

**ARTICLE**

# The economics of movies (revisited): A survey of recent literature

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**Abstract**

Twenty years ago, there were all but a handful of scholarly studies published about the economics of the motion picture industry. Over the first decade of the new millennium, this changed dramatically and many studies began to appear in economics journals and those of cognate disciplines. The following, and most recent, decade has seen this trend continue and the literature on the “economics of movies” has well and truly matured. While economics and marketing disciplines still generate the most output, newer data-orientated disciplines have increasingly turned their attention towards the industry and its abundance of rich and relatively accessible data. This survey endeavors to concisely but comprehensively review recent literature related to this eternally fascinating industry.

**KEYWORDS**

film economics, motion picture economics, movie economics

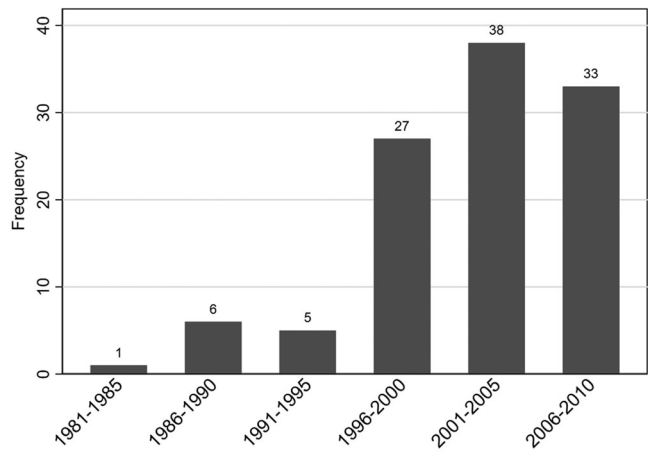
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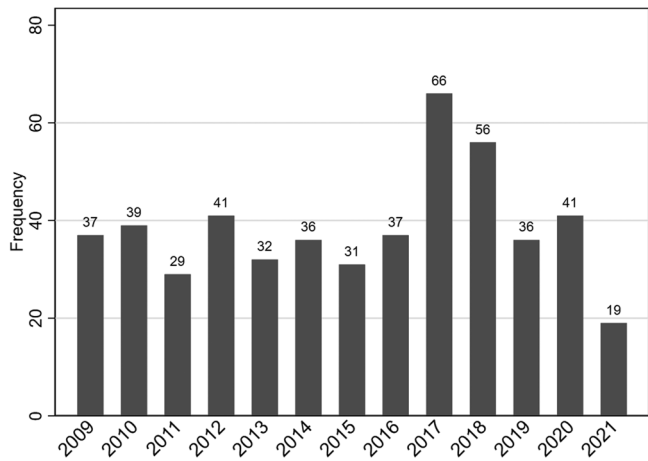
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**FIGURE 1** Studies surveyed by year: McKenzie (2012)



**FIGURE 2** Studies surveyed by year: this survey



## 1 | INTRODUCTION

In a comprehensive survey of the literature related to “the economics of movies,” McKenzie (2012) notes that the preceding decade (corresponding approximately to the years 2000–2010) witnessed a dramatic increase in the number of scholarly studies examining topics relevant to motion pictures as both a product and as an industry (Figure 1). The subsequent decade following has continued this trend and at an increasing pace. Spanning publications from the mid 1980s until the late 2000s, McKenzie (2012) cites 110 references in his review. However, the last decade alone has seen more than quadruple this number of scholarly contributions published in economics and related disciplines (Figure 2). While the present survey admittedly casts a wider net than McKenzie (2012), there is compelling evidence to support the claim that there has been a significant increase in research examining issues broadly relevant to the motion picture industry.<sup>1</sup>

There are at least four possible explanations for the increased amount of published research related to the film industry. First and foremost, data have continued to become more accessible and often can be harvested at low cost from public websites. Online industry resources such as Box Office Mojo and IMDb provide good examples. With the diffusion of web-scraping technologies, previously time-intensive costs of collecting large data sets about films and their attributes have

never been lower. Second, the applied nature of research in this area has coincided with a general shift toward applied research of the discipline more generally. While economic theory will always have its place, it is probably fair to say that the last decade has seen considerable relative growth in empirical work. Development in econometric techniques and increased computing power has certainly helped the field develop in this respect too. Third, the research body has matured. While 20–30 years ago, research on this industry was sparse and fragmented, with the benefit of time and critical mass research now can build on prior work and ultimately progress in a more ordered way. Fourth, media interest in the industry has increased over the years alluring new researchers to the field.

The objective of this paper is to review literature published over the last decade, or so. To avoid extensive duplication with existing reviews such as McKenzie (2012), 2009 was chosen as the cut-off year. However, to assist the reader in understanding the contextual origins of some lines of research, a select number of pre-2009 papers is also cited in the review. While economics and marketing have historically accounted for the lion's share of studies on the subject matter, other disciplines have risen to prominence in recent years. For example, contributions from disciplines related to data analytics and information systems have increased significantly. This is particularly evident in the subset of literature concerned with forecasting and prediction of box office performance. Increased access to big data coupled with the development of prediction algorithms provides the most obvious explanation of such growth. While prediction is not typically the objective of research from economics or marketing scholars, who tend to focus more on explanatory modeling, certain techniques have crossed over and are routinely being used to develop causal methods and inference. For example, machine learning techniques are now routinely being used to select control and instrumental variables in causal model design. This review therefore includes papers from these quickly developing areas of research.

This survey is intended to be comprehensive but concise. In this way, it serves both those new to the area, as well as those who are familiar with the literature but would benefit from a categorized review of recent work. Following McKenzie (2012), the structure of this review is based loosely on the definitions of “movie microeconomics” and “movie macroeconomics.” In this respect, movie microeconomics focuses on studies dealing broadly with the demand and supply of the film product itself, whereas movie macroeconomics deals with issues more relevant to the entire industry.<sup>2</sup> However, the distinctions are not always well-defined and are necessarily subjective. As a guiding principle, classification was based upon where the paper's main contribution was made. Insofar, as further subsection classifications are concerned, there is also subjectivity where papers are grouped by themes that may or may not reflect the paper's core focus. Ultimately, interested readers should make their own judgment about each paper's contribution. Finally, given the volume of literature surveyed, contributions are grouped coarsely necessarily sacrificing specific details of the research.

This survey covers exactly 500 research studies within the 2009–2021 period. The survey was limited to refereed journal articles, books, and book chapters. However, by far the most represented of these are the journal articles, with 485 contributions from 215 unique journals.<sup>3</sup> References were collected from a variety of databases, including EconLit, Google Scholar, Mendeley, and so forth. All studies were also manually crosschecked for completeness. Most journal publications related to the subject matter appear in the *Journal of Cultural Economics* (45 articles), followed by the *Journal of Media Economics* (24). Highly ranked management and marketing are also featured in the top 10, including *Management Science* (17), *Journal of Marketing Research* (13), *International Journal of Research in Marketing* (13), and *Marketing Science* (12). Figure 3 provides the top 15 journal of this study, as well as those of McKenzie (2012).<sup>4</sup>

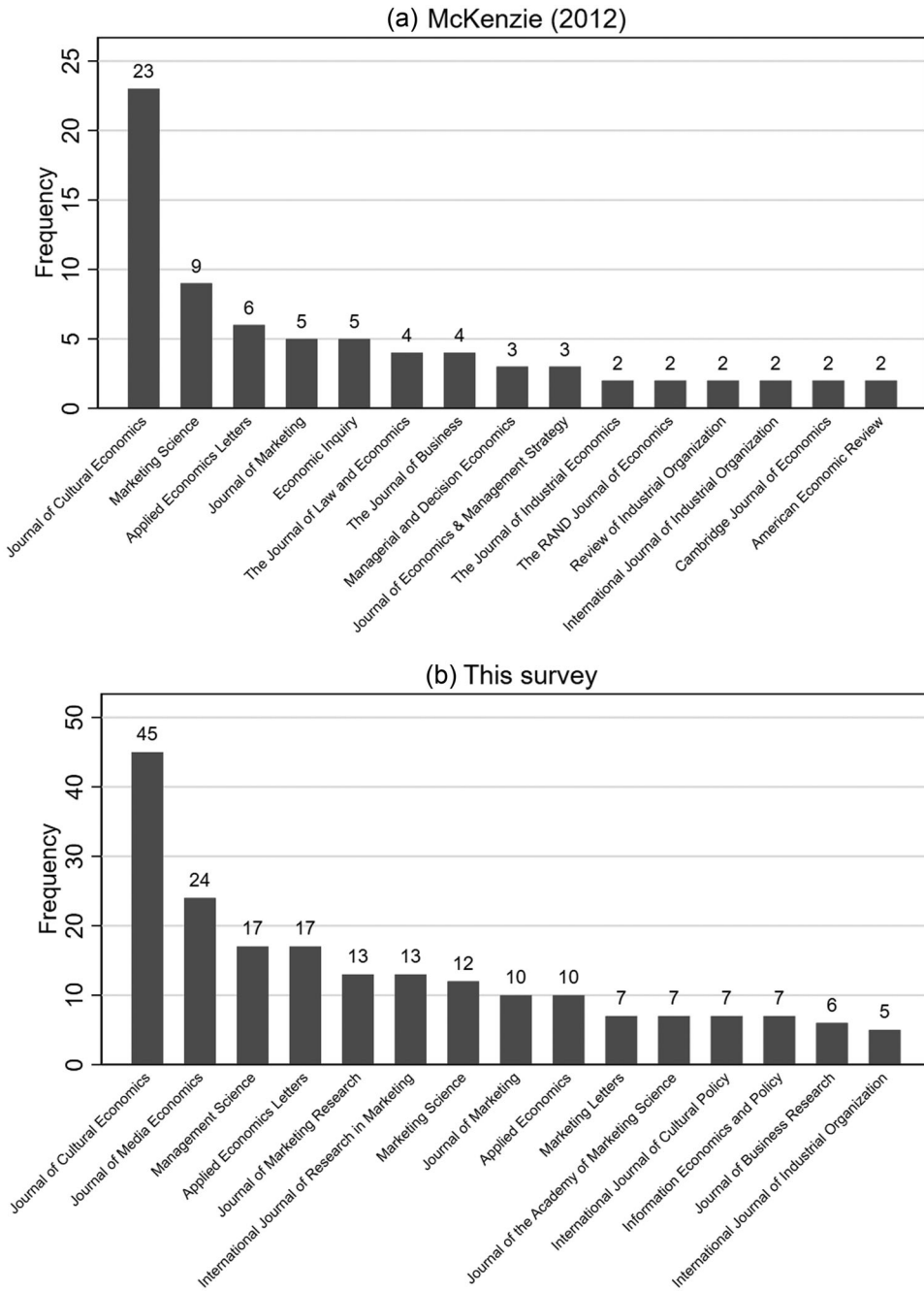


FIGURE 3 Top 15 journals in McKenzie (2012) and this survey

Overall, movie-related papers perform well according to the 2019 Australian Business Deans Council (ABDC) Journal Quality List.<sup>5</sup> Figure 4 shows that almost 31% of published journal articles appeared in A\* publications in the current survey, which is significantly above the representation of A\* journals on the ABDC list (7%). The percentage of A\* publications is almost identical to those surveyed by McKenzie (2012), at 30%. There is some difference in terms of the other

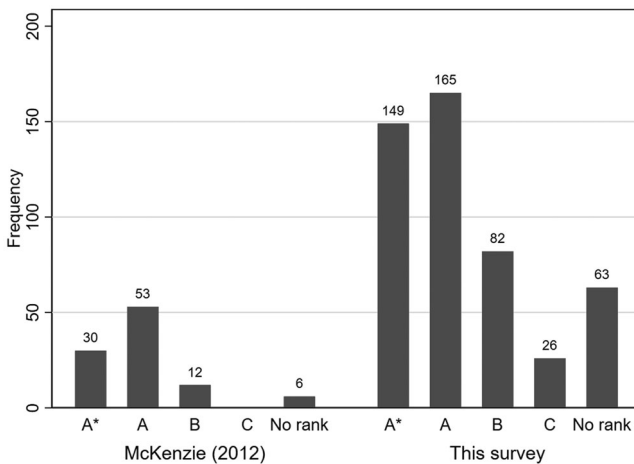


FIGURE 4 ABDC journal quality rankings: McKenzie (2012) and this survey

ranks, which reveal a relatively lower proportion of A publications and relatively more B, C, and non-ranked journals in the current survey. As indicated above, however, the current study casts a relatively wider net, which is somewhat skewed by papers related to box office forecasting. In total, the combined share of A\* and A publications is almost 65%, which is also significantly above the combined 32% representation on the full ABDC list. While one may surmise the field is performing strongly insofar as journal rankings are concerned, this aggregate masks the distribution between the different disciplines surveyed. Notably, very few A\* papers are featured in the top journals in economics, with most being observed in management and marketing journals. Further reflection on this issue is presented in the final section of this survey.

Consistent with the growing body of academic studies on various facets related to the industry, there have been a number of excellent books, book chapters, special journal issues, and literature surveys that warrant mention. Books relating to Hollywood and its business operations include Epstein (2012), Elberse (2013), Hofmann (2013), Squire (2017), and Gunter (2018). Beyond Hollywood, edited book volumes have focused on the role of public support, including Murschetz et al. (2018) and Hill and Kawashima (2018). Of course, any student or scholar of the entertainment industries, including the film industry, must read Hal Vogel's seminal work, now in its 10th edition (Vogel, 2020). Other recent contributions on the broader entertainment industries that are also required reading include Foutz (2017), Hennig-Thurau and Houston (2019). Important chapter contributions specific to the film industry include Chisholm (2013), Fernandez-Blanco et al. (2013a), Walls (2014, 2018), and Chisholm and Liu (2018). Journal "special issues" on the film industry, including articles cited in this survey, have been published in the *Journal of Cultural Economics* edited by Chisholm et al. (2015), Hennig-Thurau et al. (2021), and by Hill and Kawashima (2016) in the *International Journal of Cultural Policy*. Finally, survey articles focused on different areas of scholarly contribution have evolved in economics and cognate disciplines. Examples include Hadida (2009), Simonton (2009), Kumb et al. (2017), Goff Inglis and Zolfaghari (2017), and Cabral (2019).

The remainder of the paper is structured as follows. Section 2 discusses the movie microeconomics literature, divided into demand and supply side studies. Section 3 discusses movie macroeconomics, where studies examining issues more relevant to the entire industry are considered. Section 4 considers some other studies that are indirectly related to motion pictures and the motion picture industry but do not fall into the above groupings. These include, for example, the TV and Video-on-Demand (VoD) industries, which also distribute film content in ancillary

markets, along with other entertainment content. Finally, Section 5 provides concluding remarks and discusses directions for new research.

## 2 | MOVIE MICROECONOMICS

This section is broadly structured into studies on: (1) the demand side of the market; and (2) the supply side of the market. With respect to the demand-side studies, the section begins by examining a range of demand studies that can usefully be classified as “hedonic demand” studies, which primarily consider film attributes as determinants of box office revenues and how these can be modeled with attention to specific institutional and econometric considerations. Also in this subsection, papers dealing with the blockbuster properties of the industry are reviewed, including studies concerned with understanding the behavioral and statistical properties of the information transmission process that explain such outcomes. Studies examining the role of film-specific attributes on box office outcomes are subsequently examined. These include: (1) critic and user reviews; (2) stars and other talent; (3) sequels, franchises, and remakes; and (4) classification ratings. The section on demand concludes with a review of the expanding literature concerned with prediction and forecasting of box office revenues at the individual film level.

With respect to the supply-side studies, the section reviews various issues of concern to the producers, distributors, and exhibitors of films. At the production level, this involves issues related to content acquisition, content selection, casting, among others. With respect to distribution, timing of theatrical release and associated marketing strategies are among some of the issues that have received attention. Finally, studies focused on exhibition have examined pricing, spatial competition, film scheduling, among other topics.

### 2.1 | Demand

#### 2.1.1 | Modeling box office outcomes

Modeling the correlates/determinants of successful films has continued to provide a fruitful area of research for scholars.<sup>6</sup> Such models are sometimes referred to as “hedonic” demand models, owing to the fact they seek to decompose the (revenue) value of film into quantifiable characteristics. Beyond new data sets and explanatory variables, there has also been progress in statistical modeling of heavy-tailed box office distributions, as well as in research seeking to better understand the behavioral foundations of such distributions. Consideration of potentially endogenous explanatory variables has also been given attention by a number of studies, whereas other research has incorporated various types of survey data to enrich models of box office demand.

In studies examining determinants of box office outcomes (including contributions discussed in subsequent sections), most researchers employ a log transformation of the dependent variable to facilitate statistical inference. However, previous research has shown that empirical box office revenue distributions typically exhibit such extremities of skewness and kurtosis that this standard remedial process may not accurately capture the properties of the distributions being examined and therefore lead to flawed inference (often associated with William Goldman’s famous quote: “nobody knows anything”).<sup>7</sup> To address such concerns, Walls (2009a, 2009b), Walls (2010a) and

Walls and McKenzie (2020) model the correlates of box office revenue using nonparametric and skew-stable regression techniques. In related research, Ventura et al. (2019) examine similar correlates using the family of log-symmetric distributions, while Antipov and Pokryshevskaya (2011) apply a finite mixture model approach. Other research devoting effort to defining the statistical properties of box office revenue distributions includes Bi and Giles (2009), Pan and Sinha (2010), Yeung et al. (2011), and Babutsidze and Valente (2019).

Complementing research-related heavy-tailed distributions resulting from blockbusters, research efforts have also been devoted to better understanding the behavioral explanations that generate such distributions.<sup>8</sup> Moretti (2011) observes that social learning shocks are larger for films catering to teenage audiences and rules out network externalities using data on weather shocks. However, Gilchrist and Sands (2016) suggest that demand momentum is also driven by preference for shared experience (i.e., network effect) and not only by social learning. Cabral and Natividad (2016a) also argue social consumption value, or network externalities, play an important role. Regardless of the mechanism, blockbusters are extremely important for the industry's performance (McKenzie & Smirnov, 2018), and have become increasingly so over the last century (Pokorny & Sedgwick, 2010).

Beyond remedial measures intended to address the statistical peculiarities of revenue (perhaps the most common dependent variable of interest), endogeneity of key right-hand-side variables presents another challenge to correctly estimating correlates of box office revenues. Fernandez-Blanco, Orea, and Prieto-Rodriguez (2013) examine a type of endogeneity that presents in models where the researchers have created an explanatory price variable (as a proxy for ticket price) by dividing film revenue by film attendance, a practice that induces endogeneity by construction. Clement et al. (2014) build upon previous research using a structural demand–supply framework to explicitly handle potential endogeneity of (release) screens, while Elliott et al. (2018), Dastidar and Elliott (2020) develop models to remediate endogeneity induced through higher budget allocations to films with *ex ante* higher expected revenues.

While most empirical studies of movie demand use box-office data and observable film-level characteristics (Addis & Holbrook, 2018; Chang et al., 2016; Feng & Sharma, 2016; Fetscherin, 2010; Gaenssle et al., 2018; Hon & Yen, 2018; Hwang et al., 2017; Pangarker & Smit, 2013; Terry et al., 2010; Zhuang et al., 2014), other studies have complemented the analysis with consumer survey data. For example, Redondo and Holbrook (2010) and Irandoust (2018) investigate correlates of successful films but focus on how these relate to the demographic profiles of the cinema audience using survey data, while Gazley et al. (2011) employ conjoint survey data to model preferences for movie demand. Chuu et al. (2009) also consider demographics as they relate to preferences for art versus commercial films, and Wühr et al. (2017) consider the relationship between gender and genre preference also using survey data.

Related research of Brewer et al. (2009) incorporates exit polling survey scores to proxy for word-of-mouth information sharing, whereas Feng (2017) studies determinants of internet-based stated preference intention to see a film. A different survey approach of Shon et al. (2014) investigates alternate categorization of films (compared to the usual genre categories) and the relationship with box office outcomes. Other research relating to demand and genres examines the relationship between preference for romance films and physical coldness (Hong & Sun, 2012), and emotional scenes in children's movies and subsequent demand of the same production company (Abdeltawab & Obaidalahe, 2020).

## 2.1.2 | Reviews

Beyond doubt, of all potential explanatory variables of box office performance, reviews have received the most attention. Before the widespread adoption of the Internet and the rise of social networking, professional critic reviews provided an important signal for consumers seeking information about new films. Early literature in this area sought to explore the function and disentangle causal effects, sometimes referred to as the prediction versus influence paradigm.<sup>9</sup> While professional critics still serve an important function, online consumer reviews have also become extremely important given their ubiquity.

The impact of professional critics' reviews has continued to be explored in various ways (Carrilat et al., 2018). For example, studies have looked at the role of advertising in moderating, or being moderated by, critic reviews (Moon, Bergey, and Lacobucci, 2010). The absence of reviews prior to a film's opening has also been considered as a way to establish the causal relationship (Brown et al., 2012, 2013). Related research investigates whether genres associated with literary content respond more to critics' reviews (Koschat, 2012), as well the extent to which racial bias may impact box office revenues (Fowdur et al., 2012). Others examine whether reviews have more impact in times of economic uncertainty (Dhar & Weinberg, 2016). Beyond the impact on box office outcomes, other research investigates how the studio's parent company is impacted by critic reviews (Chen et al., 2012), as well as whether the parent company plays any role in the reviews of affiliated critics (Dellavigna and Hermle, 2017).

While many studies continue to seek empirical evidence on the impact of professional critic reviews on box office performance, an increasing number instead focus on "big data" sources of user reviews harvested from social network and blogging sites

(Baek et al., 2017; Chiu et al., 2019; Gelper et al., 2018; Hennig-Thurau et al., 2015; Houston et al., 2018; Hsu & Jane, 2016; Lee, Hosanagar, & Tan, 2015; Lee, Lee, & Hwang, 2017; Oh et al., 2017; Treme & VanDerPloeg, 2014). A number of studies compare professional and user reviews directly (Plucker et al., 2009), as well as examining how each affect box office outcomes (Huang et al., 2017; Wallentin, 2016). As opposed to investigating the relationship between critic and user reviews using film revenues, some researchers consider film survival at the box office as an alternative metric of performance (Legoux et al., 2016; Souza et al., 2019), while others opt for experimental approaches (Chakravarty et al., 2010; Suárez-Vázquez, 2011; Thrane, 2018; Tsao, 2014; Wallisch & Whritner, 2017), as well as survey-based methods (Bialecki et al., 2017).

Within the literature investigating user reviews, many studies focus on the role of volume and valence (Kim, Park, & Park, 2013a; Kim, Yoon, & Choi, 2019), while related studies apply tools of sentiment analysis for a deeper understanding (Hwangbo & Kim, 2019; Mohanty et al., 2018; Rui et al., 2013; Vujić & Zhang, 2018). Others explore the level of agreement (or disagreement) between reviews (Lee et al., 2017; Yoon et al., 2017), while separate studies consider the nature of the reviews themselves and whether they are viewed as "helpful" by other users (Lee & Choeh, 2018) or perceived as "promotional" in nature (Ma et al., 2019). Related research examines movie ticket purchase intentions based on the interplay between rating scores and textual content of the reviews (Tsang & Prendergast, 2009). Ticket purchase intention has also been investigated with respect to the trust in social networks within which consumers engage (Fu et al., 2018).

Moderation from advertising spending is examined in the context of user reviews by Lee et al. (2019), while Wang and Guo (2017) examine the relationship between user reviews and exhibitor screen allocation decisions. Beyond simply considering the impact of user reviews, Song et al. (2017) investigate the effect of cultural congruence on user reviews. As opposed to modeling the



impact of reviews on box office, Wasserman et al. (2015) investigate the correlates of the number of user reviews themselves, while Feng (2019) considers similar correlates with user ratings. Finally, in a broader study of user reviews across various product classes, Schoenmueller et al. (2020) study the polarity of review distributions.

Whether using critic or user review data, pinning down the causal relationship requires remediating potential endogeneity created by an omitted variable bias. In early literature in this area, this was sometimes referred to as the “prediction versus influence” problem. Various approaches to resolving such issues have been adopted in recent literature. Notable examples include Chintagunta et al. (2010) who use local geographic market box office data (rather than national-level data, coupled with the sequential rollout of movie releases between local markets); Hennig-Thurau et al. (2012) who exploit the divergence between user reviews and critic reviews; and Basuroy et al. (2020) who apply instrumental variable panel-data techniques based on time-varying critic and user reviews.

### 2.1.3 | Stars and talent

Since the origins of popular filmmaking, movie stars have been a hallmark of its success. During the studio era, the “star system” provided the foundation of production and marketing Hollywood’s biggest films. While the levels of compensation of top stars soared, industry observers and academic scholars began asking whether such levels of income were warranted and whether the stars employed in films genuinely increased the box office beyond the value of their compensation.<sup>10</sup> While in more recent years the largest salaries have declined, the industry’s top stars still commend huge salaries by almost any measure. Beyond on-screen talent, other talent associated with production also often receive significant compensation that raises similar questions about the value of their contribution to box office outcomes.

Academic studies examining the economic contribution of stars and other off-screen talent provide mixed findings (Hofmann et al., 2017; Nelson & Glotfelty, 2012). One obvious explanation is the variety of ways in which variables measuring such inputs have been operationalised. While many studies make use of industry sources (such as Hollywood Hot Lists or IMDb’s StarMeter), other studies use past performance in terms of box office outcomes and/or awards. Studies also differ in terms of their conceptual approach. For example, a number of studies frame it from a “resource-based view” (Mannor et al., 2016; Skilton, 2009; Wirtz et al., 2016), while others take a “brand equity” perspective (Luo et al., 2010; Mathys et al., 2016). Although these approaches may also overlap (Griffith et al., 2017).

A number of studies extend the analysis of star impact to include gender (Lindner et al., 2015; Suárez-Vázquez & Montañés-Roces, 2017), age (De Pater et al., 2014; Treme & Craig, 2013), race (Hermosilla et al., 2018), Oscar awards (Jensen & Kim, 2015), talent (Hofmann & Opitz, 2019), celebrity status (Treme, 2010), and even sex appeal (Addis & Holbrook, 2010; Karniouchina, 2011b). Other research focuses on the team aspect of filmmaking, both in relation to on-screen and off-screen talent. Studies of this nature focus on the histories of the participants (Cattani et al., 2013; Jung & Kim, 2010; Kim, 2013; Narayan & Kadiyali, 2016; Rossman et al., 2010) and also the networks they operate within (Ebberts & Wijnberg, 2009; Packard et al., 2016; Yudelsohn, 2011), as well as issues of discrimination within such networks (Grugulis & Stoyanova, 2012). Against this backdrop, both commercial and artistic outcomes are examined by Hadida (2010, 2013), and Durand and Hadida (2016). Relatedly, the career paths of film directors and their impacts on box office outcomes are studied by John et al. (2017), Chan et al. (2018), and Jensen and Kim (2020).

As opposed to a direct examination of revenue impacts, Joshi (2015) compares the volatility of films with and without stars. Based on historical data, Fleck and Hanssen (2016) study the gender pay gap between stars, while Hanssen (2019) examines how the introduction of color impacted the studio star system. Other studies consider how stars impact strategic variables related to production and distribution (Liu et al., 2014). Beyond definition and measurement issues inherent in an analysis of “star” impact, further complication that has received attention is the likelihood of nonrandom assignment of stars to movies, which manifests as a form of endogeneity. Studies directly addressing this issue using different remedial approaches include Liu et al. (2015), Kupfer et al. (2018), and Peng et al. (2019).

#### 2.1.4 | Sequels, franchises, and remakes

It is well known that sequels, franchises, and (to a lesser extent) remakes have become increasingly important for film studios in recent years.<sup>11</sup> The rise of high-budget superhero and other action franchises have in large part been driven by globalization and, in particular, the increasing importance of the Asian film market. Because such films generally transcend cultural barriers more easily, it is little surprise the major studios have shifted production resources in this direction. There are other potential explanations about the shift to sequels, franchises, and remakes as well. The most obvious would be the perceived reduction in uncertainty if the parent film(s) were successful. Other explanations relate to the advancement of special-effect technologies on the supply side and the improvements to in-home entertainment technologies on the demand side.

A number of scholars consider sequels and/or remakes as examples of “brand extension” (Bohnenkamp et al., 2015; Dewani et al., 2021; Hennig-Thurau et al., 2009). Within these studies, comparison of performance is made between sequel and non-sequel films, sequel and parent films, and parent and (comparable) non-sequel films (Dhar et al., 2012; Gong et al., 2011; Kim & Kim, 2018; Lampe & Pancs, 2020; Terry et al., 2016; Yeh, 2013). Related research also examines how book adaptations perform relative to non-adapted films (Joshi & Mao, 2012; Knapp et al., 2014), as well as how the price of adapted books is impacted by box office outcomes (Asai, 2016).

With respect to relevant strategic supply-side considerations, studies investigate the relationship between advertising and sequel (as well as parent) films (Kim & Bruce, 2018), while other research examines whether changes to the creative team between installments affect outcomes (Filson & Havlicek, 2018; Opitz & Hofmann, 2016). Related research investigates the relationship between the increased bargaining power of stars in sequel films with advertising (Ma et al., 2014a). Based on an historical analysis, Pokorny et al. (2019) highlight that sequels have become an important risk management tool of studios, who operate a portfolio approach to film production.

#### 2.1.5 | Classification ratings

Classification ratings provide a signal about a film’s content, insofar as whether the film contains adult themes. Researchers routinely include these as a form of control variable in models where box-office revenues (or some other variable, such as critics reviews) are the dependent variable of interest. Some authors have sought a deeper understanding of classification ratings by examining how they are determined and how they impact consumer demand and/or production supply decisions. A number of papers in this area build off earlier studies that documented what became

known as the “R-rating puzzle.”<sup>12</sup> That is, why studios continue to produce R-rated films that perform relatively worse at the box office.

Beyond the content explanations of film classification (violence, profanity, nudity, sex, etc.), research has investigated whether the histories of the production team have a bearing on mature-age classifications (Waguespack & Sorenson, 2011), while other research focuses on the composition of panels tasked with such decisions (Leenders & Eliashberg, 2011) as well as the extent to which the classification is self- or state-regulated (Lampe & McRae, 2021). Extensions on work related to the R-rating puzzle have re-examined the causal relationship. Attention has been given to whether it is the content or rating driving the observed result. To this end, identification strategies have made use of industry sources that capture content, such as “kidsinmind.com” (Garcia-del-Barrio & Zarco, 2017) or “screenit.com” (Palsson et al., 2013). With respect to an explanation of the R-rating puzzle, Goff et al. (2014) suggest producers care about both box office outcomes and critical reviews. Tangentially related to the issue of film classification, Dahl and DellaVigna (2009) examine whether violent films have antisocial spillover effects. On a different tangent, Esberg (2020) explores the content of films and state censorship.

## 2.2 | Predictions

Before turning to discussion of supply, it is worth pausing and reflecting on discussion thus far and the implications for industry decision makers who may wish to forecast (or predict) demand. While most empirical studies in economics and marketing are inferential, seeking to investigate causal relationships (or at least suggestive correlations) between key variables, a smaller number have instead focused on the question of box office predictability. In some instances, such prediction models may involve using observable film characteristics with simple regression methodology, which are not unlike the hedonic demand models previously described.<sup>13</sup> In other instances, different types of mechanisms have been used such as prediction markets or crowd-based information aggregation.

Outside of economics and marketing, however, scholars from data science (and related) disciplines have devoted considerable efforts to prediction models for box office outcomes. Fueled by the increasing accessibility to big data coupled with advancements in machine learning algorithms, the number of published studies has increased at an exponential pace over the last decade. Although prediction, per se, may not be of direct interest to economics and marketing scholars, tangential topics are of much interest. For example, the ability of virtual stock markets (such as the HSX) or industry professionals to aggregate information has more general relevance to the efficient functioning of markets. At a more methodological level, many machine learning models are now routinely used by applied researchers when selecting variables to use as instruments in causal work.

While an extended review is beyond the scope of this survey, Appendix Table A1 provides a list of 70 published journal articles relating to box office revenue prediction. Given that many of these contributions originate in disciplines where refereed conference proceedings are often viewed equally as important as journal publications (unlike economics or marketing), it should also be noted that the journal articles cited represent only a relatively small fraction of research in this area as this survey does not include conference proceedings and the like. The interested reader should consult the numerous additional references within the journal articles listed in the table.

## 2.3 | Supply

### 2.3.1 | Production and distribution

Once a movie idea or script has been “greenlit,” it goes through the various stages of production before the finished product is ready to be marketed and distributed. The creative team and budget are set in expectation of consumers’ demand. Depending upon the type of release, different marketing activities may be undertaken including focus groups, trailers, internet teasers, print advertising, television advertising, and so on. Another important strategic consideration relates to the timing of the release in domestic and international markets. Simultaneously, the number of release theatres (or screens) will be determined in negotiation with cinema operators. Once released, adjustments may be made to the number of theatres and/or advertising in response to revealed demand.<sup>14</sup>

Given the large costs involved in film production, studios seek strategies to reduce risk such as replication of previously successful films (Wei, 2020) and adopting a portfolio approach towards production (Sacco & Teti, 2020). However, total removal of risk is almost impossible and the success or failure of films inevitably have budgetary implications for future productions (Natividad, 2013). There is no single model for how a film proceeds from an idea or concept to production. Some films are picked up from a simple pitch (Luo, 2014), whereas others are written into full formed screenplays before they are considered (Goetzmann et al., 2013; Harris et al., 2017; Paulich & Kumar, 2021).

When financing decisions are made, the attached production team (Ebbers & Wijnberg, 2012) and expected appeal to cinema operators (Leung et al., 2020) become important in guiding the ultimate budget, as does the genre (Hsu et al., 2012; Shamsie et al., 2009) and anticipated competitive environment (Delre et al., 2017; King et al., 2017). Strategic product placement is a well-known strategy for subsidizing production costs (Karniouchina et al., 2011; Patil & Bisoyi, 2012; Wiles & Danielova, 2009), but this is not without risk if consumers are put off by the practice (Song et al., 2015). While films making use of advanced special effects such as 3D (Knapp & Hennig-Thurau, 2015) continue to push costs well into the hundreds of million dollars with increasing frequency, basic production and editing costs have actually fallen. As a result, opportunities for niche films have increased (Benner & Waldfogel, 2020).

Once a film has been produced, it is ready to be marketed and distributed to cinemas. This involves a series of decisions including selection of an appropriate title (Bae & Kim, 2019), choice of distributor (Zhang et al., 2019), target audience (Beckwith, 2009), release date (Belleflamme & Paolini, 2019; Calantone et al., 2010; Cartier & Liarte, 2012; Einav, 2010; Gutierrez-Navratil et al., 2014; Ma et al., 2018; Yang & Kim, 2014; Zhang et al., 2017), as well as the type and scale of release (Agostini & Saavedra, 2011; Chen et al., 2013; Prieto-Rodriguez et al., 2015). Studios often move release dates of films, which has been shown to impact the studio’s parent company’s share price (Einav & Ravid, 2009). Similarly, the success of pre-releasing advertising in terms of opening week box office results has also been shown to impact the parent company’s share price (Joshi & Hanssens, 2009).

If the film is released in international markets, consideration also has to be given to the timing of the international release relative to the domestic market (Cabral & Natividad, 2020; Dalton & Leung, 2017). In many instances, a studio may also undertake focus groups to help fine tune the marketing campaign, with increasingly sophisticated methods including neuro-analysis (Barnett & Cerf, 2017), live comments listening (Zhang et al., 2020), and other analytics available as a result

of big data (Behrens et al., 2021). Previews and trailers have always been viewed as one of the most important ways to market a film (Karray & Debernitz, 2017) but in the age of the internet, shorter clips have become another crucial promotion tool (Liu et al., 2018).

The dynamics and form of prerelease and post-release advertising have provided researchers with interesting questions, including the relationship with word of mouth (Bruce et al., 2012; Kim & Hanssens, 2017; Lim & Li, 2018), blogs (Gopinath et al., 2013), and ultimately box office outcomes (Delre et al., 2016; Huang et al., 2015; Song et al., 2016). Social media plays an important role in the prerelease marketing of a film (Ding et al., 2017; Mabry & Porter, 2010), as it promotes online searches that affect opening week box office revenues (Kim, 2020). Related research considers the impact of post-release television advertising (Rennhoff & Wilbur, 2011) and advertising during major sporting events (Ho et al., 2009; Stephens-Davidowitz et al., 2017), while other research examines whether inclusion of positive validation by critics in print advertisement influences consumers (Rao et al., 2017). A different strategic action relates to the studio's estimate of opening weekend box office revenue, which is often overestimated compared to the actual result (Malhotra & Helmer, 2012).

### 2.3.2 | Exhibition

After a film has been produced, marketed, and distributed, it finally reaches consumers at the cinema. Cinema managers negotiate terms of exhibition contracts with distributors, as well as making cinema-level pricing and programming decisions.<sup>15</sup> While some countries require ownership separation between distribution and exhibition, others do not.<sup>16</sup> This raises further strategic questions for decision makers in vertically integrated companies. Similarly, some countries operate (almost) uniform pricing practices, whereas others (such as China) do not. Both practices have implications for profit maximizing behavior. Beyond these strategic considerations, the cinema industry has faced waves of technological change from the arrival of sound and color, through to competition from television, video, and now online streaming.

Before a film is released in cinemas, an exhibition contract is required to determine revenue sharing arrangements and screening obligations. Such contracts are studied by Gil and Lafontaine (2012), Gil (2013), Barron et al. (2020), and Baranchuk et al. (2020). Of course, the terms of these contracts are likely to depend on whether there is common ownership of the distributor and exhibitor, which was banned in the United States by the Supreme Court in the 1940s. Since these famous antitrust cases, industry observers and academics have continued to show interest in the impact and appropriateness of the court's ruling (Gil, 2010, 2015; Hanssen, 2010). Although vertical integration between distribution and exhibition was banned as a result, it exists in many international markets and continues to be of interest to researchers (Chung et al., 2018; Fu, 2009; Gil, 2009). Vertical contracting issues related to blind-bidding are also examined by Mulligan and Wedziewski (2012).

At the local market level, spatial competition and ownership structures have been studied with respect to inter-cinema programming decisions (Chisholm et al., 2010; Chisholm & Norman, 2012; Elizalde, 2013). Entry and exit decisions, as well as competition between city, suburban, and regional cinemas, have also provided research topics in both historical and contemporary contexts (Collins et al., 2009b; Gil & Marion, 2018; Orhun et al., 2016; Sedgwick et al., 2014; Takahashi, 2015). At the cinema level, applied and theoretical research examines the profit implications from common uniform ticket pricing practices of the industry (Chen, 2009; Choi et al., 2015; Courty & Nasiry, 2018; De Roos & McKenzie, 2014; Ho et al., 2018), as well as the relationships between

geographic concentration of cinemas and ticket prices (Bohme & Muller, 2011). Willingness-to-pay for movie tickets is investigated in relation to concession sales by Gil and Hartman (2009), while willingness-to-pay for specific service features of cinemas (such as VIP class, etc.) is examined using conjoint analysis by Arteaga et al. (2019), with the latter having relation to studies about auditoria design of cinemas, such as Park and Ham (2016) and Liu and Courty (2021). Also at the cinema level, programming decisions are studied by Eliashberg et al. (2009a, 2009b), Dawande et al. (2010), and Fox (2017).

Beyond strategic considerations faced by cinemas competing in locally connected markets, the changing forces of technological progress have impacted the cinema industry since its inception more than 100 years ago. For example, Gil and Lampe (2014) study the diffusion of color during the 1940s and 1950s. More than 50 years later, the cinema industry is again experiencing a technical disruption event as consumers embrace in-home streaming technologies, with cinema attendance declining in many countries (Weinberg et al., 2021).

### 3 | MOVIE MACROECONOMICS

By convention, industry economics falls under the broader banner of microeconomics. However, within the literature related to the motion picture industry, some studies examine topics more relevant to the entire industry and its activities. While these studies are certainly fewer in absolute number, a number of interesting results have been documented that reveal insights about aggregated demand and supply issues.<sup>17</sup> For example, Yamamura (2009) and Sisto and Zanola (2010) investigate Becker and Murphy's rational addiction model using aggregated cinema attendance data, while Hand and Judge (2011) use aggregated data to look at the underlying seasonality that has previously been explored using product-level data. Competition between cinema attendance and other cultural activities is studied by Kim (2009) and Gil and Gutierrez-Navratil (2017), while Izquierdo-Sanchez et al. (2016) examine cinema attendance versus sports viewing.

Other research focuses on the relationship between macroeconomic activity and aggregate patterns of demand (Orme & Vogel, 2020; von Rimscha, 2012), while Lepori (2015) investigates whether attending comedy films induces riskier stock buying activity. On the production side, Aray (2017) examines Spanish movie production post civil war, Aray (2021) investigates the relationship between Oscar awards and foreign movie production, while Bakker (2012) considers the broader historical context of production and the relationship with industrialization. Beyond these studies, other studies focusing on more macro-industry issues include studies related to industry subsidization, international trade, and the ever-present threat of piracy, which are each now discussed in more detail.<sup>18</sup>

#### 3.1 | Subsidies

Public support of the film industry is often defended on the grounds it promotes the national culture and/or protects it from the dominance of other cultures. While many argue that such support is necessary for maintaining domestic production, others contend such assistance is redundant and a waste of public money. The most common type of support is subsidies, which include both direct grants and/or loans, as well as indirect tax credits and/or rebates. Other forms of industry

support come from taxes and domestic-production quotas placed on TV stations and increasingly VoD services as well.

Evaluation of “success” from public support is not straightforward for various reasons. First and foremost, defining success is problematic as far as whether it relates to financial outcomes (such as box office revenues) or other measures of success (such as festival awards or critical acclaim). A second reason why evaluation of success is difficult, and one particularly relevant for empirical researchers, relates to defining counterfactual measures to evaluate success. Other metrics of success might be “economic” in relation to job creation or spending boosts to the local economy, which creates separate challenges for evaluation. Notably, much support available at the state or regional level is provided with for such economic objectives, whereas national funding more commonly exists to serve cultural purposes.

In the film industry, public support is usually in the form of direct or indirect production subsidisation, and less so at the stage of distribution or exhibition (Carroll Harris, 2018). However, securing such subsidies is often complicated by the requirements imposed by funding bodies, such as multi-territorial licensing agreements (Poort & van Til, 2020). Many countries also mandate that TV networks (Fernández-Blanco & Gil, 2012) and VoD services provide support to domestic content production (Kostovska et al., 2020). With the involvement of public money, restrictions on type and levels of cultural content is sometimes imposed. This has historically been the case for many European countries and more recently in Asian countries as well (Su, 2014; Zhou, 2020).

Public support has been shown to have mixed relationships with financial and nonfinancial metrics of success (McKenzie et al., 2020; McKenzie & Walls, 2013; Meloni et al., 2015; Teti et al., 2014). Researchers have examined the long-run impacts from continued public support (Jourdan & Kivleniece, 2017) and whether widespread usage of subsidies is effective at building a strong domestic industry (Agnani & Aray, 2010; Messerlin & Parc, 2014, 2017). Other research examines the strategic use of co-productions and the role of policy in developing domestic film industries (Yan & Yu, 2021; Yecies, 2016). Public film support also has mixed outcomes with broader economic objectives (Christopherson & Rightor, 2010; Collins & Snowball, 2015; Collins et al., 2019; Mitchell & Stewart, 2012). With the associated difficulties in identifying relationships between tangible outcomes and public funding using observational data, tangentially related studies infer value derived from industry subsidisation using stated-preference methods (Lawton et al., 2022; Wiśniewska et al., 2020).

### 3.2 | Trade

In recent years, the international market has become increasingly important for the major US studios who export their products. However, cultural differences between countries mean that what is popular in one country is not necessarily popular in another country. Researchers have attempted to understand how cultural differences affect demand for imported films and how the Hollywood studios have adjusted their production and distribution strategies accordingly.

Hollywood’s dominance of the global film industry has remained unchallenged since the birth of cinema over 100 years ago. Through a powerful global distribution network (Pardo & Sánchez-Taberner, 2012; Shin & Chiu, 2016), most cinemas around the world devote much of their screen time to Hollywood’s latest offerings, leading many observers and researchers to question the impact on local consumers tastes (Fu & Govindaraju, 2010). For a number of years, the international share of global box office has been increasing as the US share declines (Walls & McKenzie, 2012). While some argue that supply has been responding to global demand, others suggest

bandwagon effects have been responsible (Xu & Fu, 2014). Other research considers how changing cultural composition of the population within a country impacts its demand for US imports versus imports from other foreign markets (Park, 2015).

Cultural differences between countries create demand frictions, which impact box office outcomes (Kim & Jensen, 2014; Moon & Song, 2015; Moon et al., 2016; Quinn, 2009). A number of studies explore such frictions using metrics of cultural (dis)similarity between countries, such as those developed by Hofstede (Broekhuizen et al., 2011; Budeva, 2010; Feng & Sharma, 2016; Fu & Sim, 2010; Özmen, 2018; Wang et al., 2020a). The relationship between these dimensions and observable film characteristics has also been considered by a number of researchers (Akdeniz & Talay, 2013; Alaveras et al., 2018; Jane, 2020; Moon et al., 2015). Other studies directly examine the exportability of films based on their domestic performance (Lee et al., 2009), implicit quality (Tang et al., 2018), and brand name strategies (Gao et al., 2020).

Related studies have noted that there is potential asymmetry and dynamism that impacts bilateral cultural affinity and have sought alternative metrics to capture such relationships, with a view to better explaining observed trade flows (Hellmanzik & Schmitz, 2015; Shin & McKenzie, 2019). Of course, demand for imported films is not only determined by cultural differences but also by the strategic actions of international distributors (Holloway, 2014, 2017), as well as bilateral and global fixed costs (Hanson & Xiang, 2011) and other trade barriers (Jane et al., 2015; Parc & Messerlin, 2018).

### 3.3 | Piracy

Since the arrival of Napster and derivative file-sharing technologies, the content industries have been waging war against the threat of mass online piracy in an effort to protect their revenues. While initial declines were felt heaviest in the music industry, as bandwidth and internet speeds increased the television and film industries began to feel similar pressures on their sales. Fast forward 20 years and while many things have changed, digital piracy still remains a challenge for the content industries, albeit it in different forms. With the arrival of streaming technologies, on-demand illegal services now mimic many legitimate services for a fraction of the cost. Researchers have continued to investigate the extent of sales displacement resulting from illegal content. However, challenges still exist with acquiring data and establishing credible causal relationships. Other research has focused on the policy responses of governments and the impact on supply.

As a result of the disruption created by piracy, many academic scholars have examined the extent to which sales have been displaced as a result of piracy. However, while the question seems relatively straightforward, establishing credible causal relationships has proven challenging given the interplay between lawful and unlawful consumption (Smith et al., 2019; Tyrowicz et al., 2020). Using data related to actual prerelease and/or post-release piracy, mixed evidence has been reported on the sign and magnitude of sales displacement (Koschmann & Bowman, 2017; Lu et al., 2020; Ma et al., 2014b; McKenzie & Walls, 2016). Given the inherent challenges with revealed-preference piracy data, some researchers have opted instead to use survey data to explore similar questions (Bai & Waldfogel, 2012; Herz & Kiljański, 2018; Jha & Rajan, 2021; Nishijima et al., 2020), while other survey-based studies have focused more on identifying the characteristics of individuals who participate in the activity (Cox & Collins, 2014; Ho & Weinberg, 2011).



Rights holders and governments have adopted various strategies to combat piracy. This has involved pursuing individuals who consume illegal content, as well as the illegal providers they use. In some countries, internet service companies have also been the focus of litigation. The effectiveness of these policies has been examined by researchers in different dimensions, including whether they serve to reduce the unlawful behavior and/or whether they increase legitimate sales (McKenzie, 2017; Orme, 2014). A number of studies have also used the shutdown of illegal sites as an empirical strategy to identify such effects (Aguilar et al., 2018; Danaher & Smith, 2014; Peukert et al., 2017). Beyond demand-side effects, related research examines the impact of piracy on film production (Telang & Waldfogel, 2018) and the value of anti-piracy technologies (Walls & Harvey, 2018).

#### 4 | RELATED INDUSTRIES

In one way or another, almost all of the research surveyed thus far all relates to the theatrical motion picture industry. Obviously, however, movies are not only consumed at the cinema and are sequentially released in different downstream markets, more commonly known as “windowing.” Historically, following the theatrical release most movies would next be released on video (VHS, DVD, Blu-ray, etc.), which is now mostly on-line via a transactional “VoD” service.<sup>19</sup> This allows consumer limited access for a period of time (for example, 24 or 48 h). Alternatively, they may purchase a permanent digital version of the film, although this is far less common for the majority of consumers. Following this window, the film may be released on subscription VoD services, such as Netflix or Amazon. Further down the windowing schedule, and typically the last stage of the release, is network television, which is often supported by advertising revenues paid to broadcasters but may also be publicly supported.

In these “ancillary markets,” platform providers face many similar but also different considerations as theater managers. For example, contractual arrangements with the distributor must be negotiated that cover the duration of the release on the platform, exclusivity provisions, and price paid for the content. At the same time, while films are distributed on these platforms post-theatrical release, they often compete for consumer attention with other content on the same or other platforms—for example, television shows, news, and sport. As a result, executives are faced with various decisions related to catalog content, scheduling, and advertising that goes well beyond only the films released. Of course, such decisions differ in relevance and importance contingent on the type of platform, and whether it is terrestrial television, or subscription-, transaction-, advertisement-supported-VoD. However, given the nature of in-home consumption for all forms, competition between service provider is intensified. Also, the threat of piracy is also likely more intense due to the comparable consumption experience for in-home consumers.

Given the seismic shift towards different types of streaming services, it is almost inevitable that academic research will follow. To date researchers have only touched the tip of the iceberg, with studies examining topics such as catalog content, bundling, willingness to pay, and the relationships with piracy. Although some of these studies align with research related to other formats from both the past and present (such as DVD and TV), other research is new and idiosyncratic to these new industries. While a full review of the various topics covered by scholars considered in the “related industries” is beyond the scope of this survey, Appendix Table A2 provide a list of example studies for the interested reader.

## 5 | SUMMARY AND OPPORTUNITIES FOR FUTURE RESEARCH

Research related to the “economics of movies” has made significant progress over the last decade. However, while some areas have received considerable attention, other areas have remained relatively unexplored. Certainly much research has continued to explore key determinants of box office outcomes, with most contributions related to reviews. While the impact of critic reviews dominated much of the earlier research in this area, the rise of social networking, blogs, and other consumer review mechanisms has stimulated considerable interest attempting to understand how these affect box office outcomes. The primary empirical challenge remains to establish credible causal relationships. Future work in this area must make this a first priority.

The role of stars and off-screen talent has also continued to provide research questions for scholars. However, given the subjective nature of defining a star, results continue to be mixed. Subject to this caveat, research has continued to explore the impact of stars on film outcomes and also how the creative team operates. Given the level of data availability concerning individuals’ careers and the teams they operate within, there exists many opportunities for researchers with interests in connected labor markets. There are also opportunities to explore inequalities and discrimination issues, which have been highlighted in recent years. Again, establishing causal relationships remains the main challenge in such endeavors.

Given the industry’s preoccupation with sequels and franchises, scholars have also devoted considerable efforts to better understanding this strategy. While not all films are necessarily destined for future installments, the ones that are become almost predictable to even the most casual industry observer. Consumer reception to such works is just one side of the coin, with the other being the studio’s motivation for the strategy. Similarly, classification ratings provide research opportunities with respect to both the consumption decision as well as the production decision. As with reviews and star/talent effects, the importance of causal identification cannot be overstated.

Beyond the strategic decisions relating to sequels and ratings, many other important decisions are made during production and distribution processes. To date, most of the scholarship has tended to focus on the observable distribution decisions, such as those related to release date, number of screens/theaters, and (of course) the role of advertising. Extending from this is the relationship with international distribution strategy in terms of market entry decisions relate to timing and scale. With respect to production, there has been work on how budgets are determined, and the strategic effectiveness of the team assembled. There are likely opportunities to better understand the green-lighting process and how the sequential decisions relate to final outcomes.

Once the film is ready for exhibition, a whole different set of considerations become relevant, such as the local competition forces and the need to manage screens within a multiscreen complex. Pricing decisions are also important in this respect. Increasing access to data from countries, such as China, with nonuniform pricing strategies provides opportunities to estimate more robust demand models and test economic theory. As digitization continues to disrupt the industry and cinemas explore ways to increase the value proposition for cinemagoers, there is much scope to examine the success of these new strategies.

While the macroeconomic aspects of the industry have attracted far less attention, there is certainly scope for important contributions in this area. In particular, there is a large gap in scholarship addressing issues related to public support policies, including both direct and indirect subsidies. Also, and as the world continues to become more global, coupled with the emerging

importance of large markets in Asia, trade issues are also becoming increasingly important. Industry observers have noted for some time that the US domestic share of box office has steadily declined over the past couple of decades relative to the share of international box office. Furthermore, many have also noted this growth has had a direct impact on the type of films Hollywood has been producing, catering for an international market with an appetite for action blockbuster and franchise content.

Although the theatrical cinema window has historically provided the backbone of the industry, it is clear that the tide is shifting, and the in-home entertainment market is where much of the attention will be focused in coming years. This is not only true for the industry itself, but likely also for scholarly research in this area. Many of the most interesting questions about the theatrical film industry have been addressed (and in some instances, perhaps to excess), but the technological disruption resulting from digitization will continue to provide many new opportunities for research. While lack of consumer demand data has historically provided a major obstacle to research in this area, there are reasons to be optimistic such obstacles will be reduced in the future. In November 2021, Netflix announced the release of weekly global streaming hours for the top 10 film and television series, as well as ranked film and television series for 94 countries. This is significant because up until this time, Netflix had been fiercely protective of its data with researchers and industry participants (including those providing content to Netflix) having no real insight into Netflix's consumption. While the new data are still limited in some respects, researchers can certainly combine this data with information from other sources to investigate many potentially interesting questions.

Of course, there is likely to be another significant topic keeping researchers occupied for some time to come. At the time of writing, the impact of COVID-19 on the film and broader entertainment industries is yet to be fully understood. With production and consumption disrupted to extents never before seen in most countries, the collateral damage is certain to be enormous. Also certain is that many academic studies will investigate this disruption in the coming years. While early evidence is limited, emerging studies confirm large impacts (Kim, 2021). Beyond the immediate impacts, the long-term structural effects on the industry remain unknown. For example, with so much production put on hold during extended lockdown periods, the flow-on effects are likely to be significant. Furthermore, with many cinema operators already struggling in the face of changing consumer habits, the same lockdowns are almost certainly going to reshape the exhibition sector. Consumer habits are also likely to have been affected, with many unwilling to attend cinemas due to fear of transmission or adhere to public health orders.

As a final comment, it is worth reflecting on the standing of "movie economics" in the field of cultural economics, and the economics discipline more broadly. Certainly it is true that the subfield of movie economics dominates the field of cultural economics. However, while routinely appearing in the *Journal of Cultural Economics*, and to a slightly lesser extent *Journal of Media Economics*, there is still relatively limited penetration in top industrial organization and general-interest economics journals. This less the case in top management and marketing journals, such as *Management Science* and *Marketing Science* (among others). Potentially this reveals fundamental differences between core research agendas of economics versus those of its cognate disciplines, coupled with the typical industry data available for empirical analyses. For example, marketing scholars have devoted considerable research attention to different facets of production and distribution strategy that resonate closely with that discipline's core subject matter.

The movie-related studies that have been published in the top journals in economics provide some insight about how scholars with research interests in this area might target the top-tier journals of the field. Specifically, such papers appear less about movies, per se, and more about

general economic phenomena. In that sense, interesting research questions need to extend beyond the confines of the film industry itself. Of course, in addition to the right question, one also needs great data and sound empirical work. With the “credibility revolution” permeating through the fields of empirical economics in the past couple of decades, researchers working with movie-related data need to continue to ensure that research matches current standards of the discipline. As (repeatedly) suggested above, in many contexts this requires carefully articulated and robust causal identification of empirical relationships.

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## ENDNOTES

<sup>1</sup> McKenzie (2012) was first published online in 2010. The number of studies surveyed in 2008, 2009, and 2010 were only six, six, and three, respectively. This masks the fact that the upward trend in Figure 1 continued in the 2006–2010 bucket.

<sup>2</sup> This distinction is sometimes guided by the type of data used. For example, demand may be analyzed at the product level or national level, which would be categorized as micro and macro, respectively. However, in some contexts, “micro” data can be used to examine what are considered more industry-level issues, such as trade or piracy.

<sup>3</sup> As a point of comparison, McKenzie (2012) reviews 101 journal articles (from 40 unique journals) within the 110 total references cited.

<sup>4</sup> Other journals tied at position of 15 include *The Economic History Review* and *Applied Economics* for McKenzie (2012); and *Decision Support Systems* and *Journal of Advertising Research* for this survey.

<sup>5</sup> The ABDC list was selected as it has the largest coverage of journals relative to comparable rankings lists, with 2682 journals in total. See <https://abdc.edu.au/research/abdc-journal-quality-list/>.

<sup>6</sup> Notable early studies in this area include Prag and Casavant (1994), De Vany and Walls (1996), and Ravid (1999).

<sup>7</sup> This is addressed in various studies by Arthur De Vany and David Walls, many of which were republished in De Vany's (2003) book *Hollywood economics: How extreme uncertainty shapes the film industry*.

<sup>8</sup> Such literature originates from the pioneering work of De Vany and Walls (1996, 1999) who examined the connection between theoretical models of information transmission and resulting empirical revenue distributions.

<sup>9</sup> See, for example, Eliashberg and Shugan (1997), Basuroy et al. (2003), and Reinstein and Snyder (2005).

<sup>10</sup> See, for example, De Vany and Walls (1999), Ravid (1999), and Elberse (2007).

<sup>11</sup> A number of early studies documented superior returns and less risk associated with sequels. See, for example, De Vany and Walls (1999), Ravid (1999), and Palia et al. (2008).

<sup>12</sup> See, for example, De Vany and Walls (2002) and Ravid and Basuroy (2004).

<sup>13</sup> Litman (1983) provides one of the earliest examples of this type of model.

<sup>14</sup> Some notable pre-2009 studies focused on the aspects of production and distribution include Krider and Weinberg (1998), Corts (2001), Fee (2002), Elberse and Eliashberg (2003), Goettler and Leslie (2005), Einav (2007), and Palia et al. (2008).

<sup>15</sup> Filson et al. (2005) and Swami et al. (1999) provide early studies related to contracting and programming, respectively.

<sup>16</sup> Orbach and Einav (2007) provide an insightful discussion about the industry's longstanding practice of uniform pricing.

<sup>17</sup> Early examples of studies using aggregated data include Cameron (1986, 1990, 1999).

- <sup>18</sup> Earlier studies in these areas include Jansen (2005) (subsidies), Marvasti and Canterbury (2005) (trade), and Hennig-Thurau et al. (2007) (piracy).
- <sup>19</sup> Early studies concerned with different aspects of the various video industries include Ravid (1999), Hennig-Thurau et al. (2007), and Mortimer (2007, 2008).

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## APPENDIX

TABLE A1 Box office revenue prediction studies

Type	Authors	Methodology
Artificial intelligence	Gaikar et al. (2015)	Fuzzy inference system (using Twitter data)
Deterministic	Siva et al. (2012)	Prediction formula (using Twitter data)
Deterministic	Edwards et al. (2014)	Mathematical model (including simulation)
Diffusion	Wang et al. (2010)	Bass model (using prerelease media appearance and WoM)
Diffusion	Lee et al. (2012)	Generalized Bass model (accounting for herd behavior)
Diffusion	Marshall et al. (2013)	Bass model (accounting for imitation)
Econometrics	Doshi et al. (2010)	Linear and nonlinear regression (using social network analysis)
Econometrics	Qin (2011)	Dynamic regression models (using social media analysis)
Econometrics	Somlo et al. (2011)	Non-linear regression model (theatre allocation of films)
Econometrics	Karniouchina (2011)	Linear regression (using HSX data)
Econometrics	Gemser et al. (2012)	Linear regression (using minimum guarantee)
Econometrics	Hand and Judge (2012)	Aggregate attendance forecasting (using Google trends)
Econometrics	McKenzie (2013)	Linear regression (using HSX data vs. Box Office Mojo polling game)
Econometrics	Mestyán et al. (2013)	Linear regression (using Wikipedia activity of editors and viewers)
Econometrics	Derrick et al. (2014)	Two-stage linear regression (using film attributes)
Econometrics	Du et al. (2014)	Linear and nonlinear regression (using microblog data)
Econometrics	Roos and Shachar (2014)	Structural model (using political variables)
Econometrics	Yahav (2016)	Stepwise linear regression (using functional data analysis)
Econometrics	Zimbra et al. (2017)	Two-stage mixed models (using Twitter and platform data)
Econometrics	Divakaran et al. (2017)	Partial least squares structural equations (using social network data)
Econometrics	Hofmann-Stöltzing et al. (2017)	Linear regression versus diffusion model (using film attributes)
Econometrics	Bharadwaj et al. (2017)	Hierarchical linear regression (using film attributes)
Econometrics	Kim et al. (2018)	Linear regression (using sentiment analysis)
Econometrics	Lee et al. (2019)	Linear and nonlinear structural model (using user reviews)
Econometrics	Baranowski et al. (2020)	Linear and nonlinear regressions (using cinema level data)

(Continues)

TABLE A1 (Continued)

Type	Authors	Methodology
Econometrics	Del Vecchio et al. (2021)	Linear regressions (using emotional arcs)
Information aggregation	Lovullo et al. (2012)	Linear regression (using industry experts and film attributes)
Information aggregation	Court et al. (2018)	Incentivized mechanisms (using industry experts)
Machine learning	Zhang et al. (2009)	Back propagation neural network (using film attributes)
Machine learning	Lee and Chang (2009)	Bayesian belief network (using film attributes)
Machine learning	Song and Han (2013)	Various algorithms (using film attributes)
Machine learning	Kim et al. (2013a)	Support vector machine (using social network data)
Machine learning	Eliashberg et al. (2014)	Kenel-based algorithm (using movie script text analysis)
Machine learning	Ghiassi et al. (2015)	Artificial neural networks (using film attributes)
Machine learning	Kim et al. (2015)	Various algorithms (using social media analysis)
Machine learning	Chen et al. (2016)	Various algorithms (using social media analysis and microblog data)
Machine learning	Lash and Zhao (2016)	Various algorithms (using script and film content analysis)
Machine learning	Liu et al. (2016)	Linear and support vector regressions (using social media analysis)
Machine learning	Hur et al. (2016)	Various algorithms (using consumer review sentiment)
Machine learning	Lipizzi et al. (2016)	Various algorithms (using social media analysis)
Machine learning	Xiao et al. (2017)	Linear stepwise regression (using trailers)
Machine learning	Antipov and Pokryshevskaya (2017)	Random forest model (using film attributes)
Machine learning	Kim et al. (2017)	Various algorithms (using social media analysis)
Machine learning	Park and Kim (2017)	Linear and support vector regression (using competitive environment)
Machine learning	Lehrer and Xie (2017)	LASSO and model averaging (using social media analysis)
Machine learning	Lee et al. (2018)	Various algorithms (using film attributes)
Machine learning	Hu et al. (2018)	Various algorithms (using film attributes)
Machine learning	Ru et al. (2018)	Deep neural networks (using film attributes)
Machine learning	Liu and Xie (2019)	Machine learning versus econometrics (using film attributes)
Machine learning	Zhou et al. (2019)	Various algorithms (using film attributes)
Machine learning	Balaganesh and Bhuvaneshwari (2019)	Various algorithms (using film attributes)
Machine learning	Lu and Xing (2019)	Neural network (using conjoint survey data)
Machine learning	Wang et al. (2019)	Sparse subspace clustering (using film attributes)
Machine learning	Toubia et al. (2019)	Collaborative filtering hybrid models (using film synopsis analysis)

(Continues)

TABLE A1 (Continued)

Type	Authors	Methodology
Machine learning	Natarajan et al. (2019)	Various algorithms (using film attributes)
Machine learning	Liao et al. (2022)	Stacking fusion model (using film attributes)
Machine learning	Ahmad et al. (2020)	Various algorithms (using YouTube trailer reviews)
Machine learning	Wang et al. (2020b)	Deep neural networks (using film attributes)
Machine learning	Lee et al. (2020)	Various algorithms (using blogs, social networks, and social media)
Machine learning	Abidi et al. (2020)	Various algorithms (using film attributes)
Machine learning	Ahmed et al. (2020)	Various algorithms (using film attributes)
Machine learning	Kim (2020)	Machine learning versus econometrics (using film attributes)
Machine learning	Nemzer and Neymotin (2020)	Various algorithms (using IMDb movie descriptions)
Machine learning	An et al. (2021)	Various algorithms (using film attributes)
Machine learning	Sumod et al. (2021)	Various algorithms (using film attributes)
Psychometrics	Peress and Spirling (2010)	Item response theory (using critic reviews)
Psychometrics	Boksem and Smidts (2015)	Neural metrics (using brain response to movie trailers)
Psychometrics	Christoforou et al. (2017)	Neural metrics (using neurophysiological and eye-gaze metrics)
Psychometrics	Palomba (2020)	Linear regression (using consumer personality and lifestyle data)
Simulation	Delen and Sharda (2010)	Agent-based model (using Hofstede indices)
Statistical	Foutz and Jank (2010)	Functional shape analysis (using HSX data)

TABLE A2 Related industries studies

Industry	Authors	Context of study
Adult film	Lüdering (2018)	Networks and careers
Broadway theatre	Han and Ravid (2020)	Demand and role of stars (including movie stars)
DVD	Smith and Telang (2009)	Sales, broadcast television and piracy
DVD	Milkman et al. (2009)	Preferences and demand for rental films
DVD	McKenzie (2010)	Sales and box office sales
DVD	Walls (2010b)	Sales dynamics and distribution
DVD	Smith (2011)	Release window timing and industry profits
DVD	Mukherjee and Kadiyali (2011)	Sales and rentals
DVD	Karaca-Mandic (2011)	DVD player adoption
DVD	Lang et al. (2011)	Sales and R-rating
DVD	Chung et al. (2012)	Rentals forecasting
DVD	Luan and Sudhir (2010)	Sales and the effectiveness of advertising

(Continues)

TABLE A2 (Continued)

Industry	Authors	Context of study
DVD	Kumar et al. (2014)	Sales, broadcast television and long tail
DVD	Cabral and Natividad (2016b)	Cross selling between old and new titles
DVD	Ahmed and Sinha (2016)	Optimal release timing
DVD	King and King (2017)	Video rental kiosks
DVD	Tan et al. (2017)	Sales concentration versus long tail effect
DVD	Mukherjee and Kadiyali (2018)	Sales and release strategy
DVD	Hashim et al. (2019)	Sales and impact of digital formats
DVD	Sinha et al. (2019)	Sales and impact of cultural values
DVD	Kaimann (2020)	Sales and relation to box office revenues
In-home film	Huang et al. (2015)	Profitability of small versus big budget films
In-home film	Axarliian (2017)	Rental versus buying and digital access
In-home film	Barbosu (2017)	Big data and consumer demand
In-home film	Knox and Eliashberg (2009)	Rental versus buying
Online videos	Fu and Sim (2011)	Viewership dynamics and distribution
Online videos	Hsieh et al. (2012)	Viewership and marketing
Streaming	Aguiar and Waldfogel (2017)	Hegemony and trade
Streaming	Train (2015)	Willingness to pay and privacy
Streaming	Prince and Greenstein (2017)	Cord cutting
Streaming	Glasgow and Butler (2017)	Willingness to pay and privacy
Streaming	Hiller (2017)	Optimal bundling
Streaming	Godhino de Matos et al. (2018)	SVoD impact on piracy
Streaming	Hadida et al. (2021)	SVoD versus Hollywood and business strategy
SVoD	Wayne (2018)	Branding
SVoD	Clement et al. (2018)	Disruption and value chains
SVoD	Lobato (2018)	International catalogs
SVoD	McKenzie et al. (2019)	Willingness to pay and disruption
SVoD	Godinho de Matos and Ferreira (2020)	Binge watching and demand
SVoD	Kübler et al. (2021)	Content valuation and business strategy
Television	Waldfogel (2009)	Viewership and web distribution
Television	Schweidel and Kent (2010)	Viewership and advertising strategy

(Continues)

TABLE A2 (Continued)

Industry	Authors	Context of study
Television	Petrin and Train (2010)	Demand estimation with endogenous variables
Television	Kent and Schweidel (2011)	Viewership and advertising strategy
Television	Danaher et al. (2011)	Forecast ratings
Television	Danaher and Dagger (2012)	Forecast ratings
Television	Liebowitz and Zentner (2012)	Viewership and internet usage
Television	Crawford and Yurukoglu (2012)	Bundling and welfare
Television	Esteves-Sorenson and Perretti (2012)	Channel switching and inertia
Television	Vázquez-Maguirre and Hartmann (2013)	Non-market strategies, market structure, and policy
Television	Hennig-Thurau et al. (2013)	Valuation of TV rights for films
Television	Wilbur et al. (2013)	Viewership and advertising strategy
Television	Nishida and Gil (2014)	Regulation and entry
Television	Joo et al. (2014)	Advertising effectiveness and internet search
Television	Nagy and Midha (2014)	Viewing relationships with Twitter and advertising
Television	Cadario (2015)	Viewership and word of mouth
Television	Yeo (2017)	Scheduling
Television	Fossen and Schweidel (2017)	Advertising effectiveness and eWOM
Television	Gong et al. (2017)	Viewership and marketing
Television	Seiler et al. (2017)	Viewership and marketing
Television	Deng and Mela (2018)	Viewership and advertising strategy
Television	Crawford et al. (2018)	Vertical integration and welfare
Television	Fossen and Schweidel (2019)	Product placement effectiveness
Television	Belo et al. (2019)	Viewership, advertising, and time shifting
Television	Schauerte et al. (2021)	Digital disruption and business strategy
Television	Hardy (2022)	Viewership and piracy
Various	Waldfogel (2016)	Digitization and supply
Video rentals	Collins et al. (2009a)	Characteristics of consumers
Video rentals	Ioannou et al. (2011)	Vertical contracting
Video rentals	Ho et al. (2012b)	vertical contracting
Video rentals	Ho et al. (2012a)	Vertical contracting
Video rentals	Zentner et al. (2013)	Online viewership and long tail
VoD	Nam et al. (2010)	Service adoption and signal quantity
VoD	Dogruel (2018)	Consumer behavior
VoD/IPTV	Song et al. (2018)	Determinants of movie success