SIGNALING AND PUBLIC FILM FUNDING IN GERMANY

Florian Kumb, Reinhard Kunz

Diskussionspapier Nr. 02-17
Oktober 2017

ISSN 1611-3837
Abstract

Signaling and Public Film Funding in Germany

This article applies Structural Equation Modeling to examine signaling factors during the financing phase of motion picture. Findings demonstrate that public funding uses non-content signaling factors while private investors do not. Furthermore, private investments do not affect funding bodies nor does the subsidization level influence investors. Consequently, the risk of adverse selection results in inefficient subsidization. Results contribute insights into operational management of public subsidization and the differing decision-making rationale of public and private financiers.

Keywords: Motion picture industry, film subsidies, public and private financing, Signaling Theory, Structural Equation Modeling
1. Introduction

Public film funding is important in many European markets. In Germany, 18 different federal and regional film funds spend more than 300 million Euros per year (FFA, 2014). The budget of the current MEDIA program of the European Union amounts to 1.5 billion Euros between 2014 and 2020 (European Commission). Nevertheless, the impact of public subsidization on creative industries in general and the film industry in particular is an ongoing political and academic debate. The positive impact of public film funding on the viability of the industry has been denied by empirical studies (e.g., Bagella and Becchetti, 1999; Jansen, 2005; McKenzie and Walls, 2013).

However, the reasons that have reinforced the state’s role in film financing prevail. The film industry differs considerably from perfect market competition and is fraught with high risk. Large investment requirements and limited product life cycles impede reliable forecasts. Although the total market revenues remain comparatively stable (Hand, 2002), individual profits of a movie differ widely and are hardly predictable (Bi and Giles, 2009). This implies immanent conflicts between distributors and exhibitors (Chiou, 2008). In addition to the economic reason of market failure, cultural purposes are major arguments for public subsidization. They include objectives, such as the creation of a cultural identity, the increase in cultural diversity, and positive externalities (e.g., Vitkauskaite, 2015). Goal ambiguity, which is an important constraint in public administration (Chun and Rainey, 2005), is empirically observable.

In microeconomic theory, financiers choose the best content option. Private investors contribute exactly that amount of financial resources that can be returned during the exhibition period. Public funders, by contrast, contribute greater financial resources that are economically inefficient but socially desirable. However, the ongoing debate on the effects of market regulation implies that empirical outcomes are ambivalent and require further research (e.g., Jansen, 2005; Meloni et al., 2015). Nevertheless, research regarding the motion picture industry focuses on value creation after financing (e.g., Eliashberg et al., 2006; McKenzie, 2012; Simonton, 2009). Most scholars examine theatrical exhibition (e.g., De Ross and McKenzie, 2014; Gil, 2007; Moul, 2008). Even studies on public film funding analyze output-related research issues, such as the relationship between subsidization level and box-office revenues (e.g., McKenzie and Walls, 2013). Financial resources as a major input factor and film financing at the initial stage of value creation have received only little attention.
The aim of this paper is to advance academic research concerning strategic behavior in the context of public subsidization. We test disposable non-content signaling factors that are available during film financing. The paper answers the following research questions:

**RQ1:** What signaling factors other than content-related aspects are relevant for (a) public film funding bodies and (b) private investors?

**RQ2:** How appropriate are the non-content signaling factors to prevent adverse selection?

We use a comprehensive data set of the German motion picture industry to analyze the research questions. All 2,010 locally produced or co-produced motion pictures, theatrical-released in Germany between 2005 and 2014, are included in this data set. Our results from structural equation modeling suggest that public subsidization depends on star power, producer power, and reputation potential. At the same time, these non-content factors cannot explain the decision-making rationale of private investors. Furthermore, there is barely any statistical dependency between private investment and public subsidization. Consequently, we show that signaling factors which are utilized by public funding bodies aggravate the risk of adverse selection.

These insights contribute to literature in two dimensions. Firstly, the research expands industrial organization theory in the context of public subsidization. Secondly, this paper is among the first to examine, theoretically and empirically, signaling theory in the context of film financing in highly subsidized market settings. Both contributions may be helpful to improve subsidy allocation and public subsidization schemes.

The remainder of the paper is structured as follows. First, we review previous economic literature regarding signaling theory and film financing. After that, we develop the theoretical framework of this paper. Then, we conceptually frame and present our modeling approach, including method, hypotheses, and data description. This is followed by a description of the empirical findings and a discussion of the results. The last section concludes, abstracts, and points out limitations as well as further research opportunities.
2. Literature Survey

The motion picture industry is a well-researched subject, especially in management and marketing research. Comprehensive literature reviews of Chisholm et al. (2015), Eliashberg, et al. (2006), Hadida (2010), (cite withheld for blind review), McKenzie (2012), and Simonton (2009) present the various insights. This paper is based on three specific fields of this research. Firstly, film financing usually requires negotiations between independent institutions. The resulting contractual relations between financiers and production companies are described in literature as principal-agent relationships. Therefore, agency theory, the inherent risks of such relationships, and signaling theory as the basis for possible solutions create an essential theoretical foundation of this paper. Secondly, in many European markets, similar to R&D, film financing depends significantly on public subsidization. Consequently, the insightful field of research on the relationship between public subsidies and private investments constitutes a further theoretical component. Thirdly, we address the consequences of public film funding. Thus, we build our study on previous academic research based on the negative effects of public funding in several motion picture markets.

2.1. Signaling in Principle-Agent Relationships

Agency theory addresses transactions between independent institutions. The approach describes relationships in which a requesting principal engages an agent to perform certain tasks in situations where conflicts of interest, uncertainty, and asymmetric information exist. The theory is mainly based on the work of Alchian and Demsetz (1972), Ross (1973), as well as Jensen and Meckling (1976). Film studios are the leading institutions in the multi-organizational network of U.S. film production (see Chiou (2008) on the relationship distributors and exhibitors). Production companies (agents) make decisions during the period of production that affect financiers (principals). On this occasion, production companies could opportunistically exploit their informational advantage during the financiers’ decision-making process. This includes their knowledge regarding their suitability (hidden characteristics, e.g. concerning production capability), the agent’s real objectives (hidden intention, e.g. about budget allocation), and the agent’s performance (hidden action, e.g. concerning a movie’s real quality).

As a result, financiers of motion pictures face several risks that are inherent in the contractual relationship. They are described as adverse selection, hold up, and moral hazards (Picot et al., 2008). The risk of adverse selection is highly relevant at the preliminary stage of
film financing. It deals with the ex-ante, erroneous selection of an agent by a principal, which is defined by Akerlof (1970). This risk exists because of insufficient information on the agent’s characteristics (Laffont and Martimort, 2002; Picot et al., 2008). Film investors also face a high risk of adverse selection or rejection of profitable projects offered by production companies (Bagella and Becetti, 1995; Gil, 2007). Several studies discuss this economic problem in literature. Some authors address inefficiency problems of underlying bilateral contracts between distributors and production companies (e.g., Corts, 2001; Scott, 2004). Other researchers examine the relationship with third party investors (e.g., Hofmann, 2013) and in the context of crowdfunding (e.g., Seog and Hyun, 2009).

Potential solutions are screening by the principal (Stiglitz, 1975) as well as signaling by the agent (Spence 1974, 1974a). Connelly et al. (2011) provided a comprehensive literature review on signaling theory. Riley (2001) and Stiglitz (2002) provided numerous economic insights that result from screening and signaling. Kirmani and Rao (2000) developed a classification of possible signals. For the motion picture industry, Basuroy et al. (2006) contributed an empirical analysis of signaling during the distribution of films using the examples of advertising expenditures and sequels. Stars are another possible signaling factor (e.g., Elberse, 2007).

2.2. Relationship between investment and subsidization: R&D and movies

Motion pictures are information goods. Each film represents a unique copy that was individually manufactured and has a limited product life cycle. Product features, pricing, distribution, and communication strategies need to be combined individually. Thus, high sunk costs and uncertainty prevail (Bi and Giles, 2009; Hand, 2002) and create difficult economic conditions. In particular, European politicians legitimize public film funding by means of the existence of market failures, public good characteristics (Vogel, 2015), and positive externalities (e.g., Meloni et al., 2015; McFadyen et al., 2000; Vitkauskaite, 2015).

Research & Development (R&D) projects and motion pictures have similar characteristics. The risk associated with R&D spending is also high. Nonetheless, many R&D investments are socially desirable due to positive externalities. Market imperfections may prevent private R&D expenses from reaching the socially optimal level (Stiglitz and Rosengard, 2015). This is observable if appropriability of profits is imperfect; thus full exclusion of third parties is prohibited. Consequently, insights into the relationship between R&D subsidies and private investments could provide indications of the relationships between
private financiers and public funders in the motion picture industry. Kleer (2008), for example, argued that R&D subsidies act as a signaling factor for private investors. Other researchers analyzed joint investment situations (e.g., Cassiman, 2000; Erkal and Piccinin, 2010). Talako et al. (2013) contributed a relevant modeling approach for the interaction of public and private R&D financing. Zuniga-Vicente et al. (2014) compiled a detailed overview of research on R&D spending.

2.3. Effects of Public Film Funding

Several studies examine the effect of public subsidization in the context of motion picture markets (e.g., Marvasti and Canterbery, 2005). Iapadre (2014) provided a comprehensive summary of the debate on this issue. Some scholars revealed additional insights into individual markets. Bagella and Becchetti (1999) showed the independence of box-office revenues from subsidies in Italy. Meloni et al. (2015) argued that there are genre-specific differences. Jansen (2005) demonstrated that film funding schemes in Germany do not support the viability of the German film industry. Regional funding schemes in some states of the U.S.A. have also been criticized (e.g., Tannenwald, 2010). Furthermore, there is no correlation between film funding and economic success in the Australian theatrical market, according to the study of McKenzie and Walls (2013).

3. Theoretical Framework

Film financing in many markets comprises two components: private investments and public subsidies. Assuming that fundamental principles of microeconomic theory, such as optimizing and rational behavior, prevail, private investors strive to maximize individual profits. They contribute the amount that is necessary to reach this purpose. At the same time, the contribution does not exceed the revenue expectations of exhibition. Nevertheless, several reasons based on information asymmetries, positive external effects, and merit good characteristics are ascribed a social welfare contribution that exceeds private investment (e.g., Vitkauskaite, 2015). Although not recoupable and therefore economically inefficient, they are socially desirable. Therefore, governments in many European countries, such as Germany, commit themselves to support the film industry (e.g. FFA). The amount of subsidies corresponds to the movie’s contribution to social welfare and compensates for private underinvestment.
Let $C_i$ be the predetermined exogenous costs of movie $I$, which is a proposed financing option. The variable $P_i$ symbolizes the willingness of private financiers to invest, which equates at most the expected revenues $R_i$ of exhibition ($R_i \geq P_i$). $S_i$ symbolizes the willingness to subsidize, which should equate at most the added social welfare $AW_i$ ($S_i \leq AW_i$). From the perspective of a social planner, the subsidy allocation may lead to four possible outputs, two are optimal and two are suboptimal. As Table 1 shows, the outcomes are optimal provision, optimal non-provision, suboptimal provision, and suboptimal non-provision of a movie budget.

### Table 1 Outputs of subsidy allocation in film financing

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal provision</td>
<td>$S \leq (C - P) \leq AW$</td>
</tr>
<tr>
<td>Optimal non-provision</td>
<td>$S &lt; AW &lt; (C - P)$</td>
</tr>
<tr>
<td>Suboptimal provision</td>
<td>$AW &lt; (C - P) \leq S$</td>
</tr>
<tr>
<td>Suboptimal non-provision</td>
<td>$S &lt; (C - P) \leq AW$</td>
</tr>
</tbody>
</table>

The two suboptimal outputs lead to adverse selection (Picot et al., 2008) because subsidies are provided although $C_i - P_i$ is above $AW_i$ or subsidies are withheld although $C_i - P_i$ is below $AW_i$. Possible strategies to overcome this state are screening and signaling (Connelly et al. 2011). Efficient signaling of applying institutions may prohibit suboptimal non-provision, while effective scanning of funding bodies may prohibit suboptimal provision; both involve the use of signaling factors. However, signaling factors may be misinterpreted, unreliable, or even abused. From the perspective of a public funding body, this will lead to inefficient subsidy allocation, which is empirically observed (e.g., Jansen 2005). The following modeling approach investigates signaling in the film financing process in the German motion picture industry.

### 4. Modeling Approach

The aim of our modeling approach is to conceptualize and examine if non-content signaling factors are utilized in the context of film financing in Germany. Furthermore, we investigate if these signaling factors compensate for the risk of adverse selection or provide a sufficient explanation for existing inefficiencies. Therefore, we develop hypotheses, which are derived
on the basis of economic literature, construct a research model, and test it empirically, using structural equation modeling (SEM).

4.1. Hypotheses

Screening and signaling by involved stakeholders characterize the process of film financing. At the financing stage, there are not many decision factors available to private investors and public funders, except for the film-specific script or concept. These are commitments of participants in major onstage and offstage positions, including the director, main cast, producers, and production crew.

4.1.1. Star Power

The decision on the director and the main cast is usually taken, at the latest, after the completion of the script. Their commitment may influence the decision of private investors and public funding bodies. The employment of stars, including well-known actors and directors, is frequently discussed in literature. Several studies confirmed a positive influence of stars on box-office revenues (e.g., Elberse and Eliashberg, 2003; Gonget al., 2011; Hadida, 2010; Hennig-Thurau et al., 2012; Nelson and Glotfelty, 2012; Walls, 2009). The involvement of stars may be a quality signal to investors and funding bodies. Star Power increases revenue expectations (Elberse, 2007) and reduces the risk of sunk costs (e.g., De Vany and Walls, 2004; Hennig-Thurau et al., 2013). Therefore, we assume that Star Power, defined as the cumulative popularity of cast and director, is a signaling factor for public and private financing decisions.

H1a: The level of star power is a signaling factor with a positive influence on public subsidization.

H1b: The level of star power is a signaling factor with a positive influence on private investment.

4.1.2. Producer Power

In addition to the essential project-based creative staff, such as producers or art directors, private investors and public funding bodies know the applying production company. From the resource-based view, the past development of a company signals competitive advantages due
to diseconomies of time compression (Peteraf, 1993) for competitors. This includes knowledge of customer expectations and behavior as well as existing relations with potential investors or members of funding committees. We define *Producer Power* as the cumulative perceived creative and economic competitiveness. Previous findings show that the success of a film is influenced by the size of its distributor (e.g., Chang and Ki, 2005; Natividad, 2013; Prieto-Rodriguez et al., 2015). If the production company is among the major producers, this may influence financiers’ decisions accordingly. Therefore, we assume that the power of the production company in terms of creativity and economic strength is a signaling factor and has a positive influence on investors and funding bodies.

\[ H_{2a}: \text{The level of producer power is a signaling factor with a positive influence on public subsidization.} \]

\[ H_{2b}: \text{The level of producer power is a signaling factor with a positive influence on private investment.} \]

4.1.3. *Reputation Potential*

On the one hand, participating staff has a substantial interest in enlarging their creative reputation as a signaling factor to justify higher fees in the future (Wei, 2006). On the other hand, the reputation of the producer and team members can be a greater signaling factor of high-quality art-house movies than mass-market movies. Using the example of the Dutch motion picture market, Ebbers and Wijnberg (2012) showed that artistic reputation leads to lower investments because of conflicting targets of art and business. We hypothesize the same effect for the German market.

The constellations of certain subjects (e.g., biopics or historical drama) and members of cast and team may be helpful to receive public attention and positive responses within the industry (e.g., Ravid et al., 2006). The central task of public funding bodies is to support the industry’s development (e.g., German Federal Film Law) and in this way legitimate its work. Therefore, a higher reputation potential of the movie, defined as the cumulative signaling strength, may increase the public subsidization propensity. We assume that a higher reputation potential increases public subsidization but diminishes private investment.
H₃ₐ: The reputation potential is a signaling factor with a positive influence on public subsidization.

H₃ₖ: The reputation potential is a signaling factor with a negative influence on private investment.

4.1.4. Film Financing Sources: Private Investment and Public Subsidization

Two funding sources are usually available in Europe to finance films: private investments by production companies or third parties and public film funding (Cineuropa). In our model, public subsidization and private investment serve as endogenous constructs, where the funding bodies are informed about private investment amounts. The reason is that the producer discloses the financing structure of a film project when applying for public funding according to the terms and conditions of German funding bodies (e.g., FFA). Regarding the funding objective of encouraging economic development, we assume that the investment amount is a signal that positively affects public subsidization.

H₄: The level of private investment is a signaling factor with a positive influence on public subsidization.

Following the economic principle of microeconomic theory, private investors try to maximize investment returns and minimize investment amounts. Therefore, we assume in an alternative model that private investors anticipate the public subsidization propensity and adjust their investment accordingly. Therefore, an increase in public subsidization does not serve as a signaling factor that increases private investments due to their aim of risk reduction.

H₅: The level of public subsidization is a signaling factor with a negative influence on private investment.

4.2. Research model

Star Power, Producer Power, Reputation Potential, Private Investment, and Public Subsidization are the latent variables (constructs) of the research model. We hypothesize that
Private Investment and Public Subsidization are both endogenous constructs, which are influenced by the signaling factors Star Power, Producer Power, and Reputation Potential. Additionally, we hypothesize a correlation between Public Subsidization and Private Investment. Figure 1 illustrates the structural model with its corresponding hypotheses.

![Structural Model with Hypotheses](image)

**Fig. 1** Structural model with hypotheses

4.3. Method

SEM is a well-established method in marketing and management research to analyze effects of latent variables and underlying relationships (Gefen et al., 2000). SEM is a regression-based, integrative approach, which encompasses different statistical methods (Bowen and Guo, 2011). Kaplan (2009) provides a comprehensive overview of this method.

There are two major approaches to empirically apply SEM. In addition to covariance-based SEM (CB-SEM), which is mainly used, partial least square structural equation modeling (PLS-SEM) is an alternative variance-based approach (Hair et al., 2011). PLS-SEM, primary developed by Lohmoeller (1989), faces growing popularity in marketing and
management literature (Hair et al. 2012; Peng and Lai 2012). An increasing number of papers in leading journals apply this approach (Reinartz et al., 2009). It is more suitable in an exploratory design, whereas CB-PLS is mainly used to test well-established theories. Our research aim is to identify major signaling factors and their relationships in film financing; the character of this primary test of the derived hypotheses requires the application of PLS-SEM (Hair et al., 2011; Reinartz et al., 2009). Furthermore, PSL-SEM is capable of dealing with a lower number of manifest indicators per construct than the covariance based approach (Reinartz et al., 2009; 1975). If there are only measures that are formatively specified, CB-SEM cannot be applied due to identification problems (Diamantopoulos and Riefler, 2011; MacCallum and Browne, 1993). Additional reflective indicators have to be integrated (Bollen and Davis, 2009). The overall performance of PLS-SEM models is less susceptible to weak individual constructs and misspecified paths (Chin, 2010; Reinartz et al., 2009). At the same time, we have to pay attention to major limitations of this approach. The absence of a global goodness-of-fit index and consistency tests of measures are major weaknesses of PLS-SEM (Hair et al. 2014; Henseler and Sarstedt, 2013). A group of sub-indices tries to compensate for these limitations. For example, the Standardized Root Mean Square Residual (SRMSR, Hu and Bentler, 1999) is one quality criterion, which covers the difference between perceived and predicted correlations. The findings of Bentler and Huang (2014) as well as Dijkstra and Schermelleh-Engel (2014) address these limitations. We use SmartPLS 3 (Ringle, Wende, and Becker et al., 2015) to analyze our research model empirically.

4.4. Measurement Model and Data Description

The sample of this study consists of data on the German motion picture industry. The industry information service Mediapix / Blickpunkt-Film provides basic information on motion pictures, including cast, production companies, crew, cinema release date, country of origin, and partly budget. Firstly, all motion pictures that were released in German cinemas between 2005 and 2014 are considered (N=5,200). Selection effects are excluded since all movies with a minimum length of 40 minutes are taken into account². Secondly, we split all motion pictures by their country of origin. As a result, 2,010 films form the sample of this study. They were locally produced (n=1,277) or co-produced (n=733) in Germany, which is a prerequisite to apply for public film funding.

Star Power of a movie is a latent variable and consequently is uncountable. Derived from literature (e.g., Karniouchina, 2011), we introduce measures for cast as well as directors to describe this construct. Therefore, we develop local popularity indices for cast and
directors of each movie in its year of production. The score is based on an annual community ranking of Filmstarts, one of the leading German online film magazines (2.83m unique users per month). These time-dependent and country-specific measures take into account that star power can significantly change between countries and during a star’s career. They are formative indicators of star power because they are defining characteristics of the construct (Diamantopoulos and Winklhofer, 2001). Furthermore, the measures are not interchangeable and do not covary (Jarvis et al., 2003).

Measuring Producer Power is difficult due to its invisibility. Thus, we need to identify adequate measures to evaluate the construct. The number of produced movies in the period under consideration may serve as an indicator for company size, separating small and medium-sized production companies from major producers. Furthermore, the track record of a company may signal economic competitiveness. The track record is a performance indicator, which consists of the cumulated cinema admissions in Germany of all of the company’s movies during the period under consideration until the year before a respective movie is released. Both measures, the number of produced movies and the track record, refer to legally independent production companies. Dependent companies, i.e. companies of which other production companies hold at least 25 percent of the capital, are consolidated. Consequently, we can avoid the influence of volatile legal structures, which are exemplarily caused by single-purpose companies (e.g., Studio Babelsberg subsidiaries), that major companies frequently found for realizing one single motion picture. We specify the measures formatively due to their characterizing effect on the construct and the absence of interchangeability (Diamantopoulos and Winklhofer, 2001; Jarvis et al., 2003).

Since Reputation Potential is also a latent variable, it needs an appropriate operationalization. We base the quality rating of a film on the (actual) reputation received by critics and award juries, and apply the reviews of Filmstarts’ editorial staff (Review_FS), which are based on a 0 to 5 scale. In addition, we use the number of nominations in major film-related categories of the Academy Awards (“Oscar”), Golden Globes, European Film Awards (“Felix”), German Film Awards (“Lola”), and the Berlin International Film Festival (“Bears”). We choose nominations instead of awards received because they comprise a larger reference group of high-quality movies and a lower bias risk of irrelevant circumstances that may affect the decision (Cite withheld for blind review). The measures are formative as they characterize the construct individually, they are not interchangeable, and they do not covary (Diamantopoulos and Winklhofer, 2001; Jarvis et al., 2003).
The information on *Public Subsidization* originates from annual reports of the considered funding bodies. These include two federal funding sources (FFF-P, BKM) as well as the nine biggest regional funding initiatives in terms of annual subsidy amounts\(^3\) (FMS, FFHSH, HIF, MBB, MDM, MFG, FFF, FFF-BBF, and NM)\(^4\). The public funding decision is usually carried out by committees (e.g., FFA-P) or the management (e.g., MBB) of the respective funding body. The reasons for acceptance or rejection are unknown; they are not even presented to the applying companies. Exceptions (and therefore unconsidered) are the automatic funding of DFFF, which requires to meet formal criteria, and FFA reference funding, where the applying company qualifies for subsidization if it had a successful project in the past. Total public subsidization is not observable; therefore, it is described by the effective funding amount of the eleven funding bodies. The measures are formative due to their individual contribution to explaining subsidization levels and their missing interchangeability (Diamantopoulos and Winklhofer, 2001; Jarvis et al., 2003).

*Private Investment* is a construct that includes all financial contributions that are not public subsidies. It consists of one manifest indicator, the cumulated investment amount. Movie budgets are the basis of this measure, however, they are partially unavailable. Therefore, we use the data set of our previous study (cite withheld for blind review). Compared to other empirical studies on the motion picture industry, which conduct sample selection (e.g., Elberse and Eliashberg, 2003) or list-wise deletion (e.g., Clement et al., 2014), our data set is free of missing values due to imputation procedures. This prevents the risk of bias, since budget data are not missing completely at random (Little’s 1988 MCAR-Test results: Chi-square = 274.538, d.f. = 18, p \(\leq .001\)). Additionally, we improve the accuracy of estimates to the (unknown) true budget value of documentaries, which have homogenous and comparatively low budgets in Germany. With the help of two industry experts, we introduce three budget categories\(^5\) to reduce the volatility of imputed budget data of 376 documentaries and approach the true (unknown) budget values.

5. Findings

We test the hypothesized relationships and estimate individual path coefficients and quality indices with SmartPLS. The findings regarding our structural and measurement models are presented and discussed below.

5.1. Descriptive Statistics and Quality Indices
Based upon theoretical considerations, we develop two models. Model 1 includes hypotheses H1 to H3 and H4 (influencing factors of public funding). Model 2 includes H1 to H3 and H5 (influencing factors of private investment). Table 1 provides an overview of all included variables and their descriptive statistics.

**Table 2** Variables in the research model’s descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAST</td>
<td>2,010</td>
<td>0</td>
<td>205</td>
<td>8.31</td>
<td>22.51</td>
</tr>
<tr>
<td>DIRECTOR</td>
<td>2,010</td>
<td>0</td>
<td>16</td>
<td>.12</td>
<td>.97</td>
</tr>
<tr>
<td>NO. OF MOVIES</td>
<td>2,010</td>
<td>1</td>
<td>51</td>
<td>2.60</td>
<td>5.98</td>
</tr>
<tr>
<td>TRACK_RECORD</td>
<td>2,010</td>
<td>0</td>
<td>3,297,284</td>
<td>108,202.34</td>
<td>315,807.75</td>
</tr>
<tr>
<td>NOMINATIONS</td>
<td>2,010</td>
<td>0</td>
<td>4</td>
<td>.11</td>
<td>.43</td>
</tr>
<tr>
<td>REVIEW_FS</td>
<td>2,010</td>
<td>0</td>
<td>5</td>
<td>2.22</td>
<td>1.51</td>
</tr>
<tr>
<td>INVESTMENT AMOUNT</td>
<td>2,010</td>
<td>0</td>
<td>67,176,000</td>
<td>2,470,699.91</td>
<td>5,714,320.39</td>
</tr>
<tr>
<td>BKM (federal)</td>
<td>2,010</td>
<td>0</td>
<td>908,000</td>
<td>25,942.23</td>
<td>76,336.26</td>
</tr>
<tr>
<td>FFA-P (federal)</td>
<td>2,010</td>
<td>0</td>
<td>1,000,000</td>
<td>76,490.55</td>
<td>163,225.31</td>
</tr>
<tr>
<td>FFF (regional)</td>
<td>2,010</td>
<td>0</td>
<td>3,573,244</td>
<td>73,481.34</td>
<td>232,955.22</td>
</tr>
<tr>
<td>FFF-BBF (banks)</td>
<td>2,010</td>
<td>0</td>
<td>1,000,000</td>
<td>4,987.56</td>
<td>48,649.89</td>
</tr>
<tr>
<td>FFHSH (regional)</td>
<td>2,010</td>
<td>0</td>
<td>1,110,000</td>
<td>30,496.70</td>
<td>113,782.31</td>
</tr>
<tr>
<td>FMS (regional)</td>
<td>2,010</td>
<td>0</td>
<td>2,500,000</td>
<td>94,090.67</td>
<td>251,437.18</td>
</tr>
<tr>
<td>HI (regional)</td>
<td>2,010</td>
<td>0</td>
<td>1,000,000</td>
<td>12,292.22</td>
<td>81,327.14</td>
</tr>
<tr>
<td>MBB (regional)</td>
<td>2,010</td>
<td>0</td>
<td>1,700,000</td>
<td>72,592.43</td>
<td>175,933.54</td>
</tr>
<tr>
<td>MDM (regional)</td>
<td>2,010</td>
<td>0</td>
<td>1,000,000</td>
<td>34,830.18</td>
<td>123,469.93</td>
</tr>
<tr>
<td>MFG (regional)</td>
<td>2,010</td>
<td>0</td>
<td>800,000</td>
<td>16,869.24</td>
<td>76,314.15</td>
</tr>
<tr>
<td>NM (regional)</td>
<td>2,010</td>
<td>0</td>
<td>700,000</td>
<td>6,289.24</td>
<td>39,146.29</td>
</tr>
</tbody>
</table>

Our models achieve an SRMSR of 0.029 as shown in table 2, which is below the cutoff value of 0.08 (Hu and Bentler, 1999). Furthermore, we control for multicollinearity using variance inflation factors (VIF). All values of both the structural (inner) and measurement (outer) models are between 1.006 and 1.860 with the exception of FFA, which has a VIF of 2.572. This is below the threshold of 5.0 (Hair et al., 2010) and the more restrictive threshold of 3.33 (Diamantopoulos and Siguaw, 2006). The common method bias is irrelevant because our data comes from different independent sources (Podsakoff et al., 2003).
The R² coefficients of determination (Adjusted R²) as further quality criteria show robust but differing results for endogenous constructs. Exogenous constructs of non-content signaling factors account for 37.9 percent (37.1 percent) of the variance in public subsidization, whereas they explain only 4.6 percent (5.7 percent) of private investment. According to Chin (1998), the explanation level of public subsidization is moderate (R² ≥ 0.33), whereas non-content signaling factors explain private investment insufficiently (R² < 0.19). All t-tests prove statistical significance (p ≤ 0.05).

The outer weights of exogenous constructs show significant effects in both measurement models (p ≤ 0.001), except for the director popularity index. The insignificant specification (p = 0.255; 0.281) may result from the nature of the index, which refers to just one crew position. Consequently, there are many 0 values, reflecting low-ranked directors in terms of popularity. The outer weights of endogenous constructs yield significant results for all large funding bodies (FFA, FFF, FFF-BBF, MBB, FMS) at a significance level of p ≤ 0.05. Smaller funding bodies show volatile results, e.g. BKM is a significant indicator in model 2 (p = 0.038), but not in model 1 (p = 0.127). MFG is significant at p ≤ 0.10 (p = 0.051, 0.62). Results for FFHSH, HI, MDM, and NM are insignificant (p ≤ 0.05). These findings reflect that smaller funding bodies support a smaller number of projects, e.g. HI subsidized 103 films (5.12 percent of all subsidized films).

Construct validity and indicator reliability are not applied due to the fact that indicators are not necessarily correlated (Goetz et al., 2010). Results of cross-validation communality estimates are divergent. All results of exogenous indicators show values above 0, except for Reputation Potential (Q² = -0.125, -0.124). This demonstrates that indicators of Star Power and Producer Power are sufficient to predict endogenous constructs, whereas
indicators of Reputation Potential face weaknesses. Nevertheless, cross-validation redundancy (Stone-Geisser-Test), which is recommended by Hair et al. (2014a), yields sufficient results ($Q^2 > 0$) and thus indicates predictive relevance (Chin, 1998).

Overall, the models meet the applicable quality criteria and provide suitable results to explain public subsidization, especially with regard to the fact that content-related factors are not part of our modeling approach.

5.2 Discussion

Figure 1 presents the standardized path coefficients of the structural equation model, assuming a positive influence of private investment on public funding. Figure 2, however, shows the standardized path coefficients for the model, assuming the hypothesis that private investors anticipate public subsidization and therefore, reduce private investment levels.

![Diagram of Research Model 1](image)

**Fig. 2** Research Model 1
The influence of Star Power on public subsidization confirms H1a with comparatively high path coefficients ($w = 0.313, 0.321$) and shows that funding bodies take into account stars as a relevant factor. This result validates the use of Star Power as a plausible signaling factor, which is discussed in the literature (e.g., De Vany and Walls, 2004; Elberse, 2007; Hennig-Thurau et al., 2013), to apply for public funding. H1b, by contrast, has to be rejected due to low path coefficients ($w = 0.085, 0.041$). This result, a low impact of Star Power on private investment, contradicts the signaling characteristics and provides evidence for the findings of Brewer et al. (2009), who assume that star fees are able to skim off additional revenues. Consequently, private investors do not link their financing decision to a high degree of Star Power due to unaffected profitability. Similarly, the risk arises that star fees do not contribute additional social welfare but involve additional funding. Therefore, our study advises against utilizing Star Power as a deciding factor due to the risk of inefficient subsidy allocation for the benefit of funding proposals that involve Star Power.

The comparatively high influence of Producer Power on public subsidization ($w = 0.364, 0.372$) confirms H2a. This result implies that the consideration of this signaling factor may prohibit equal access to subsidies in the German market. Producers that have realized a large number of motion pictures or successful movies in the past tend to receive

Fig. 3 Research Model 2
more subsidies. Explanations for this may be the degree of professionalization in applying for public funding or the closeness of certain companies to decision-makers of the funding bodies (Suárez, 2011). Apart from that, funding bodies may use the signaling factor to reduce risks by subsidizing projects of well-known production companies, which has approved their efficient subsidy utilization through continuous signaling. However, *Producer Power* does not, or barely, influence private investors. H2b currently needs to be rejected due to low path coefficients (w = 0.109, 0.059). One conclusion is that production companies have equal access to private investment resources. The content is more important to private investors than the content’s producer. This means that the production company is an irrelevant signaling factor to private investors as long as it meets minimum requirements regarding production capability. This is an indicator of homogeneous and mobile core resources of production companies and puts the high influence of *Producer Power* as a signaling factor for public funding into question. Therefore, our study advises against utilizing *Producer Power* as a deciding factor for subsidy allocation due to the risk of market foreclosure.

*Reputation Potential* has a limited impact on public subsidization (w = 0.107, 0.116) and private investment (w = 0.121, 0.105). The path coefficients are indeed meaningful (w ≥ 0.100) according to Lohmoeller (1989), but according to Chin (1998), they are not (w ≥ 0.200). Therefore, we need to state only a small but positive effect of the signaling factor in both models that requires further validation. Generally speaking, our results confirm H3a and reject H3b. The results concerning public subsidization designate the nature of the German motion picture industry that is characterized by small and medium-sized companies. They offer many subsidized art-house movies of average kind and quality, which makes a distinction more difficult and reduces the signaling effect. Our results concerning private investment reflect ambiguous previous findings in literature. Some studies that examine the impact of favorable reviews on profitability confirm a positive effect (e.g., Clement et al., 2014; Jansen, 2005; Henning-Thurau et al., 2012), while others argue for equivocal correlations (e.g., Hennig-Thurau et al., 2006). Koschat (2012) as well as Reinstein and Snyder (2005) show a positive influence of positive reviews on revenues of art-house movies. This explains the positive effect of *Reputation Potential* on private investment due to the comparatively high percentage of subsidized art-house movies in Germany. Simultaneously, this reduces the signaling effect. Therefore, our study advises against utilizing *Reputation Potential* as a deciding factor for subsidy allocation in highly subsidized motion picture markets with a high rate of art-house movies.
A low regression weight regarding the influence of \textit{Private Investment} on \textit{Public Subsidization} ($w = .084$) demonstrates that both financing sources in model 1 are not interdependent. Public funding bodies do not incorporate the amount of private investment as a signaling factor in their decision-making process. This can be ascribed to goal ambiguity (Chan and Rainey, 2005) or other inefficiencies in subsidy allocation. Consequently, an increase in private investment does not increase public subsidization levels. Private investors, who try to reduce their economic risk, are not rewarded for higher investments.

In contrast to this finding, model 2 detects a small positive impact (according to Lohmoeller, 1989) of higher public subsidization levels on the share of the budget that is privately financed ($w = 0.135$). Chin (1998), however, negates a substantial influence if weights are below 0.20. Furthermore, minimum budget requirements state that five percent of total investments should come from the applying production company. This may explain the unexpectedly positive influence of this signaling factor on funding amounts. Private investors, who try to reduce their economic risk, do not need to increase the share of private investments; therefore, they remain at the minimum requirements. Thus, increased budgets with increased total amounts of subsidies lead to higher private investments in total, although the percentage may remain stable at five percent. Therefore, an increase in public funding does not serve as a signaling factor to increase private investment activity. Mediating, indirect effects are generally low and insignificant at a level of $p \leq 0.05$. Thus, we have to reject both, H4 and H5.

These results indicate that \textit{Star Power}, \textit{Producer Power}, and partly \textit{Reputation Potential} influence public film funding although this may be disadvantageous for social welfare. Contrarily, \textit{Private Investment} is no signaling factor that leads to higher public funding. However, this would be advantageous to achieve the economic objectives of public funding bodies. Firstly, subsidies should allow the production of movies by contributing additional financial resources that are not supplied by the market. Secondly, in a mid- and long-term perspective, efficient public incentives require that public funding rewards films with higher private investment percentages to prevent an ongoing dependence on public funding. Simultaneously, rational behavior of private investors will keep private investment at the lowest possible level. Therefore, \textit{Public Subsidization} is not taken into account, as are \textit{Star Power}, \textit{Producer Power}, and \textit{Reputation Potential} because they do not signal earnings potential.
Research in industrial organization has to improve this inefficiency of public subsidization by developing welfare-maximizing funding methods. Otherwise, funding bodies will not reach the target to enhance private investment and support the economic development of the industry. In contrast, if market mechanisms persist, where subsidies are substitutes for private investment or do not enhance private investment levels, they are economically useless. This situation is referred to as the soft budget constraint syndrome in economic literature (Kornai, 1986).

6. Conclusion

In this paper, we develop a research model to examine the non-content signaling factors that influence private investment and public subsidization during the film financing process. We use PLS-SEM and test the hypothesized relationships of signaling factors and financing decisions with a new data set of locally produced and co-produced motion pictures in the German market. The results advance industrial organization in the context of public subsidization of the motion picture industry. Signaling theory is expanded in film financing and demonstrates that Star Power, Producer Power, and Reputation Potential are relevant signaling factors that influence public subsidization. However, the empirical results show that they do not influence private investment sufficiently.

This discrepancy puts the suitability of analyzed non-content signaling factors into question, which are identified as relevant dimensions for public funding decisions. Taking these signaling factors into consideration, increases the risk of adverse selection that should be prevented through screening and signaling. The reasons are potential inefficiencies of star fees, market foreclosure caused by powerful producers, and distinction difficulties in reputation potential. These results contribute theoretical insights into the differing decision-making rationale of public and private financiers in the context of highly subsidized motion picture markets.

The introduction of major content-related dimensions as additional signaling factors may be an avenue for further research. Substantial content analyses could combine content-related and non-content dimensions and test whether this model will show different results. Measurable factors, such as the number of similar plots or the share of inappropriate dialogue in a script, are a few examples. This will provide noteworthy results for industrial organization economists and practitioners in the area of film financing.
Additionally, neither the amount of private investment affect decisions of public funding bodies nor the subsidization level significantly influence private investment amounts. Our results suggest a setting of two predominantly unrelated principals in a principal-agent framework, which do not utilize the financing decisions of others as a signaling factor. Film subsidies are therefore independent of the market principle. Inefficiencies exist if the recipient benefits from subsidies and a negligible added social value is achieved. Results may be similar for other industries. Consequently, structures in other industries, such as in agricultural or energy markets, may be objects of further research in industrial organization.

Our study contributes an empirical setting of the motion picture industry to industrial organization. We receive results that are similar to some prior findings regarding R&D financing (e.g., Wallsten, 2000). Nevertheless, additional research may complement theory formation in this area. For example, our results do not address the research issue whether public funding crowds out private investment.

We could argue that independence of public and private financing decisions may not have negative effects on cultural objectives of public funding bodies, but it makes the economic target of enhancing private investment unachievable. This confirms previous studies concerning economic efficiency of public film funding (e.g., Bagella and Becchetti, 1999; Jansen, 2005; McKenzie and Walls, 2013). Additional research may address the achievement of objectives in cultural terms and goal ambiguity of public policy in a cultural market context. The development of industry-supporting funding schemes in industrial organization may address goal ambiguity in public support of cultural industries. It will be an important contribution to show how the funding goal of economic strength could be achieved.

Finally, we test the research model using market data from Germany. Thus, the study focuses on a national market with a high degree of imports from the U.S.A., small firm sizes, and a complex public funding system. In addition to this, pan-European public funding is ignored. The study may face some limitations because of these special market circumstances in Germany. While we are able to provide insights into past-based film financing decisions in this particular market, applicability to other markets and predictive power regarding future financing decisions are limited, which is similar to other empirical SEM-studies. Additional research is needed to anticipate future developments and achieve generalizability. Theoretical modeling or qualitative empirical designs may derive useful implications.
Nevertheless, this study addresses the existing research gap focusing on input related aspects of the film industry. The results contribute to decision-making in financing processes of public and private actors, an area of emerging theory. The findings of this study can support developing efficient subsidy allocation mechanisms and improve funding behavior.

**Endnotes**

1. Jones and Mendelson (2011) provide a comparison of the associated properties with industrial goods.

2. Rule 2 – 2A of the 87th Academy Awards 2015, Academy of Motion Picture Arts and Sciences.

3. We exclude the funding bodies KJDF, FBMW, HFF, and SL due to their low subsidization of the included motion pictures of less than 10.0m (< 1.0m / year): KJDF is a funding scheme for young professionals; FBMW is the regional film fund of Mecklenburg-West Pomerania; HFF is the (meanwhile closed) cultural film fund in Hesse; SL is the regional film fund of Saarland.

4. Abbreviations: FFA-P is the project-based funding of Germany’s Federal Film Board; BKM is the film fund of the Minister of State for Culture and the Media; FMS is the regional film fund of North Rhine-Westphalia; FFHSH is the regional film fund of Hamburg and Schleswig-Holstein; HIF is the regional film fund in Hesse with economic purposes; MBB is the regional film fund of Berlin and Brandenburg; MDM is the regional film fund of Thuringia, Saxony and Saxony-Anhalt; MFG is the regional film fund of Baden-Wuerttemberg; FFF is the regional film fund of Bavaria; FFF-BBF is a regional film fund of Bavarian banks; NM is the regional film fund of Lower Saxony.

5. The budget categories of documentaries are based on subgenre, country of production, length, production company, and specific parameters (archive footage, docu-fiction i.a.). 250,000 Euros is the amount that is defined as the regular budget. When parameters suggest a lower or higher budget class, the documentary is categorized accordingly. They are allocated in three budget categories: 125,000 = small budget (n=8); 250,000 = normal budget (n=353); 375,000 = high budget (n=15).
References


Diamantopoulos A, Winklhofer H M. Index construction with formative indicators: An alternative to scale development. Journal of marketing research 2001;38; 269-277.


Elberse A. The power of stars: Do star actors drive the success of movies?. Journal of Marketing 2007;71; 102-120.


FFA. FFA Info. German Federal Film Board: Berlin; 2014


Hennig-Thurau T, Houston M B, Walsh G. The differing roles of success drivers across sequential channels: An application to the motion picture industry. Journal of the Academy of Marketing Science 2006;34; 559-575.


Marvasti A, Canterbery E R. Cultural and other barriers to motion pictures trade. Economic Inquiry 2005;43; 39-54.


Moul C C. Retailer entry conditions and wholesaler conduct: The theatrical distribution of motion pictures. International Journal of Industrial Organization 2008;26; 966-983


Wei L. Invited commentary: Making sense of these million-dollar babies - Rationale behind superstar profit participation contracts. Marketing Science 2006;25; 678-680.

Zuletzt erschienene Papiere:

01-17 Kumb, Florian
       Kunz, Reinhard
       Influencing Factors of Movie Supply in Germany

02-16 Kraus, Lena
       Baier, Jürgen
       Herz, Bernhard
       Pegging or Joining the Euro - Sudden Stops and Current Account
       Dynamics

01-16 Cassel, Dieter
       Ulrich, Volker
       Nutzenorientierte Erstattung für stratifizierte AMNOG-Präparate?

04-15 Kunz, Reinhard
       Siebert, Johannes
       Mütterlein, Joschka
       The Media Balanced Scorecard

03-15 Kunz, Reinhard
       Siebert, Johannes
       Mütterlein, Joschka
       Balanced Scorecard Creation based on Value-Focused Thinking

02-15 Ahlert, Marlies
       Pfarr, Christian
       The acceptance of priority criteria in health care: international
       evidence

01-15 Hohberger, Stefan
       Kraus, Lena
       Is fiscal devaluation welfare enhancing? A model-based analysis

06-14 Pfarr, Christian
       Schmid, Andreas
       Mørkbak, Morten R.
       Identifying latent interest-groups: An analysis of heterogeneous
       preferences for income redistribution

05-14 Ahlert, Marlies
       Pfarr, Christian
       Attitudes of Germans towards distributive issues in the German
       health system

04-14 Mühlbeyer, Johanna
       Held, Johanna
       Untersuchung des Attitude-Behavior-Gaps im Bio-Produkte-
       Segment

03-14 Cassel, Dieter
       Ulrich, Volker
       AMNOG-Schiedsstelle: Schlichter oder Richter? Schiedsamtliche
       Preisermittlung bei neuen Arzneimitteln jenseits von Angebot und
       Nachfrage

02-14 Erler, Alexander
       Hohberger, Stefan
       The real costs and profits of TARGET 2 balances

01-14 Cassel, Dieter
       Ulrich, Volker
       Determinanten der Preisunterschiede von Arzneimittel-
       Innovationen – Eine empirische Analyse von EU-Ländern

07-13 Siebert, Johannes
       Keeney, Ralph L.
       Stimulating the Creation of More and Better Alternatives

06-13 Keeney, Ralph L.
       Siebert, Johannes
       Proaktive Entwicklung besserer Alternativen mit Value-focused
       Thinking

* Weitere Diskussionspapiere finden Sie unter
http://www.fiwi.uni-bayreuth.de/de/research/Working_Paper_Series/index.html