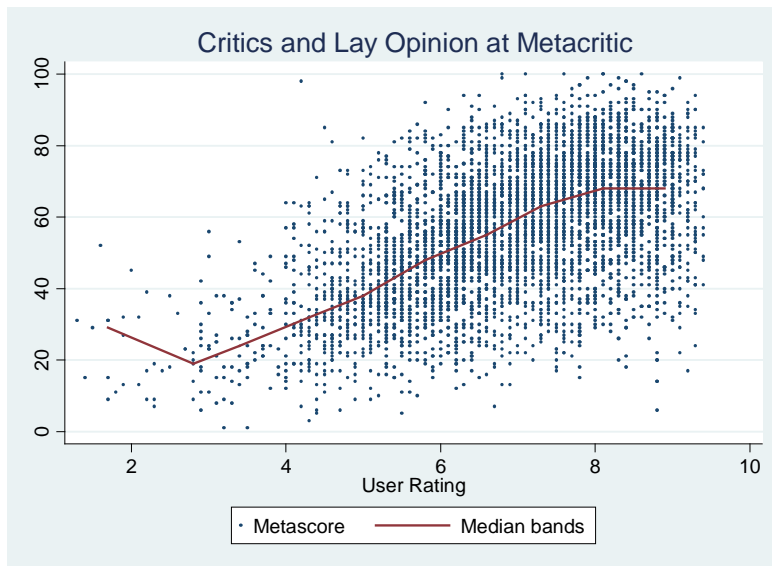
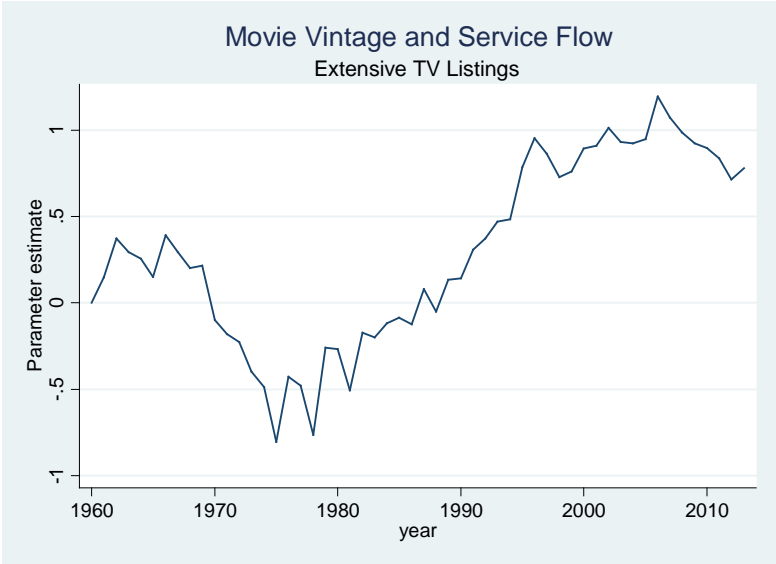


Figure 19



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