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**The determinants of motion picture box
office performance in the Czech Republic**

Bachelor's thesis

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Declaration of Authorship

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Prague, July 30, 2023

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Abstract

This thesis examines factors influencing box office performance in the Czech Republic. With an original dataset of over 1400 observations spanning 2013–2022, the thesis explores the impact of the following factors: country of origin, user reviews, production budget, star power, awards, and holiday releases. The ordinary least squares estimation method is used for the analysis. Findings reveal that movie performance is positively affected by Czech origin, user reviews, production budget, star power, and awards. This research contributes to understanding the Czech movie market and offers insights for policymakers, producers, and distributors. Further research opportunities include analyzing sequels' effects, marketing spending, and further clarification of the role of reviewers.

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Abstrakt

Tato práce se zabývá faktory ovlivňující výkonnost filmů v České republice. Na základě originálního souboru dat čítajícího více než 1400 pozorování z let 2013–2022 je zkoumán vliv následujících faktorů: země původu, uživatelské recenze, rozpočet produkce, hvězdné obsazení, ocenění a prázdninové premiéry. K odhadnutí modelu je použita metoda nejmenších čtverců. Zjištění ukazují, že na výkonnost filmů mají pozitivní vliv země původu, uživatelské recenze, rozpočet produkce, hvězdné obsazení a ocenění. Tento výzkum přispívá k pochopení českého filmového trhu a nabízí poznatky pro tvůrce politik, producenty a distributory. Další možnosti výzkumu zahrnují analýzu účinků pokračování, marketingových výdajů a další objasnění role recenzentů.

Klasifikace JEL

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Determinanty výkonnosti filmů v České republice

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Chapter 1

Introduction

Movies are a popular and traditional form of entertainment in the Czech Republic. Movie theatres grossed more than 2 billion CZK in 2022, and the Czech city Karlovy Vary has been known for hosting the international film festival since 1946. However, the movie industry is inherently a precarious business, as only three out of ten movies are able to cover their costs with box office revenues, and only one out of ten can make a profit (Hennig-Thurau *et al.* 2007). Therefore, it is helpful for filmmakers to evaluate which factors can make a movie a "success" to reduce the uncertainty of the box office.

This thesis aims to identify and quantify the main factors affecting box office performance in the Czech Republic. Based on the literature review following determinants were considered: country of origin, user reviews, production budget, star power, holiday release, and awards. The analysis will be performed on an entirely new data set compiled by the author. It was assembled from various sources and contained more than 1400 observations covering the period of 2013 – 2022. The model was estimated using the ordinary least squares estimation method to quantify the effects. Findings obtained in this thesis indicate that Czech origin, user reviews, production budget, star power, and awards are positively associated with movie performance.

The thesis is organized in the following manner: Chapter 2 provides a basic overview of the movie market in the Czech Republic, Chapter 3 introduces the topic of the economics of movies and highlights several important studies on the determinants of success. In Chapter 4, a set of hypotheses is formed, and Chapter 5 provides an extensive overview of the data set used for the analysis. Chapter 6 summarizes the used methods. Chapter 7 contains a summary of our findings and evaluation of previously proposed hypotheses.

Chapter 2

Movie market in the Czech Republic

This chapter will present an overview of movies as an essential part of the Czech entertainment industry. The first part will contain a general market overview, while the second part will describe recent trends in the Czech box office.

2.1 General overview

Filmmaking has always been a major industry in the Czech Republic. Czech cinema has a long history that dates back to the early days of global cinema. The Czech Republic had modern film studios and companies by the turn of the 20th century, and some of its films achieved international fame even before sound was introduced. The Barrandov studios, constructed in the 1930s, were the most advanced studios in Europe and later became a symbol of the Czech film industry. (Czech Film Commission n.d.)

Movies continue to be a popular form of entertainment in the Czech Republic, as the last available data on cultural participation in the Czech Republic shows. Almost half of the population has visited a cinema at least once in the past year in 2015 (Czech Statistical Office 2015). This proportion of moviegoers is above average in the EU, as the European average is 45,2 percent. The Czech Republic ranked as the 10th country in the EU in movie attendance. On the upper end, Denmark's and Sweden's share was more than 60 percent (European Commission - Eurostat 2021).

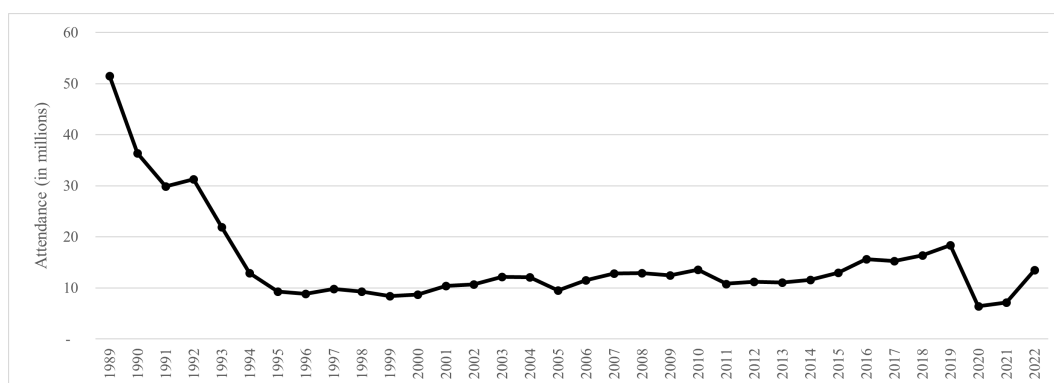
The popularity of cinema visits varies considerably between different age groups in the Czech Republic. According to data from the Living Conditions

Survey 2015, the popularity of going to the cinema decreases with increasing age. The most frequent cinema-goers were young people aged between 16 and 24. These results provide a relevant finding – cinema-going held a solid competitive position among young people’s increasingly sophisticated digital entertainment options (Czech Statistical Office 2021).

2.2 Recent trends in the Czech box office

According to the data from the Union of Film Distributors (Figure 2.1), in the period 1989 to 1995, the number of viewers has been rapidly declining. This trend was likely caused by increased video distribution and cable television and was partly negated at the beginning of the 21st century by the introduction of multiplex cinemas (Mošna 2010). In 2022, there were 31 multiplex cinemas in the Czech Republic, generating over 70 percent of the revenues of all movie establishments (Unie filmových distributorů n.d.). Since the beginning of the century up to 2019, movie attendance has been slowly increasing, averaging 3,5 percent yearly growth, with the year 2019 having the highest movie attendance since 1993, with more than 18 million admissions.

Figure 2.1: Attendance of the Czech movie theaters in years 1993 - 2022

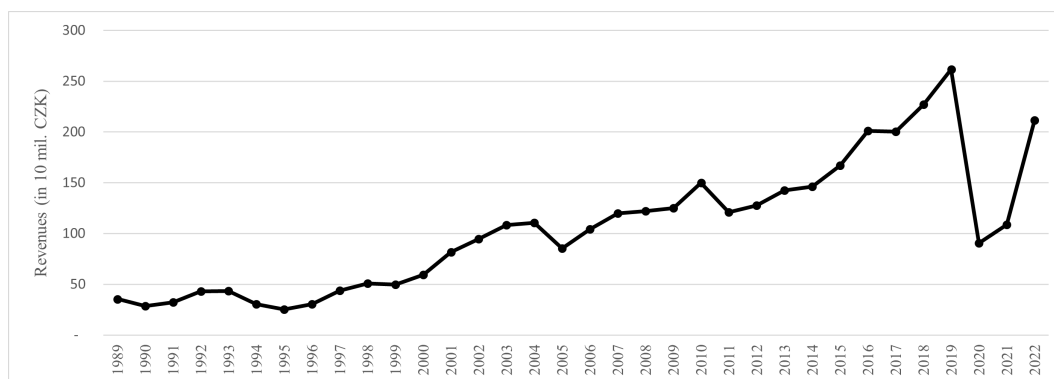


Source: Union of film distributors, <https://www.ufd.cz/prehledy-statistiky>

The development of movie revenues was quite different, as seen in Figure 2.2. While the number of visitors declined, revenues remained at the same level, even increasing in 1992. Since the introduction of multiplex cinemas in the early 2000s, revenues have been increasing by 9,57 percent every year. The exceptions were in 2005 and 2011, with 22.37 and 19.2 percent decrease, respectively. The reason for increasing revenues and simultaneously stagnating attendance is a

steady average ticket price increase, which has increased more than 22 times since 1989.

Figure 2.2: Net revenues of the Czech movie theaters in years 1993 - 2022



Source: Union of film distributors, <https://www.ufd.cz/prehledy-statistiky>

Both trends came to a halt with the COVID-19 pandemic that came in 2020. Anti-pandemic measures significantly impacted the movie industry, as attendance and revenues dropped by more than 65 percent in 2020 compared to 2019. It was the first year since 2005 that movie attendance was below ten million admissions. The year 2021 showed minor improvements, but attendance was only 38,98 percent of the record-breaking year 2019. In 2022 movie attendance and revenues have slightly recovered, with numbers returning to the level of 2015.

2.3 Other sources of revenues

Streaming services and physical copies are other possible distribution channels for motion pictures that generate revenues. The number of viewers of streaming services was positively affected by the pandemic. For example, streaming giant Netflix reported a record global increase of 37 million new subscribers in 2020 compared to the previous year. The upward trend in subscribers continued in the following period. Netflix had 223 million worldwide in the third quarter of 2022, up 2.5 million from the second quarter of the same year, according to Statista (2021) (Czech Statistical Office 2021, as cited in). Data about Czech streaming services are not available. In 2023, there are fourteen available streaming services in the Czech Republic (Deník.cz 2021).

On the other hand, physical carriers of audiovisual materials are becoming a marginal market segment. This fact is evidenced by unrecorded Blu-ray discs,

CDs, and DVDs being excluded from the CZSO's consumer basket (iDNES.cz 2018). According to data from the Structural Business Statistics, revenues from the rental of media with audiovisual content (rental of videotapes and discs NACE 77.22) have fallen more than threefold in the period between 2005 and 2020, from 507 million CZK to 158 million CZK (Czech Statistical Office 2021).

Chapter 3

Literature review

In this chapter, previous research on movie performance will be summarized. Firstly, studies regarding the economics of movies will be introduced. Secondly, studies dealing with hedonic demand models will be presented, followed by studies focusing on specific determinants of movie success. This chapter will conclude with a description of the only study that examined factors affecting movie attendance in the Czech Republic.

3.1 Economics of movies

Research in the "economics of movies" began in the 1980s, with the main topic being the impact of Paramount antitrust and consent decrees from 1948, which dealt with the motion-picture industry's organization and procedures (McKenzie 2012). Since then, the interest in this field of research has increased substantially, as the number of scholarly studies on this topic more than quadrupled in the past decade compared to the period from the mid-1980s until the late 2000s. The main reasons for this increase are more accessible data, a general increase in applied research, maturity of the research body, and increased media interest in the industry (McKenzie 2023).

The primary motivation for studying determinants of movie success is a high degree of uncertainty of success (De Vany & Walls 1999). Only about three out of ten movies break even, and one becomes profitable at the box office (Hennig-Thurau *et al.* 2007). This uncertainty is caused by the nature of movies, which are experience goods – viewers can only determine their opinions of a film after seeing it. Therefore, the choice to watch a movie depends on factors other than the quality of the experience, which could take the form of signals (Deuchert

et al. 2005). One possible way of modeling the success determinants is "hedonic" demand models, which aim to deconstruct a movie's revenue into its component parts and estimate how each component contributes. Most often, the method of multiple linear regression is used.

3.2 Hedonic demand models

To the best of our knowledge, the first study that formulated a "hedonic" demand model was done by Litman in 1983. Litman (1983) analyzed a data set containing 125 movies released in 1972-1978. As a dependent variable, theatrical rentals accruing to the distributor were used. Explanatory variables included genres, age rating, presence of a box office superstar, production costs, distributor, peak periods, and Academy Award nominations and wins. Regression results showed the insignificant effect of box office superstar and age ratings. The most significant effect was by the Academy Award winner, which showed a 16,3 million increase in revenues.

Litman & Kohl (1989) later expanded on Litman's original work by analyzing films released in 1981-1986. The original model from 1983 was expanded by variables for adaptation, country of origin, director, number of movie screens, number of annual movie admissions, and Herfindahl-Hirschman Index of market shares. The majority of the results were in line with the baseline study. The most notable deviations were the insignificance of winning an Academy Award, the increase in the effect of stars, the lower impact of the production budget, and the shift of significance from Christmas to the summer season. All new variables introduced in this model had a significant positive effect on rentals.

Litman's approach lays the foundation for studies of success determinants. Nowadays, modifications of his model are being used on either more recent data sets (Terry *et al.* 2011; Pangarker & E.v.d.M. 2013) or other national contexts such as Turkey (Eyüp & Tan 2022) or Poland (Gmerek *et al.* 2015).

3.3 Determinants of success

The following section will present studies focusing on particular success determinants. Chosen determinants are critical reviews, star power, the role of awards, and marketing expenditures.

3.3.1 Critical reviews

One of the most frequently examined determinants of movie performance is critic reviews. Reviewers play a significant role in the success of a movie, as their opinion (in the form of rating) serves as a signal of quality to the potential viewers. However, the relationship between reviews and performance may be more complex, as critics may only confirm what is already happening in movie theaters.

Eliashberg & Shugan (1997) considered two possible critics' roles: influencer, whose reviews have a causal effect on movie performance, or a predictor, whose reviews only indicate the movie's performance and do not affect it. Critical reviews were regressed on box office revenues during different periods of movies' run to test which of the two proposed roles is more prevalent, using a sample of 56 movies released in 1991-1992. If the prevalent role were the influencer, reviews would have a higher impact in the first several weeks (shortly after releasing the reviews) before word-of-mouth information takes over. Regression results showed that the impact of reviews is insignificant in the earlier weeks of screening and becomes significant after four weeks for positive and five weeks for negative reviews. These results imply that critics serve as predictors rather than influencers. However, the authors emphasize caution regarding their findings, given the challenge of separating correlation from causation, and admit the possibility of both effects simultaneously.

Basuroy *et al.* (2003) replicated the approach of Eliashberg & Shugan (1997) on a more extensive and less restricted data set of 200 movies. Their results showed that reviews are significantly correlated with each of the first eight weeks, implying that reviewers serve as influencers and predictors. Another interesting finding was that the effect of negative reviews was larger than the effect of positive reviews, which suggests that studios should invest more in damage control rather than in promoting positive reviews.

While professional critics' reviews continue to be a topic for research, an increasing number of studies concentrate on the impact of users' reviews from various blog sites and networks. In a more recent study, Huang *et al.* (2017) looked at how user comments and critic reviews from various platforms affect box office sales. A large data set of comments from users and professional reviewers on various platforms was gathered, and a machine learning method for sentiment classification was used to determine the rating of each comment on a scale from 0 (completely negative) to 1 (completely positive). To estimate

a model, the generalized method of moments estimation was used. It was found that both expert and user ratings were positively associated with movie sales, with their effects decreasing over time.

3.3.2 Star power

Another factor examined in the literature is the role of stars, often referred to as star power. Movie stars have been a sign of popular filmmaking's success since its beginnings. The "star system" was the cornerstone for producing and promoting Hollywood's biggest movies during the studio era. While the salaries of top stars skyrocketed, industry watchers and academic researchers started to question whether such income levels were justified and whether the presence of stars in movies increased box office earnings beyond the value of their salaries. (McKenzie 2023)

Ravid (1999) analyzed the role of stars in the movie performance. Two hypotheses were proposed: the "signaling" hypothesis, in which stars and large budgets indicate high returns (or at least high revenues), and the "rent capture" hypothesis that stars are paid their worth and, therefore, not improving the performance of the movie (budget increases proportionately with revenues). Linear regression and univariate methods were used to test these hypotheses on a random sample of 175 movies released between 1991 and 1993. Results of univariate testing showed that the presence of award-winning actors improved movie revenues. However, in multiple regression models, the variable for budget captures all the significance, while all other measures of star power were insignificant. Therefore, the "signaling" hypothesis in terms of stars was rejected. However, the budget itself may be a proxy for star power, and therefore there is some evidence for the "signaling" hypothesis in terms of budget. In return on investment regressions, variables for stars were all insignificant, which means that the "rent capture" hypothesis cannot be rejected.

A more recent study done by Nelson & Glotfelty (2012) used box office data from nine countries and the STARMeter rankings as a measure of star power, based on the number of visits to a star's IMDB page, to examine the connection between star power and box office earnings. Linear regression was used to test the effect on a sample of the top fifty grossing movies each year in 1999-2005. Their results showed that replacing a single average star with a top star increases revenues by \$28,011,775. However, by taking into account the production budget and the number of screens, revenues increase only by

\$5,225,365. Similarly, replacing three average stars with three top stars increases box office revenues by \$79,501,904 and only by \$49,318,858 if variables for budget and the number of screens are included.

A previously mentioned study by Basuroy *et al.* (2003) also examined the effect of stars in the context of reviews. They found that stars and budgets alleviate the effect of bad reviews. However, the effects of budgets and stars are negligible when a movie is rated positively. Therefore, well-known actors and large budgets can function as an insurance policy (Basuroy *et al.* 2003).

As can be seen from the presented studies, the findings regarding the role of stars provide mixed evidence. However, it is unsurprising that the findings are inconsistent, as the definition of a "star" varies across different research studies (Simonton 2009). While some studies utilize industry sources (Nelson & Glotfelty 2012), others rely on historical data on box office performance and awards (Ravid 1999).

3.3.3 Role of Awards

The film industry annually organizes numerous renowned award shows (such as the Academy Awards) that offer entertainment value in their own right. Extensive evidence suggests that receiving award nominations and wins substantially influences box office performance. Distributors may even modify release schedules to enhance a film's prospects of receiving nominations and, if successful, take advantage of it in their promotional activities. Given these circumstances, it is unsurprising that several researchers have conducted empirical studies investigating the impact of nominations and awards on box office performance. (McKenzie 2012)

Deuchert *et al.* (2005) explored the effect of Oscar nominations and wins on movies' weekly performances. A linear regression model was used on a large sample of 32,040 observations of 2,244 movies released between 1990 and 2000. The categories of Academy Awards considered were "best picture", "best actor/actress in a leading role", and "best actor/actress in a supporting role", as they are viewed as the most respected ones. Results of their model suggest that the positive effect of Oscar awards is achieved primarily by nominations, as a subsequent win of the award does not result in additional revenues. This finding implies that investments in awards after the nominations do not improve movie performance (Deuchert *et al.* 2005).

3.3.4 Marketing expenditures

It is reasonable to assume that advertisement might be one of the essential factors of movie success, as it can attract potential moviegoers (Litman & Kohl 1989). However, advertising costs are rarely available, and therefore the amount of empirical analysis on this topic is very limited (Simonton 2009).

One of the few exceptions is an article by Prag & Casavant (1994). They obtained "Prints and Advertising" (P&A) data on a subset of 195 movies. Results of initial regression analysis showed that production costs, sequel, star power, Academy Award win, and quality positively affect movie performance. However, when the variable for P&A was included, production costs, star power, and Academy Award win were insignificant. This paper also included an analysis of advertising expenditures, where it was found that they are determined by production cost, the presence of a star, and film genre. These results highlight the endogeneity of advertising variable (McKenzie 2012).

3.4 Determinants of movie revenues in the Czech Republic

Analysis of movie revenues in the Czech Republic has been a topic of various bachelor or diploma theses. The only publication regarding this issue is a conference paper by Žofčák (2020), who first introduced this topic in his bachelor thesis in 2014. Žofčák looked at the issue from the point of view of a potential movie-goer, who faces an unfavorable information asymmetry compared to the producer or distributor, who has complete information about the movie released.

The main research question of Žofčák's paper was whether movie ratings affect the attendance of Czech movies. A model estimated by the ordinary least squares method was used to test the hypothesis. Žofčák's dataset contained 415 movies filmed and screened in the Czech Republic from 2003 to 2017. The primary data sources were the Union of Film Distributors (UFD) and the Czech-Slovak Film Database (CSFD). The UFD was the source of the dependent variable *attendance*, measured in the number of viewers. The CSFD website was the primary source of the exogenous variables, the main one being *rating* (percentage rating of movies the on the CSFD). Other exogenous variables were dummy variables for genres (variables action, fairy/tale, documentary, drama, history, horror, comedy, romance, and thriller), a sequel

(including all sequels, prequels, remakes, and reboots), presence of a famous actor (variables actor, actress, director), Czech Lion film award, movies directed by Zdeněk Troška, years of premiere (2003–2017) and summer months (July and August).

The positive effect of rating on movie attendance was confirmed; a one percent increase in audience ratings resulted in a 1.8 percent increase in movie attendance. Other findings consisted of the positive effect on attendance of simpler genres (comedy, romance, and fairy-tale) as compared to more demanding genres (documentary), the positive effect of sequels (an increase of 121.8 percent), and positive effects of all the *star power* variables (actor, actress, director). Variables specific to the Czech market were also significant, both the Czech Lion awards (34.9 percent increase) and director Zdeněk Troška (123.4 percent increase).

Chapter 4

Hypotheses

Based on the literature review, the following set of hypotheses will be tested:

- **H1: Czech movies are grossing more than foreign movies in the Czech movie theaters**

The majority of movies screened in the Czech Republic are imported. According to the data from the UFD, only 24 percent of movies screened in the Czech Republic in 2013 - 2022 originated in the Czech Republic. However, these movies were primarily intended for Czech viewers. Cultural references, locations, and actors are more familiar to the Czech viewer, which should make the movie more attractive. Litman & Kohl (1989) tested a similar hypothesis for American audiences. This hypothesis will be tested by the variable *czech*.

- **H2: User reviews positively affect movie performance in the Czech movie theaters**

Internet users' comments positively affected movie sales (Huang *et al.* 2017). A similar finding in the context of the attendance of Czech movies was confirmed by Žofčák (2020). Our analysis will test whether this fact can be extrapolated to all movies released in the Czech Republic. Variable *csfd_score* will be used to test this hypothesis.

- **H3: Higher production budget positively affects movie performance in the Czech movie theaters**

The production budget was confirmed to be an important determinant of movie's performance (Terry *et al.* 2011; Litman 1983; Litman & Kohl 1989; Nelson & Glotfelty 2012). A higher production budget can be used

to film at more exotic locations and use better costumes or special effects. All of these factors can increase the movie's overall production value and quality, which in return increases revenues. Variable *budget* will be used to test this hypothesis.

- **H4: Presence of a well-known actor, actress or director improves movie performance in the Czech movie theaters**

Star power was confirmed to be an important determinant of a movie's performance (Litman & Kohl 1989; Nelson & Glotfelty 2012). Well-known actors and actresses are often part of marketing campaigns and are said to improve the creative value of a movie. Variables *actor*, *actress*, and *director* will be used to test this hypothesis.

- **H5: Holiday releases perform better in the Czech movie theaters**

Release pattern was argued to be an important factor affecting movie revenues (Litman 1983; Litman & Kohl 1989). However, past studies' findings are inconclusive, as its effect is often insignificant (Terry *et al.* 2011; Žofčák 2020). During the holidays, people have more free time, which could be spent at movie theatres. We will test this hypothesis with variables *summer*, *easter*, and *christmas*, which represent major Czech holidays.

- **H6: Movies that were nominated or won the Czech Lion awards or the Oscars perform better**

Movie awards are an important indicator of a movie's success (Litman 1983; Litman & Kohl 1989; Deuchert *et al.* 2005; Žofčák 2020). In past studies, the effect of the Academy Awards was mainly considered, as most studies on this topic were related to the American movie market. The most well-known movie awards in the Czech Republic are the Czech Lion Awards, which the Czech Film and Television Academy annually presents. The positive effect of winning this award was confirmed by Žofčák (2020). The following variables related to movie awards will be used to test this hypothesis: *oscars_wins*, *oscars_nomination*, *czech_lion_win*, *czech_lion_nomination*.

Chapter 5

Data review and Variables

Since this is the first analysis of movie revenues in the Czech Republic, a new data set had been produced. This chapter will introduce data sources, data cleaning procedures, variables used for the analysis, and their respective descriptive statistics.

5.1 Data sources

5.1.1 The Union of Film Distributors

The Union of film distributors (Unie filmových distributorů) is an interest association of Czech movie distributors founded in 1992. Currently, there are 15 active members, the biggest of them are CinemArt a.s., Bioscop and Falcon a.s. One of the activities that UFD partakes in is the collection of data about the movie market in the Czech Republic, such as attendance, individual movie grosses, and the number of screenings. We were provided yearly data for the period 2013 to 2022, including movies released and their respective revenues, number of viewers, screenings, country of origin, and premiere date. We will use this data as a basis for our analysis, mainly for our dependent variables.

5.1.2 The Czech-Slovak Film Database

The Czech-Slovak Film Database (CSFD.cz) is a database of films, series, and TV shows and a social network for film fans founded in 2002. Its significance in the Czech environment can be exemplified by multiple prestigious Křišťálová lupa awards, a famous internet poll in the Czech Republic. CSFD is a primary

source of qualitative movie data, such as genre, premiere date, length, country of origin, awards won, and ratings.

5.1.3 The Internet Movie Database

According to the information provided on the website, IMDb is the most well-known and reliable source of information on movies, TV shows, and celebrities in the world. It was created to assist movie and television fans in discovering new content and making viewing choices. It was launched in 1990 and is currently owned by Amazon (IMDb.com n.d.). As of June 2023, IMDb contained over 531 million data items, including 15.4 million titles (IMDb.com 2023). It is used as the primary source for international movie budgets.

5.1.4 State Cinematography Fund

State Cinematography Fund (Státní fond kinematografie) was founded in 2013 under the Ministry of Culture of the Czech Republic to support Czech cinematography. The results of the fund's board decisions regarding the application for cinematographic production support were used as a source of budget for Czech movies, as the budget was one of the required information in the application. As some movies have appeared in multiple decision results with slightly different budgets, the information provided in the most recent decision result was considered.

5.2 Data cleaning

Data obtained from UFD were in the form of ten files (one per year). Observations that missed any of three essential variables (no. of screenings, no. of viewers, and revenue) were erased, as well as observations with revenues that ended with '000' (up to 10 000 CZK), as we were informed that those are only rental fees for screenings for a small number of people, as well any negative entries (these can be attributed to year end invoicing). Subsequently, all movie titles had to be put in a single format, as there were minor changes in naming in different files that could have caused additional observations (even though they belonged to the same movie). Then we summed all variables per movie title (as the movie can be screened in other years other than its premiere) and selected movies that more than 500 people attended.

After that, budgets from IMDb and State Cinematography Fund were added. Budgets obtained from the IMDb were often in the original currencies of countries where the movie was produced. Hence all budgets we converted to the Czech Crowns using the average exchange rate of a year when the movie premiered in the Czech Republic. Finally, qualitative data, such as the date of premiere, ratings, country of origin, awards, and cast, was added from the CSFD website. In the end, our data set contained 1417 movies.

5.3 Variables

This section briefly describes the variables used to test the hypotheses. Table 5.5 at the end of this section contains overview of all included variables.

5.3.1 Dependent variables

Several possible measures of box office performance are used in past literature, such as gross box office earnings, first-week box office, or the total length of the theatrical run (Simonton 2009). For our analysis, we are going to use two measures:

- **revenues:** Box office revenues in CZK. A similar variable was used by Terry *et al.* (2011).
- **attendance:** Attendance in a number of viewers. This variable was used by Žofčák (2020).

The source of both of these variables was the Union of Film Distributors.

5.3.2 Independent variables

- **budget:** The production cost of a movie in CZK. This variable proved to be a significant determinant of movie revenues in most studies (Litman 1983; Litman & Kohl 1989; Terry *et al.* 2011; Pangarker & E.v.d.M. 2013). This amount does not include the marketing spending. This variable proved to be the main restriction for our dataset (especially for Czech movies), as production companies rarely publish budgets as it is considered proprietary information and is often estimated by industry sources (Simonton 2009).

- **csfd_score**: The users' average percentage rating of a given movie on the CSFD website. Professional critics' reviews were proven to be a significant determinant of movie performance by multiple studies (Litman 1983; Litman & Kohl 1989; Terry *et al.* 2011). However, professional critics' reviews are not readily available in the context of the Czech Republic. On the other hand, reviews from the CSFD website were shown to have a significant effect on attendance of Czech movies (Žofčák 2020), and the role of users' ratings was confirmed by Huang *et al.* (2017). Users can rate movies on a "stars" scale from 0 to 5, which is later converted to percentages (1 star = 20 percent). Users' star ratings will start to count towards the overall percentage of films and series only after they give the first 200 ratings. This variable takes on values from 0 to 100 percent.
- **czech**: Dummy variable for the movies produced in the Czech Republic. Similarly to Litman & Kohl (1989), a hypothesis regarding the preferences of the Czech audience will be tested.
- **oscars_win**; **oscars_nomination**: Dummy variables representing the nomination and subsequent win in the following Academy Awards (also known as Oscars) categories: Best Picture, Best Actor, and Best Actress. The effect of awards, especially nominations, was proven to positively affect movie performance (Litman 1983; Litman & Kohl 1989; Deuchert *et al.* 2005). Similarly to the mentioned studies, a dummy variable approach was selected. Movies that won the award have both dummy variables equal to one, as they first had to receive a nomination for the award in order to win it.

Oscars ceremonies have been held annually since 1929 by the Academy of Motion Picture Arts and Sciences, and it is considered to be the most prestigious award in the movie industry. Overall there are 24 categories of Oscar awards, the most notable being: best picture, actor, actress, supporting actor, supporting actress, and directing. To qualify for an award in a given year, a movie must be shown publicly for paid admission for at least one week at a commercial theater in the county of Los Angeles between January 1 and midnight on December 31 of that year. Foreign-language films are an exception to this rule; their nation of origin submits them, and they are not required to be screened in the United States. (Editors of Encyclopaedia Britannica 2023)

- **czech_lion_win; czech_lion_nomination:** Dummy variables representing the nomination and subsequent win in the following Czech Lion award categories: Best Picture, Best Actor, and Best Actress. The positive impact of winning the Czech lion award was confirmed by Žofčák (2020). We opted for a dummy variable approach similar to the *Oscars* variables.

Czech lion awards have been given out annually in 21 categories by the Czech Film and Television Academy since 1993. The criteria for eligibility for the Czech lion awards include at least 60 minutes duration, financing by at least 20 percent by a producer or co-producers based in the Czech Republic, and released in a given year (Český lev 2021).

- **actor; actress; director:** Dummy variables for the top thirty best actors, actresses, and directors from the CSFD charts. These charts are based on the number of users that added the actor, actress, or director to their "favorite" folder, which is limited to only ten items. Different measures of so-called star power have been included in several studies (Litman 1983; Litman & Kohl 1989; Ravid 1999; Nelson & Glotfelty 2012; Basuroy *et al.* 2003). However, the results are inconclusive. We selected an approach similar to Žofčák (2020) and used CSFD charts to approximate star power. We limited the variable to only the top 30 due to the processing constraints. Lists of selected stars can be found in Appendix A.
- **genres:** The following set of control dummy variables for genres will be included in the model: *action*, *fairy_tale*, *documentary*, *drama*, *history*, *horror*, *comedy*, *romance*, *thriller*, *fantasy*, *sci_fi*, *adventure*, *animated*, and *family*. Apart from the last five genres, the same set of genres was included in the model done by Žofčák (2020). It was found that "simpler" and traditional genres for the Czech environment positively affect attendance. The role of genres is emphasized by Desai & Basuroy (2005). The importance of genres in the Czech environment is confirmed by a survey by the marketing company Nielsen in 2019, where 65 percent of respondents choose which movie to watch based on the genre. Amongst the most popular genres are comedy, crime, and action (Nielsen Atmosphere, a.s. 2019).
- **summer, christmas, easter:** Dummy variables for the time of release.

Variable *summer* equals one if the movie was released during the Czech summer holiday (July, August). Variable *christmas* equals one if the movie was released during December, and variable *easter* equals one for movies released during April.

- **years:** Dummy variables for each year (2014–2022) to control for external factors affecting movie performance, such as the COVID-19 pandemic in 2020–2021. The year 2013 was selected as a base year and was omitted as a variable to avoid the dummy variable trap. A similar approach was used by Žofčák (2020).

5.4 Descriptive statistics

In this section, a summary of the descriptive statistics of our data set will be presented.

5.4.1 Box office performance

As anticipated, there is a strong correlation between revenues and attendance (correlation coefficient 0.988). Therefore, most independent variables should similarly affect attendance and revenues. On the contrary, interesting findings may arise if the effect of any of the variables differed in the two models.

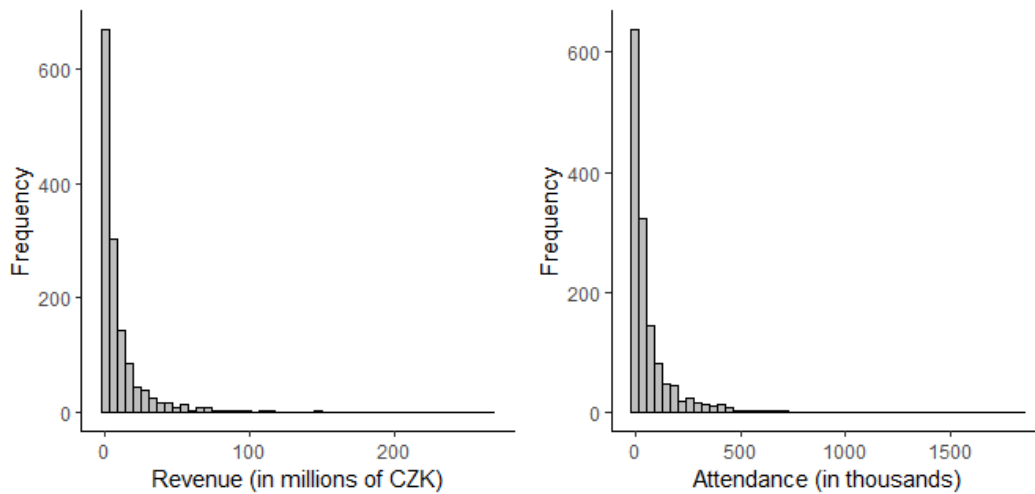
The table below provides an overview of basic summary statistics for both measures of box office performance:

Table 5.1: Summary statistics of revenues (in thousands of CZK) and attendance (in number of viewers)

Statistic	Median	Mean	St. Dev.	Min	Max
revenues	3,075.250	10,317.278	19,395.554	14.854	266,534.030
attendance	23,663	73,902.580	132,670.100	524	1,836,185

At first glance, we can see the extreme positive skew of both variables, as means are more than three times larger than medians. This observation aligns with previous research (De Vany & Walls 1999; Litman & Kohl 1989) and is even more apparent on the histograms of the used variables in Figure 5.1. In order to control for the effect of outlying observations, the logarithmic transformation will be applied.

Figure 5.1: Distribution of movie revenues (left) and attendance (right)



The most successful motion picture in 2013–2022 in terms of revenue and attendance was "Bohemian Rhapsody". It grossed over 266 million CZK and was attended by more than 1.8 million people.

5.4.2 Budget

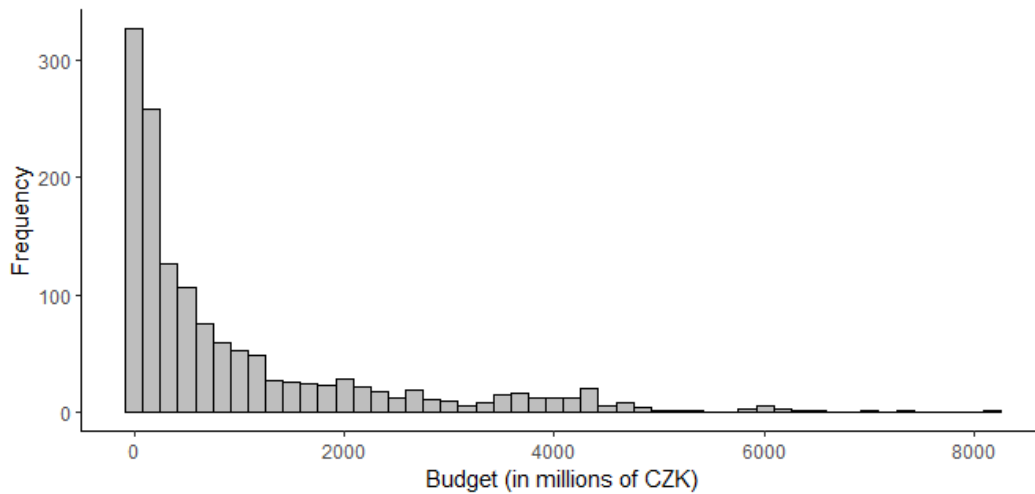
Table 5.2: Summary statistics of Budget (in millions CZK) and Profit approximation

Statistic	Median	Mean	St. Dev.	Min	Max
budget	415.000	0.993	1,336.047	0.250	8,179.500
profit	0.007	0.088	0.408	0.0001	9.560

Similarly to the dependent variables, production costs exhibit extreme positive skew, which will be fixed by applying the logarithmic transformation. The most expensive movie in our data set is "Avatar: The Way of Water", the sequel to the successful movie from 2009 "Avatar".

The second row of Table 5.2 shows summary statistics for the revenue-budget ratio, which can be used to approximate profits. It is important to note that other possible revenue streams affect profits among movie theaters, such as rentals from streaming platforms and physical copies. As this ratio takes into account only movie theaters, it serves only as an approximate of actual profits, which are generally not reported to the public and may have

Figure 5.2: Distribution of budgets (in millions CZK)



questionable economic value even if they were (Ravid 1999). Both median and mean are much lower than 1, indicating that movies rarely break even in the Czech Republic. This phenomenon is mainly caused by American production, which is very expensive and comprised of worldwide releases. Therefore, the Czech market represents only a small part of overall revenues.

Only 37 movies in our data set were able to cover costs with the Czech revenues; out of these movies, 36 were of Czech origin, and one was of Slovak origin. According to our approximation, the most profitable movie in our data set was the documentary "V síti", which is the most successful documentary movie in terms of attendance in Czech history (Státní fond kinematografie 2021). It grossed over 61 million CZK while costing only 6.4 million CZK.

5.4.3 CSFD ratings

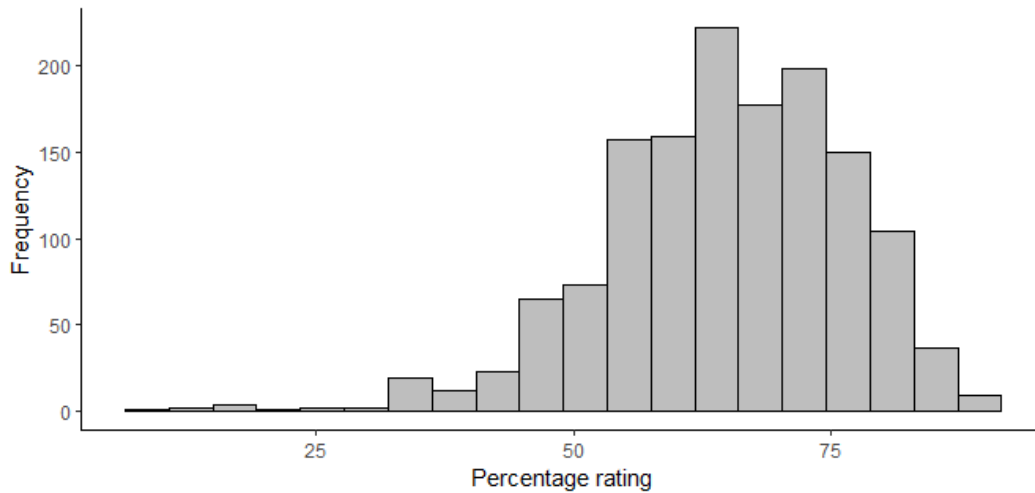
Table 5.3: Summary statistics of CSFD ratings (in percentage points)

Statistic	Median	Mean	St. Dev.	Min	Max
csfd_score	66.000	64.845	11.748	9	90

As seen from the Table 5.3, the average ratings of movies in our sample, both median and mean, are above 64 percent, which shows that users tend to rate movies rather positively. As shown in Figure 5.3, this variable has a slight negative skew. Nonetheless, we will not employ the logarithmic transformation, as the range of this variable is limited. According to CSFD users, the most

popular movies in the data set are racing movies "Ford v. Ferrari" and "Rush", as well as the western "The Magnificent Seven", all having ratings of 90 percent.

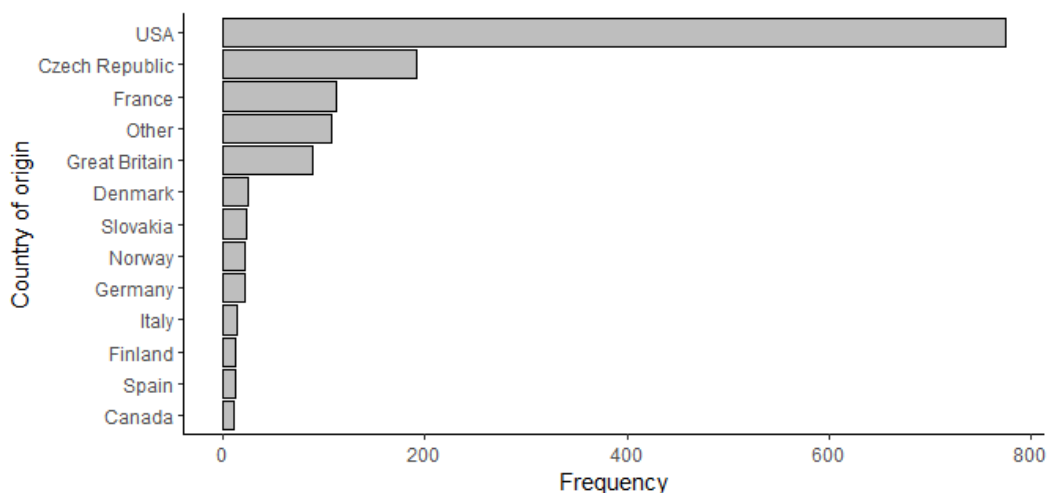
Figure 5.3: Distribution of ratings (in percentage points)



5.4.4 Country of origin

Overall, our data set contains 1417 movies from 48 countries. As can be seen in figure 5.4, the most frequent countries of origin were the United States of America (775), the Czech Republic (192), and France (112).

Figure 5.4: Frequency distribution by countries



According to data from the Union of Film Distributors, in 2013–2022, the share of Czech movies was 23.79 percent. Therefore, Czech movies are

slightly underrepresented in our data set, with only 13.55 percent representation, mainly due to the availability of information on the budget.

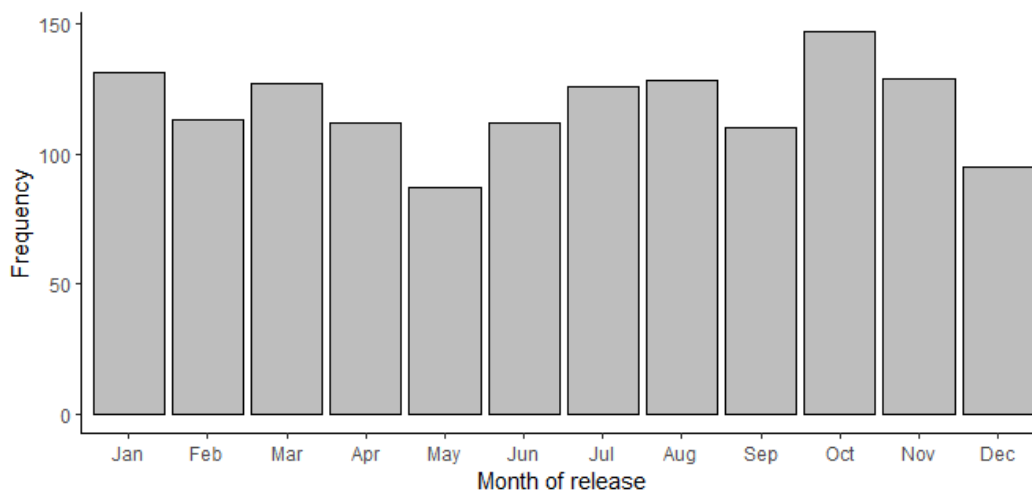
5.4.5 Awards and Cast

Overall, there were 191 movies starring famous actors, 178 movies starring famous actresses, and 70 movies directed by famous directors. Regarding awards, 83 movies in our data set were nominated for the Oscars, and 25 subsequently won the award. The movies "Everything Everywhere All at Once" and "Nomadland" won all three categories. If we look at the Czech Lion awards, 52 movies achieved nomination, and 14 movies were able to turn the nomination into a win. The movie "Bába na ledu" won in all three selected categories.

5.4.6 Month of release

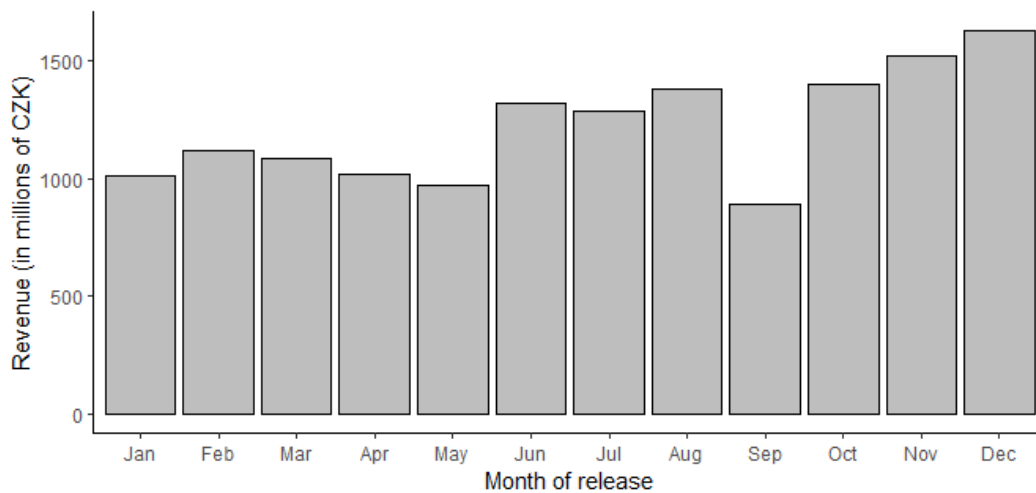
If we look at the frequency distribution of releases in Figure 5.5, we can see that movies are released relatively evenly during the year. The minor peak occurs in October, and two low points in May and December.

Figure 5.5: Frequency distribution by months



However, if we look at the revenue distribution by months in Figure 5.6, we can see a clear dominance of summer and pre-Christmas months. On the other hand, low revenues can be observed during September and January, which can be attributed to the "dumping season". "Dumping season" is a part of the year (primarily January, to a lesser extent February, August, and September) when studios are releasing movies on which they do not expect to make money (Berg & Raddick 2017).

Figure 5.6: Revenue distribution by months (in millions CZK)



5.4.7 Genres

Table 5.4 provides an overview of genres. As one movie can fall under several genre categories, the total sum of genres is larger than the number of observations. The frequency of genres is relatively evenly distributed, with the most frequent being drama and comedy.

According to a survey by company Nielsen in 2019, 59 % of respondents selected comedy as their favorite genre. In subsequent placings, there was a difference between men and women. Men prefer action (28%), crime (26%), sci-fi (24%), and historical films (24%). On the other hand, women enjoy romantic films (33%), crime (26%), and fairy-tales (21%).

Table 5.4: Summary of genres

Genre	No. Of movies	Percentage
Drama	664	18.53%
Comedy	507	14.15%
Thriller	357	9.96%
Adventure	343	9.57%
Action	338	9.43%
Sci-Fi	200	5.58%
Fantasy	194	5.41%
Family	187	5.22%
Crime	177	4.94%
Romance	166	4.63%
Animated	161	4.49%
Horror	142	3.96%
History	68	1.90%
Documentary	64	1.79%
Fairy-tale	16	0.45%

Table 5.5 contains a brief overview of all included explanatory variables:

Table 5.5: Overview of included variables

Variable	Description
budget	production costs (in CZK)
csfd_score	average user rating on CSFD
czech_lion_win	dummy variable for Czech Lion award win
czech_lion_nomination	d.v. for Czech Lion award nomination
oscar_win	d.v. for Academy Award win
oscar_nomination	d.v. for Academy Award nomination
actor	d.v. for Top 30 actors on the CSFD
actress	d.v. for Top 30 actresses on the CSFD
director	d.v. for Top 30 directors on the CSFD
czech	d.v. for movies produced in the Czech Republic
summer	d.v. for movies released in July - August
christmas	d.v. for movies released in December
easter	d.v. for movies released in April
crime	d.v. for criminal genre
animated	d.v. for animation genre
family	d.v. for family genre
adventure	d.v. for adventure genre
action	d.v. for action genre
fairy_tale	d.v. for fairy-tale genre
documentary	d.v. for documentary genre
drama	d.v. for drama genre
history	d.v. for history genre
horror	d.v. for horror genre
comedy	d.v. for comedy genre
romance	d.v. for romance genre
thriller	d.v. for thriller genre
fantasy	d.v. for fantasy genre
sci_fi	d.v. for sci-fi genre
year_2014	d.v. for movies released in 2014
year_2015	d.v. for movies released in 2015
year_2016	d.v. for movies released in 2016
year_2017	d.v. for movies released in 2017
year_2018	d.v. for movies released in 2018
year_2019	d.v. for movies released in 2019
year_2020	d.v. for movies released in 2020
year_2021	d.v. for movies released in 2021
year_2022	d.v. for movies released in 2022

Chapter 6

Methodology

This chapter will briefly introduce the methodology used for our analysis. The main source of information used throughout this chapter is a textbook by Wooldridge (2012). We will use a multiple regression model (MLR) estimated by the ordinary least squares method. The general version of the MLR for observation i can be written as follows:

$$y_i = \beta_0 + \beta_1 x_{1i} + \dots + \beta_t x_{ti} + \epsilon_i, i = 1, \dots, n$$

Where y is the dependent variable, x_1, \dots, x_t are independent variables, ϵ is the disturbance term, and n is the number of observations.

To have valid inference, the following set of assumptions has to be satisfied:

- MLR.1: Linear in parameters
- MLR.2: Random Sampling
- MLR.3: No Perfect Collinearity
- MLR.4: Zero Conditional Mean
- MLR.5: Homoskedasticity

The first assumption states that the population model can be written as the linear function of independent variables with constant coefficients and unobserved disturbance term. This condition is satisfied, as the expected effect of variables on movie revenues or attendance is linear.

The random sampling condition states that the sample must be chosen randomly from the population. This condition was satisfied, as no sampling was used, and all complete and available observations were included.

No perfect collinearity condition states no perfectly linear relationships amongst the explanatory variables. This assumption will be checked by the variance inflation factor (VIF) method.

The zero conditional mean condition says that the error has an expected value of zero given any values of independent variables. This assumption was satisfied by including as many available explanatory variables identified in previous literature as possible.

The last assumption, homoskedasticity of error terms, states that the error term has the same variance given any value of the explanatory variable. This condition will be checked using the standard Breusch-Pagan test.

Chapter 7

Empirical analysis

This chapter will present our models, assumptions testing, and the estimated coefficients; after that, hypotheses evaluation will be performed, as well as limitations and suggestions for further research.

7.1 Model specification

Two models will be estimated, one with revenues as the dependent variable and the other with attendance. The estimated equations are as follows:

$$\begin{aligned} \log(\text{revenues}) = & \beta_0 + \beta_1 \log(\text{budget}) + \beta_2 \text{csfd_score} + \beta_3 \text{czech} \\ & + \beta_4 \text{czech_lion_win} + \beta_5 \text{czech_lion_nomination} \\ & + \beta_6 \text{oscars_win} + \beta_7 \text{oscars_nomination} + \beta_8 \text{actor} \\ & + \beta_9 \text{actress} + \beta_{10} \text{director} + \beta_{11} \text{action} + \beta_{12} \text{fairytale} \\ & + \beta_{13} \text{documentary} + \beta_{14} \text{drama} + \beta_{15} \text{history} + \beta_{16} \text{horror} \\ & + \beta_{17} \text{comedy} + \beta_{18} \text{romance} + \beta_{19} \text{thriller} + \beta_{20} \text{fantasy} \\ & + \beta_{21} \text{sci_fi} + \beta_{22} \text{adventure} + \beta_{23} \text{family} + \beta_{24} \text{animated} \\ & + \beta_{25} \text{crime} + \beta_{26} \text{summer} + \beta_{27} \text{christmas} + \beta_{28} \text{easter} \\ & + \beta_{29} \text{year_2014} + \beta_{30} \text{year_2015} + \beta_{31} \text{year_2016} \\ & + \beta_{32} \text{year_2017} + \beta_{33} \text{year_2018} + \beta_{34} \text{year_2019} \\ & + \beta_{35} \text{year_2020} + \beta_{36} \text{year_2021} + \beta_{37} \text{year_2022} \end{aligned}$$

$$\begin{aligned}
\log(\textit{attendance}) = & \beta_0 + \beta_1 \log(\textit{budget}) + \beta_2 \textit{csfd_score} + \beta_3 \textit{czech} \\
& + \beta_4 \textit{czech_lion_win} + \beta_5 \textit{czech_lion_nomination} \\
& + \beta_6 \textit{oscars_win} + \beta_7 \textit{oscars_nomination} + \beta_8 \textit{actor} \\
& + \beta_9 \textit{actress} + \beta_{10} \textit{director} + \beta_{11} \textit{action} + \beta_{12} \textit{fairy_tale} \\
& + \beta_{13} \textit{documentary} + \beta_{14} \textit{drama} + \beta_{15} \textit{history} + \beta_{16} \textit{horror} \\
& + \beta_{17} \textit{comedy} + \beta_{18} \textit{romance} + \beta_{19} \textit{thriller} + \beta_{20} \textit{fantasy} \\
& + \beta_{21} \textit{sci_fi} + \beta_{22} \textit{adventure} + \beta_{23} \textit{family} + \beta_{24} \textit{animated} \\
& + \beta_{25} \textit{crime} + \beta_{26} \textit{summer} + \beta_{27} \textit{christmas} + \beta_{28} \textit{easter} \\
& + \beta_{29} \textit{year_2014} + \beta_{30} \textit{year_2015} + \beta_{31} \textit{year_2016} \\
& + \beta_{32} \textit{year_2017} + \beta_{33} \textit{year_2018} + \beta_{34} \textit{year_2019} \\
& + \beta_{35} \textit{year_2020} + \beta_{36} \textit{year_2021} + \beta_{37} \textit{year_2022}
\end{aligned}$$

The first equation represents the model with revenues as the dependent variable. In the second equation, attendance will be modeled using the same set of independent variables. The p-values for the standard Breusch-Pagan test for both models were significantly below one percent. Therefore, there is strong evidence of heteroskedasticity in both models. As assumption number five is violated, we will use the HC1 variant of heteroskedasticity robust standard error for both models to have valid inferences. There were no signs of significant multicollinearity amongst the independent variables, as all the VIF values were lower than 3.5. Therefore, assumption number 3 is satisfied.

7.2 Model estimation

Table 7.1 presents the regression results of both models. As can be seen in the summary rows, a total of 1417 observations were included in both models. Measures of fit, R squared and adjusted R squared, show that our models explain over half of the variability of the dependent variables, with the first model being a slightly better fit than the second model. F-test of joint significance provided us with F statistics of over 49, which is more than enough to reject the null hypotheses that all coefficients are equal to zero.

Table 7.1: Regression results

	<i>Dependent variable:</i>	
	log(revenues)	log(attendance)
	(1)	(2)
Constant	-0.940 (0.751)	-3.736*** (0.687)
log(budget)	0.724*** (0.037)	0.619*** (0.034)
csfd_score	0.013*** (0.004)	0.016*** (0.004)
czech	2.711*** (0.214)	2.606*** (0.190)
czech_lion_win	-0.230 (0.389)	-0.223 (0.358)
czech_lion_nomination	1.254*** (0.285)	1.095*** (0.250)
oscars_win	0.649*** (0.240)	0.606*** (0.227)
oscars_nomination	0.721*** (0.168)	0.676*** (0.154)
actor	0.282*** (0.088)	0.256*** (0.084)
actress	0.343*** (0.085)	0.308*** (0.080)
director	0.348*** (0.122)	0.298** (0.117)
action	-0.159 (0.100)	-0.165* (0.093)
fairy_tale	1.130*** (0.394)	1.139*** (0.361)
documentary	-0.676** (0.292)	-0.580** (0.250)
drama	-0.703*** (0.100)	-0.646*** (0.091)
history	-0.267* (0.156)	-0.258* (0.142)
horror	0.858*** (0.133)	0.725*** (0.124)
comedy	0.243*** (0.087)	0.212*** (0.080)
romance	0.343*** (0.122)	0.302*** (0.111)
thriller	0.035 (0.097)	-0.013 (0.089)
fantasy	-0.023 (0.099)	-0.006 (0.092)
sci_fi	0.130 (0.100)	0.116 (0.094)
adventure	0.415*** (0.104)	0.426*** (0.096)
family	0.149 (0.157)	0.233 (0.146)
animated	0.118 (0.154)	0.153 (0.142)
crime	0.143 (0.105)	0.076 (0.097)
summer	0.118 (0.090)	0.093 (0.081)
christmas	0.044 (0.118)	0.032 (0.107)
easter	-0.208 (0.134)	-0.148 (0.120)
year_2014	0.211 (0.131)	0.210* (0.120)
year_2015	0.142 (0.131)	0.139 (0.121)
year_2016	-0.012 (0.131)	0.010 (0.120)
year_2017	0.273** (0.134)	0.255** (0.122)
year_2018	0.329** (0.133)	0.256** (0.122)
year_2019	0.378*** (0.135)	0.251** (0.123)
year_2020	0.234 (0.172)	-0.014 (0.158)
year_2021	-0.512*** (0.163)	-0.663*** (0.148)
year_2022	0.246 (0.153)	-0.023 (0.143)
Observations	1,417	1,417
R ²	0.579	0.570
Adjusted R ²	0.568	0.558
F Statistic (df = 37; 1379)	51.337***	49.313***

Note:

*p<0.1; **p<0.05; ***p<0.01

7.3 Interpretations of results

As expected, both models yielded very similar results regarding the direction of effects. In terms of significance, the only differences were in variables *action* and *year_2014*, all of which were insignificant in the model with revenues as the dependent variable.

Firstly, control variables will be addressed. Out of all the *years* variables included, only years 2017, 2018, 2019, and 2021 were significant. The year 2021 had a large negative effect of 51.2 percent in terms of revenues and 66.3 percent in terms of attendance compared to the base year 2013. This finding is unsurprising, as in 2021 movie theaters were closed for almost half a year (Unie filmových distributorů n.d.). However, years preceding the pandemic exhibit a positive effect of around 30 percent in terms of revenues and 25 percent in terms of attendance compared to the base year 2013. The good state of the economy could explain these effects, as the Czech Republic was experiencing average GDP growth of 3.8 percent in this period (Czech Statistical Office 2023) and confirms the trends shown in Figure 2.1 and Figure 2.2.

The second set of control variables was related to genres. Out of fifteen variables, only eight were significant in both models. However, the interpretation of these coefficients is problematic, as one movie can be labeled with multiple genres, and there is no base movie to compare the results to. The positive effects were of the fairy tale, horror, comedy, romance, and adventure genres. These results align with the survey by Nielsen (Nielsen Admosphere, a.s. 2019). On the other hand, genres that negatively affected performance were action, documentary, drama, and history. These findings are comparable with Žofčák (2020), who stated that the less complicated and traditional genres resonate better with the Czech audience.

The rest of the variables will be evaluated from top to bottom. Budget positively affects the performance of movies; a one percent increase in budget results in a 0.724 percent increase in revenues and a 0.619 percent increase in attendance. This result is in line with previous research (Litman 1983; Litman & Kohl 1989; Terry *et al.* 2011; Pangarker & E.v.d.M. 2013) and confirms the "signaling" hypothesis in terms of budgets as proposed by Ravid (1999). However, it is important to note that the impact of the budget below one indicates that additional spending suffers from the law of diminishing returns.

The second examined variable is *csfd_score*. Our results show that a one percent increase in user ratings results in a *ceteris paribus* 1.3 percent increase

in revenues and a 1.6 percent increase in attendance. These results are very similar to Žofčák (2020), who found that a one percent increase in user ratings resulted in a 1.8 increase in attendance. Ratings have a slightly larger effect on attendance than revenues, although the difference is negligible. Our findings regarding the positive impact of reviews on movie performance are in line with Žofčák (2020) and Huang *et al.* (2017).

Variable *czech*, which evaluated the effect of country of origin, had the largest effect amongst all included variables of *ceteris paribus* 271.1 percent increase in revenues and a 260.6 percent increase in attendance. This finding shows that the Czech movies are performing better in the Czech Republic and is in accordance with Litman & Kohl (1989).

If we look at variables for awards, we see that all but *czech_lion_win* are significant. The largest effect is that of the Czech Lion nomination, which results in a *ceteris paribus* 125.4 percent increase in revenues and a 109.5 percent increase in attendance. The effect of the Oscars nomination is larger than that of actually winning the award, which is partially in line with findings of Deuchert *et al.* (2005) and Litman & Kohl (1989). However, their results showed that winning the award has no impact on the performance of a movie. The effect of the Czech Lion awards is slightly smaller than that of combined Oscars effects. On the other hand, the Czech Lion awards are associated with better performance than the Oscars in terms of nominations.

None of the variables that represented the release pattern were significant, which aligns with previous research (Žofčák 2020). This finding implies that the chosen holiday periods do not influence movie performance in the Czech Republic.

The last set of variables was regarding the presence of a major celebrity in a cast or a crew. All three included variables were significant. The largest effect on revenues is that of director, followed by actress and actor. In terms of attendance, the actress's effect was larger than that of the director. The star power effects' order and significance align with Žofčák (2020); Basuroy *et al.* (2003), although the magnitudes are smaller than Žofčák (2020). These results also confirm the "signaling" hypothesis regarding movie stars proposed by Ravid (1999).

7.4 Evaluation of hypotheses

In the following section, our previously proposed hypotheses will be evaluated.

- **H1: Czech movies are grossing more than foreign movies in the Czech movie theaters.**

This hypothesis was confirmed. The variable *czech* was significant in both models, with a p-value of less than 1 percent. The effect was positive for both models, showing a ceteris paribus 271.1 percent increase in revenues and a ceteris paribus 260.6 percent increase in attendance. Therefore, Czech viewers respond well to their national production.

- **H2: User reviews positively affect movie performance in the Czech movie theaters.**

This hypothesis was confirmed. Variable *csfd_score* was significant in both models, with a p-value of less than 1 percent, and had a positive effect. This result suggests a better movie rating on the CSFD website is positively associated with better movie performance. However, as the analysis was not performed on time series data, inferences regarding the causal relationship must be made with caution, as both possible roles of reviewers should be considered Eliashberg & Shugan (1997).

- **H3: Higher production budget positively affects movie performance in the Czech movie theaters.**

This hypothesis was confirmed. Variable *log(budget)* was significant in both models, with a p-value of less than 1 percent and a positive effect on performance. Higher budgets imply improved performance but with the diminishing returns effect.

- **H4: Presence of a well-known actor, actress, or director improves movie performance in the Czech movie theaters.**

This hypothesis was confirmed. All three variables for star power (*actor*, *actress*, *director*) were significant in both models, and their effects were positive. Therefore, a movie star's presence can improve a movie's performance in the Czech Republic.

- **H5: Holiday releases perform better in the Czech movie theaters.**

This hypothesis is rejected, as none of the variables relating to the time of release (*summer*, *christmas*, *easter*) were significant in both models. This result suggests that the chosen times of release have no impact on

movie performance in the Czech Republic. This result indicates that with additional free time, Czech people prefer to spend it on other activities.

- **H6: Movies that were nominated or won the Czech Lion awards or the Oscars perform better.**

This hypothesis is partly confirmed, as all related variables except for winning the Czech Lion award were significant with p-values of less than 1 percent, and their effects on movie performance were positive. This finding implies that movie awards can improve movie performance in the Czech Republic. However, similarly to the *csfd_score* variable, caution must be exercised when drawing conclusions regarding the causal relationship.

In total, out of the six formulated hypotheses, five were confirmed. Hypothesis five was rejected as none of the corresponding variables were significant in either model.

7.5 Limitations

As with any quantitative research, several obstacles were in place. Firstly, the number of explanatory variables was limited by the availability of the data. For instance, we were unable to include marketing spending, which was proven to be a significant determinant of performance by previous research (Prag & Casavant 1994). Including marketing data in the analysis would greatly improve it. The second issue was regarding the budget data. As was mentioned in Chapter 4, it was the most limiting variable. This issue might have introduced a bias, as it is possible that some non-random portion of movies was left out of the analysis. A similar problem was encountered in the majority of previous studies due to the nature of the data, and some form of restriction on the data set had to be put in place (Litman 1983; Litman & Kohl 1989). By including as many observations in our data set as possible, we tried to limit the impact of this issue, but to some extent, it was still present. There is room for improvement by obtaining more budget data and increasing the number of observations.

Chapter 8

Conclusion

This thesis aimed to identify and quantify factors that affect the box office performance of movies in the Czech Republic. As measures of movie performance, box office revenues and attendance were used. Six hypotheses regarding movie performance were formulated after a brief overview of the Czech movie market and an inquiry into previous research. To test these hypotheses, several possible factors were included: budget, ratings, country of origin, awards, and star power. As a completely new data set had to be assembled, a comprehensive description of the data followed. Subsequently, two models were estimated using the ordinary least squares estimation method, and results were presented.

Out of the six included hypotheses, five were confirmed. Results show the positive effect of budget, ratings, country of origin, awards, star power, and specific genres on both measures of box office performance. On the other hand, the premiere timing had no significant impact. These results may be helpful to policymakers, as they may consider subsidizing some less performing but important genres, or producers and distributors, to use as guidance on the performance of their potential creation in the context of the Czech Republic.

The main contribution of this thesis is formulating and analyzing the first comprehensive model of movie performance in the Czech Republic. A sizable data set of over 1400 observations covering the last ten years was used to achieve this. This model allowed us to extrapolate previous research on the whole movie market in the Czech Republic, and the results are as much contemporary as possible. Our findings may serve as a baseline for further research on movie revenues in the Czech Republic.

There are several possibilities for further research. Firstly, a variable for sequels could be added and its effect evaluated, as it was found to be signifi-

cant by several studies (Žofčák 2020; Litman & Kohl 1989; Terry *et al.* 2011). Another possible addition could be a variable for the marketing spending, as it proved to absorb the significance of other variables (Prag & Casavant 1994). The last possible suggestion would be the time series analysis of user reviews to identify the role of reviewers in the Czech Republic (Basuroy *et al.* 2003; Eliashberg & Shugan 1997).

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Appendix A

Additional tables

Table A.1: List of actors, actresses and directors from CSFD charts

Actors	Actresses	Directors
Johnny Depp	Natalie Portman	Quentin Tarantino
Leonardo DiCaprio	Scarlett Johansson	Steven Spielberg
Tom Hanks	Angelina Jolie	Christopher Nolan
Brad Pitt	Keira Knightley	Tim Burton
Bruce Willis	Jennifer Aniston	James Cameron
Morgan Freeman	Meryl Streep	David Fincher
Christian Bale	Kate Winslet	Ridley Scott
Robert Downey Jr.	Helena Bonham Carter	Peter Jackson
Robert De Niro	Cate Blanchett	Martin Scorsese
Jack Nicholson	Nicole Kidman	Miloš Forman
Will Smith	Uma Thurman	Clint Eastwood
Jim Carrey	Emma Watson	Stanley Kubrick
Al Pacino	Sandra Bullock	George Lucas
Tom Hardy	Anne Hathaway	David Lynch
Sylvester Stallone	Julia Roberts	Darren Aronofsky
Keanu Reeves	Charlize Theron	Woody Allen
Nicolas Cage	Jennifer Lawrence	Michael Bay
Kevin Spacey	Emma Stone	Robert Zemeckis
Edward Norton	Milla Jovovich	Guy Ritchie
Hugh Jackman	Audrey Hepburn	Frank Darabont
Arnold Schwarzenegger	Rachel Weisz	Hajao Mijazaki
Heath Ledger	Kate Beckinsale	Francis For Coppola
Ewan McGregor	Sigourney Weaver	Robert Rodriguez
Russell Crowe	Naomi Watts	Alfred Hitchcock
Jake Gyllenhaal	Mila Kunis	Jan Svěrák
Ivan Trojan	Cameron Diaz	Sergio Leone
Jason Statham	Rachel McAdams	Jiří Menzel
Anthony Hopkins	Penélope Cruz	Joel Coen
Clint Eastwood	Emily Blunt	Jan Hřebejk
Adam Sandler	Megan Fox	Ladislav Smoljak