Do Bubble Behaviors Exist in Chinese Film Stocks?

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Abstract
This article investigates bubbles in the Chinese film industry to reveal the industry’s boom and bust process that influences employment, citizen’s livelihoods, and even economic growth. We adopt the film stock index to reflect the industry’s trajectory and employ the generalized and backward sup augmented Dickey–Fuller tests to detect bubble periods. Empirical results indicate that there are three positive bubbles in 2007, 2013, and 2015, indicating that the film market continues to expand after temporary frustrations. Meanwhile, one negative bubble is found in 2019, which demonstrates that the bubble’s negative impacts persist and the film industry is still having problems such as declining industrial output. Economic growth, film quality, and industrial policies are common factors for all bubbles. The global financial crisis, capital in- and outflows, internet giants’ entry and sky-high remuneration are reasons for certain bubble behaviors. Hence, market practitioners should actively recognize bubbles and observe their evolution, which will favor industrial stabilization. A perfect legal system, moderate industrial policies, a competitive market environment, and other measures are needed to confront the opportunities and challenges.

Keywords
film industry, bubbles, generalized sup ADF test, backward sup ADF test, bubble measure

Introduction
The Chinese film market has grown rapidly and just falls behind that of North America. Its box office reached a record of 8.93 billion U.S. dollars in 2018, an increase of 9.2% compared with 2017, accounting for 21.34% of the world’s film consumption (Song, 2018). The number of films screened reached 50,766 in 2017 with a 31.95% annual growth rate since 2012 (Fan, 2019). Meanwhile, the number of Chinese domestic films also increased from 100 to 1,082 from 2002 to 2018, and more than 1.76 billion filmgoers went to a cinema in 2018 (X. Zhang, 2019). The prosperous industry provides more than 1.026 million jobs and creates 515.15 billion U.S. dollars output value, which accounts for 4.2% of gross domestic production (GDP) in 2017. The industry’s rapid development makes it a target industry for capital flow from private equity (PE), venture capital (VC), and banks (Hao et al., 2018; Kokas, 2019). Films enrich people’s material and spiritual lives and can improve their awareness and civility while spreading. However, the rapid growth of the film industry is always accompanied by a periodic boom and bust process, which has negative effects. For example, the fixed asset investment for film production appears to have a “roller coaster” track and its growth rates were 75.61%, 166%, −26.31%, 69.71%, and −20.42% from 2013 to 2017, respectively. There were shocking incidents such as enterprises and actors experiencing sky-high remuneration and using yin-yang contracts to evade taxes that were exposed to the public in 2018. Sky-high remuneration means that the remuneration for actors accounts for more than 50% of the total film production costs. A yin-yang contract means that the contracting parties sign two agreements: one is announced to the public and the other one is private. Affected by the shocks, the top film producers Huayi Brothers Media Co. Ltd. and Beijing Enlight Media Co. Ltd. saw their market values fall by 46.92% and 31.16%, respectively. More seriously, the growth of box office revenue was 9.2% in the first half of 2019, which was the slowest growth rate in the most recent decade. The film industry is a large industrial chain; the production process requires the cooperation of multiple departments such as literature, photography, and editing; and its industrial volatility affects tourism, real estate, and other industries (Y. Li et al., 2019; X. Zhang, 2019). Based on these serious consequences, we employ bubble detection to capture the boom
and bust process in the Chinese film industry. This article adopts the film stock index to reflect the industry’s development levels. The generalized sup augmented Dickey–Fuller (GSADF) test and backward sup augmented Dickey–Fuller (BSADF) test (Phillips et al., 2015a, 2015b) are applied to detect and timestamp bubble behaviors. Meanwhile, a bubble model (Gürkaynak, 2008) is also utilized to explain the formation and bursting of each bubble. Subsequently, based on Etienne et al. (2014), this study further classifies bubbles into positive and negative bubbles, which is done to reflect the upward and downward industrial development trends, respectively. After applying the mentioned method, the policy implications, including the industry’s chain construction and government support, are provided to stabilize the film industry’s development.

The current studies of the Chinese film industry, which pay little attention to the industry’s development and its features, do not match its practices in reality (Xin & Mossig, 2017). This article carries out a corresponding analysis as follows. First, the loosening-up and encouraging policy framework promote the development of the film industry. According to O’Connor and Gu (2014), the film industry has been an important source of economic growth; hence, China published more than 36 related documents by the end of 2018. These documents form a relatively complete policy framework to deregulate and accelerate the industry’s development. Second, the film industry’s scale and quality experience rapid development, which makes the industry an important tool to propagate positive social value such as a spirit of dedication. Since 2004, the film industry’s annual growth rate has been over 15%, which exceeds China’s GDP growth rate and has started to change the landscape of Chinese cultural consumption customs and the national industrial structure (Shan, 2014). Third, the concentration in the Chinese film industry has been strengthened. Due to lower production costs, film production activities have been transferred from traditional centers (mainly Hollywood) to emerging areas such as Canada, reflecting the industry’s decentralization trend (Scott & Pope, 2007; Yeh & Davis, 2008). However, the industry’s concentration has strengthened in China, and clusters are regarded as a valid way to promote the development of the film industry (X. Zhang & Li, 2018). For example, the numbers of producers and films produced in Beijing reached 243 and 352 in 2017, respectively accounting for 48% and 52% of the total in China in 2017. In comparison, their proportions were just 31% and 46% in 2002, respectively. Finally, the Chinese film industry encounters external and internal challenges. Hollywood films achieve huge success in China, accounting for 41.7% of the total box office in 2016, which places great pressure on domestic film producers (Brzezski, 2017). For example, The Fast and The Furious grossed a box office of US$0.39 billion in China, which is the highest box office and record among imported films (Tartaglione, 2017). Not limited to Hollywood, Bollywood films also started to occupy a share of the Chinese market and both Dangal and Three Idiots obtained high box offices. Regarding domestic factors, the film industry still relies heavily on policy implementation (Shan, 2014). Government regulation and intervention would produce serious limitations for film production (Song, 2018). Severe resource waste, restraints on institutional supply, and an incomplete financing system also exist in the film industry (Xin & Mossig, 2017; Yang, 2015). It is undoubtedly that the film industry is at the dawn of a new era, but it still confronts opportunities and challenges, including supportive industrial policies, booming domestic markets, and severe competition from Hollywood and Bollywood. These issues provide huge uncertainties for the film industry and are why the industry sometimes plunges as quickly as it rises (G. Feng, 2017). The hump-shaped industrial motion track may result in bubble processes; hence, we need to recognize the process and take measures to achieve sustainable development.

Compared with previous studies, our work fills in the research gap in the following aspects. First, this article constructs a framework for reviewing Chinese film industry reforms from multiple perspectives. The previous literature generally focuses on a single side of reforms, including ideological transference (Fan, 2019; Hao et al., 2018; Meyer-Clement, 2015), policy and the legal system (Harvey, 2019; W. Peng, 2015), and government agency (Frater, 2018; Vlassis, 2016; Zhou, 2015). However, a single perspective cannot be used to fully interpret the film industry’s bubbles, and thus, a multiperspective framework is needed to enhance the explanatory power. This framework not only includes traditional factors such as ideology, the policy system, and government, but it also contains factors such as economic growth, film enterprises, the Sino–U.S. trade war, foreign competitiveness, public scandals, and others. Second, this article recognizes four bubble periods of the Chinese film industry and gives a comprehensive explanation for each bubble. Existing studies are mainly centered on the influencing factors of periodic fluctuations and challenges in the film industry (Courty & Zhang, 2018), such as film policies and state administration (Song, 2018), commercial capital (Kokas, 2019; W. Peng, 2015), economic growth (Teo, 2019), personal income (Morawetz et al., 2007; Shortal, 2018), film quality (G. Feng, 2017), and intense competition from Hollywood (Jin, 2013). Nevertheless, few studies employ a bubble model to explain the film industry’s boom and bust process and locate the accurate starting and ending points of every bubble. By identifying the starting and ending of each bubble in the film industry, we find that positive bubbles in 2007, 2013, and 2015 and negative bubble in 2019 are related to the global financial crisis, capital in- and outflow, internet giants’ entry, and economic growth. Finally, most previous papers are qualitative research, discussing the Chinese film industry’s development, problems, and countermeasures (Fan, 2019; Harvey, 2019; Zhou, 2015). However, this study investigates bubbles in the film industry.
to reveal the industry’s boom and bust process by using GSADF and BSADF tests via a bubble model, which performs better for structural breaks and is useful as a real-time bubble detection algorithm. In addition, the empirical results of this article could be useful for policy makers and the managers of Chinese film enterprises to guide the development of the film industry. For example, the bursting of the last bubble in 2019 is related to filmmakers’ illegal activities and capital outflows. Thus, a perfect legal and regulation framework and scientific financing system should be established by government agencies.

This article finds that there are three positive bubbles in 2007, 2013, and 2015 and one negative bubble in 2019. Based on the theoretical bubble model, bubbles may occur when the market price deviates from fundamental values. Hence, this article investigates the potential reasons for the deviation. The common influencing factors include the box office, economic growth, and industrial policies. The global financial crisis, capital in- and outflow, internet giants’ entry, Hollywood competition, and sky-high remuneration are reasons for certain bubble behaviors. Specifically, we emphasize the negative bubble, which is the fourth bubble. A negative bubble is defined as when the average price (AVEP) of the film industry index (FII) during the bubble period is lower than the price of the bubble starting point. This reflects that although the film industry suffers from a period of adjustment, it cannot recover to the development level before the bubble and is still facing a dilemma. Based on this current situation, we should take measures to confront opportunities and challenges and promote the film industry’s stable development. The following policy suggestions are given: The government should improve the film censorship system, consistently implement film industry policies, and guide a reasonable investment financing system for the film industry. Enterprises should focus on the film content and quality and pay attention to foreign competition and cooperation and macroeconomic changes.

The layout of the remainder of this article is as follows. “Literature Review” section gives the literature review. “The Bubble Model” section elaborates on the bubble model. “Bubble Detection Procedure” section shows the bubble detection procedure. The data and empirical results are displayed in “Data” and “Empirical Results” sections, respectively. “Conclusion” section offers the conclusion and policy implications.

**Literature Review**

**Chinese Film Industry Reform**

The Chinese film industry has carried out profound reforms in terms of ideology, the policy and legal system, and government agency. First, the ideological transference is regarded as a lighthouse that guides the reform of the Chinese film industry. Meyer-Clement (2015) indicates that the Chinese Communist Party (CCP) commonly requires film production to follow political needs and regards film as effective instruments for publicizing the CCP’s ideology. Zhou (2015) and Fan (2019) demonstrate that the Chinese government has started to provide funds for commercial films and regard them as a useful tool for soft power expansion. Meanwhile, China has attempted to convey its national reputation to the world by copying the U.S. film industry’s mode (G. Feng, 2017; Hao et al., 2018). Subsequently, the Chinese “13th Five-Year Plan” emphasizes accelerating the development of the domestic film industry and propagating socialist values (Shortal, 2018). Next, policy and legal system changes cultivate freedom, fairness, and the legal environment. In the late 1980s, the dual-track censorship system was established to ensure that film production, advertising, and distribution were regulated by the State Administration of Radio, Film and Television (SARFT). Censorship plays an essential role in developing the Chinese film industry, and even now, it still determines which films can be produced and released (Harvey, 2019). In 2002, the shareholding and film chain systems were introduced to promote the reform of corporate governance in state-owned film enterprises. Meanwhile, private capital is allowed to enter the film industry and set up new enterprises (Deng, 2011). “The Amended Film Management Act,” which aims to standardize the order of the film market, was established in 2002 (W. Peng, 2015). The SARFT issued the two policies of “Regulations on Sino-Foreign Jointly Produced Films” and “Temporary Regulations on Market Access of Film Production, Distribution and Exhibition,” which provide policy support for commercializing the film industry, in 2003 (Zhou, 2015). “The Cultural Industries Promotion Plan,” which aims to promote film production and marks an important milestone in film history, was established in 2009 (Shan, 2014). The State Council issued “The Guidance on the Promotion of Film Industry Prosperity and Development” in 2010 to establish a film industry system that includes fair market competition and independent enterprise operations (Yang, 2015). China implemented “The Film Promotion Law,” which encourages film enterprises to produce high-quality works that can meet the requirements for distribution, in April 2017 (Fan, 2019).

Last, the government agency started to lose cultural control and play the role of a night watchman. The Chinese film industry has suffered multiple rounds of government agency reforms since the mid-1980s. The government established two overseers in the form of the General Administration of Press and Publication and the SARFT (Zhou, 2015). Until 2009, the SARFT oversaw all administrative functions for the film industry and ended the 22-year dual control system (H. Li, 2010). However, the SARFT was abolished in 2018 and the Propaganda Department of the Communist Party’s Central Committee took over film regulation (Frater, 2018). The accelerating film industry reforms seem to suggest a clear reduction in government intervention and the creation of a liberal market environment (Vlassis, 2016).
Chinese Film Industry Frustrations and Challenges

Although China has witnessed dramatic progress in its film industry in the past 20 years, periodically, frustrations and challenges accompany this process (Courty & Zhang, 2018). Morawetz et al. (2007) demonstrate that film consumption uncertainties depend on film quality, income, and the market environment, which would bring high financial risk for investors. H. Li (2010) argues that globalization provides opportunities and challenges related to innovation, technology, and the administrative system for the Chinese film industry. Jin (2013) indicates that external factors, such as intense competition from Hollywood and Western values, are major impetuses for the Chinese film industry’s development. W. Peng (2015) finds that the film market has changed from hot money-driven activities to more reasonable and commercial behaviors. Yang (2015) discovers that the Chinese film industry has turned into connotative and intensive growth, which secures sustainable development. Xin and Mossig (2017) indicate that private and foreign film enterprises have replaced state-owned enterprises in the market, and the competition and cooperation between them have reached unprecedented levels. B. Zhang (2017) argues that the withdrawal of subsidies for online ticket purchasing is a significant factor that contributed to the slowdown of the film industry’s development. G. Feng (2017) argues that film ratings, box offices, and film festival awards are considered to be important factors influencing the development of the Chinese film industry. Shortal (2018) shows that although the Chinese film market has expanded, the expansion process may be influenced by economic growth, personal income, and other factors. Song (2018) argues that film policies and the state administration create complexities, such as unfair competition between state and non-state-owned film enterprises, in Chinese film markets. Cao (2018) shows that the Chinese film industry has suffered multiple rounds of changes from obedience to rebellion and from laudation to criticism. F. Feng and Sharma (2018) indicate that the film industry is affected by market and economic factors, but income and admissions have no influence on Chinese filmgoers. Teo (2019) indicates that the Chinese film market suddenly dipped in 2016, which ended its rapid development process and mirrored its low economic growth. Kokas (2019) argues that commercial capital is an important supplement to a national film investment system and divides the film industry into several interdependent centers such as Beijing and Shanghai. Nakajima (2019) shows that film awards and festivals are one of the important mechanisms that structure Chinese film production, distribution, exhibition, and reception. Jin (2013) finds that the opportunities offered by the internet for distributing accessible cultural products such as films are worth further exploration. W. Peng and Keane (2019) show that China’s film-making reputation has not improved significantly, although the government endorses many coproduced projects. Khoo (2019) shows that the practically of the concept of “Hollywood” lies in its ability to coproduce Asian films and represent the status of transnational Chinese cinemas in Hollywood. McMahon (2020) argues that in the Chinese theatrical market, the largest film distributors and producers have become strong competitors in the Chinese film business under the protection of the state. Gilardi et al. (2020) indicate that platforms such as Hulu, Netflix, and Amazon and BAT (Baidu, Alibaba, and Tencent) companies control the Chinese film industry. In addition, the Sino–U.S. trade war provides new challenges for both Hollywood and the Chinese film industry (Chong & Li, 2019). Sino–U.S. trade relations affect Hollywood’s ambitions, which has been an ongoing news story during Donald Trump’s presidency (McCoid, 2017; Wolf, 2018). For China, it is necessary to stimulate domestic demand for cultural products by means of strengthening publicity, first-line investigation and research, and standardizing cultural products (Gao, 2020).

Although many previous studies have studied the Chinese film industry (Cao, 2018; G. Feng, 2017; Kong, 2007; X. Zhang & Li, 2018; Zhou, 2015), they still have the following deficits. Most literature just depicts the industrial fluctuations in box office revenues, investment, and output, but few studies employ a bubble model to explain the film industry’s boom and bust process. Bubble behaviors always create price or stock index crashes, industrial recessions, and other consequences; hence, we investigate the bubbles in the film stock index. Next, the accurate starting and ending points of every bubble cannot be dated, which reduces the accuracy and credibility of empirical studies. Depending on the GSADF test, BSADF test, and measures for positive (negative) bubbles, this article fills the research gap on recognizing each bubble period and giving comprehensive explanations for them. Finally, each bubble is further classified as a positive or negative bubble. A positive bubble indicates that the adjustment effect exceeds the impact effect, and the film industry would keep developing rapidly. The impact effect measures the largest magnitude of the price increases driven by a bubble. The adjustment effect measures the degree to which the market mechanism adjusts the price back to market fundamentals. Conversely, a negative bubble means that the impact effect is stronger and the film industry is still in a dilemma, even after the bubble.

The Bubble Model

The Chinese film industry has experienced different stages of development. The domestic market opened in 1994 when China imported about 10 foreign films per year while adopting a common international practice of revenue sharing. After China joined the World Trade Organization (WTO) in 2001, the number rose from 20 to 34 during Chinese president Xi Jinping’s visit to the United States in February 2012 (W. Su, 2014). Since 2004, the Chinese film industry has entered a stage of rapid growth in which every link in film.
production from production to distribution and screening has achieved considerable development and the industry chain has continued to mature (Aranburu, 2017). Although China is the second largest film market in the world, the film industry is easily influenced by external shocks. For example, the shocking incidents of sky-high remuneration and using yinyang contracts to evade taxes have attracted the public’s attention. The State Administration of Taxation has announced strict investigations of tax evasion, which caused Huayi Brothers Media Corporation’s and Zhejiang Talent Television & Film Co., Ltd.’s share prices to plummet. Meanwhile, the Chinese film industry faces competition not only from Hollywood but also from the emerging Bollywood. In addition, the foreign and domestic financial and political environments, such as the global financial crisis and Sino-U.S. trade war, create additional uncertainties for the industry’s development. Therefore, this article provides the following hypotheses:

**Hypothesis 1:** There are multiple bubbles in the Chinese film industry.

**Hypothesis 2:** Positive and negative bubbles exist in the Chinese film industry.

Referring to Wang et al. (2020), the bubble model is utilized to detect the Chinese film industry’s boom and bust process. It is rooted in previous studies (Diba & Grossman, 1988; Gürkaynak, 2008; Lucas, 1978) and widely applied in energy industries (C. Su et al., 2017), the stock market (Phillips & Shi, 2018), and the art market (Assaf, 2018). In terms of their studies, a bubble might appear when asset prices deviate from their fundamental values, and the process can be modeled as follows:

\[ P_t = \sum_{i=0}^{\infty} \left( \frac{1}{1 + r_f} \right)^i \mathbb{E}_t \left( D_{t+i} + U_{t+i} \right) + B_t, \]

where \( P_t \) is the asset price, \( i \) denotes the discount time, \( D_t \) represents the payoff, \( r_f \) denotes the discount rate, \( U_t \) represents the unobservable fundamentals, and \( B_t \) represents the bubble part. The market fundamental \( P_t^f \) equals \( P_t - B_t \), and \( B_t \) satisfies the submartingale property:

\[ B_t = \left( 1 + r_f \right)^{-1} \mathbb{E}_t \left( B_{t+1} \right). \]

Any sequence of random variables satisfies this homogeneous expectational equation. Thus, Equation 2 can be transformed into the following:

\[ P_t = P_t^f + B_t. \]

When there is no bubble, Equation 3 shows that \( P_t \) is absolutely equal to \( P_t^f \). However, \( P_t \) is affected by \( B_t \) instead of \( P_t^f \), meaning that bubble behaviors always arise in asset price movement. To find bubble behavior, an extensive methodological investigation is conducted using previous tests, including the two-step test (Dezhbakhsh & Demirguc-Kunt, 1990), the momentum threshold autoregressive (MTAR) model (Payne & Waters, 2005), the intrinsic bubble test (Chen et al., 2009), and the Markov Switching Augmented Dickey–Fuller (MSADF) test (Xie & Chen, 2015). However, although the tests’ conclusions are convincing, there are shortcomings. When bubbles burst, the MSADF cannot identify the accurate beginning and ending points (Shi, 2011). In addition, the MTAR model tends to detect periodically collapsing bubbles (Y. J. Zhang & Yao, 2016). The GSADF and BSADF tests are employed in this article to solve the abovementioned problems, which allow a flexible window size in the recursive regression process to raise the detecting power in testing bubble behaviors and extend the sample sequence.

**Bubble Detection Procedure**

**The GSADF and BSADF Tests**

Detecting the bubble process has become a priority in studies (Zeev, 2018), and we employ the GSADF and BSADF tests provided by Phillips et al. (2015a, 2015b) to recognize periodic collapsing bubble behaviors. The GSADF test utilizes a forward recursive method that contains a rolling window ADF regression process to raise the detection power and extend the sample. We assume that the rolling window regression process moves from the starting point \( (r_1^{th}) \) to the ending point \( (r_k^{th}) \) of the total sample \( (T) \). Therefore, the regression equation is shown as follows:

\[ \Delta P_t = \alpha_{r_1,r_k} T^{-\eta} + \beta_{r_1,r_k} P_{t-r_1} + \sum_{i=1}^{k} \phi_{r_1,r_k} \Delta P_{t-i} + \epsilon_t, \]

where \( \alpha_{r_1,r_k} \) and \( \beta_{r_1,r_k} \) are constant. \( T_{r_1,r_k} \) shows the number of observations in the regression. \( \eta \) indicates a localizing coefficient that controls the magnitude of the intercept and drifts. As indicated in Phillips et al. (2015a, 2015b), when \( \eta \) \( > \frac{1}{2} \), the GSADF statistic distribution is irrelevant to \( \eta \). \( k \) demonstrates the lag order and is set to zero according to the test of Campbell and Perron (1991). \( \epsilon_t \) follows NID(0, \( \sigma^2_{\epsilon,t} \)). The test allows starting point \( r_1 \) to vary within the range \([0, r_k - r_0] \) and the ending point to vary within the range \([r_0, 1] \). \( r_0 \) is the smallest window size. The GSADF statistic is the supreme value of the ADF statistics calculated over all feasible ranges \( [r_1, r_k] \) in this recursive approach, and the equations are as follows:

\[ \text{GSADF}(r_0) = \sup_{r_1 \in [0,1], r_k \in [0, r_0-1]} \left\{ \text{ADF}_{r_1}^{r_k} \right\}, \]
where \( r_w = r_2 - r_1 \), which obeys the standard Wiener process. We select \( r_0 \) according to the sample size. When the sample size is small, \( r_0 \) needs to be large to ensure the estimation accuracy. Conversely, \( r_0 \) should be small to respond to a large sample to capture opportunities for detecting bubble behaviors. The critical values of the GSADF test are estimated through 2,000 Monte Carlo simulations. In Equation 6, when the statistics of GSADF\((r_0)\) exceed its critical values, bubble behavior is proved to exist.

The BSADF test conducts the sup ADF test on a backward extended sampling sequence to timestamp bubble episodes. The starting \((r_s)\) and ending \((r_e)\) points for bubbles are estimated using the following equations:

\[
\begin{align*}
    \text{BSADF}_{r_s} (r_0) &= \sup_{r_s \in [0, r_1 - r_2]} \{ \text{ADF}_{r_s}^{(r_0)} \}, \\
    \hat{r}_s &= \inf_{r_s \in [r_1 - r_2]} \{ r_2 : \text{BSADF}_{r_s} (r_0) > \text{scv}_{r_s}^{(r_0)} \}, \\
    \hat{r}_e &= \inf_{r_e : \frac{1}{T} \int_{r_1}^{r_2} w(r) \, dr - \frac{1}{r_2} \int_{r_1}^{r_2} w(r) \, dr > \text{scv}_{r_e}^{(r_0)}},
\end{align*}
\]

where \( \delta \) is a frequency-dependent parameter. \( \text{scv}_{r}^{(r_0)} \) represents the 100 \((1 - \beta_r)\)% critical value of the sup ADF statistic for \( T_r \) observations. Analogously, the significance level of \( \beta_r \) relies on the sample size \( T \) and it goes to zero when \( T \to \infty \).

The Measure for Positive and Negative Bubbles

Following Etienne et al. (2014), the bubbles can be divided into positive and negative bubbles. If the AVEP during the explosive period exceeds the initial price (INIP) at the start of the explosive period, the bubble is positive. Conversely, a negative bubble would occur. This can be depicted as follows in each bubble period:

\[
\begin{align*}
    \text{AVEP} - \text{INIP} > 0 & \Rightarrow \text{Positive bubble,} \\
    \text{AVEP} - \text{INIP} < 0 & \Rightarrow \text{Negative bubble.}
\end{align*}
\]

A bubble episode is specified as the net effects of the impact effect and adjustment effect. A positive bubble is measured by AVEP – INIP > 0, indicating that the adjustment effect is greater than impact effect, further revealing that the initial impact could be dissolved (adjusted) by the market mechanism. A positive bubble means that the film industry would return to its prebubble level and retain its rapid development in industrial output, the box office, and other aspects. Regarding negative bubbles (AVEP – INIP < 0), the impact effect is larger, which demonstrates that the film industry is still affected by bubbles and confronts dilemmas such as decreased investment and market recessions.

Data

This article employs a stock index of the film industry to reflect the industry’s development, and the data come from the Wind database. The sample ranges from 2001:M01 to 2019:M05 as the index provided open access starting in 2000 and it includes 233 monthly observations. Meanwhile, it also covers essential incidents, including implementing laws related to the film industry, the global financial crisis, the Chinese stock market crash, and sky-high remuneration incidents. In Figure 1, the upper line demonstrates the price of the FII and substantial volatility can be seen during the sample period. The obvious pecking points of FII can be observed in three periods: 2007:M01-2007:M08, 2012:M09-2013:M09, and 2014:M12-2015:M11. In the first period, strong economic growth provides unprecedented developmental opportunities for the film industry. In 2007 Q1 and Q2, the growth rates for GDP are 13.8% and 15%, respectively, and the per capita disposable income growth rates are 19.5% and 17.6%, respectively, both reaching historical records. In the second period, the film industry faces an intensive policy time. The major policies include the “Sino-U.S. Memorandum on Resolving Film-related Industries,” the “Opinions on Strengthening the Management of Film Cooperation across the Taiwan Strait,” and “Subsidies for the Creation and Production of Domestic High-tech Films,” which improved the prosperity of the film market. Over the last period, the film industry’s scale reached more than 15 billion U.S. dollars and the box office growth rate was 49%, which is the highest point since 2010. The Preferential Policies for Film Culture Industry was also implemented to promote the industry’s development. However, suffering from the Chinese stock market crash, FII starts to decline at the end of 2015. Table 1 further shows the descriptive statistics for FII. The index reaches its peak in 2015:M12 with 11,596.61 points, which is approximately 21 times greater than the lowest point. The skewness is positive, which demonstrates that the stock index frequently has few extreme gains and small losses and is right-skewed. The \( \beta_2 \) kurtosis is less than 3, which demonstrates that FII obeys a platykurtic distribution and means that there are more extremely large deviations from the mean than when a normal distribution exists. The results of the Jarque–Bera test further prove that FII follows a nonnormal distribution.
Empirical Results

Although prior studies have widely investigated bubble behaviors, few can offer an effective and convincing method that can be practically applied. Therefore, this article employs the GSADF test provided by Phillips et al. (2015a, 2015b) to detect whether bubbles exist in the film industry. As shown in Table 2, the statistic for FII is 6.71, which is greater than the critical values of 1.87, 2.02, and 2.29, which means that multiple bubbles exist in the film industry. Then, we further employ a new timestamping strategy from the BSADF test to recognize each bubble period. This can construct an effective warning system and ensure that the necessary policies are carried out in a timely manner. The empirical results demonstrate that there are four bubbles in the Chinese film industry.

The first bubble appears at 2007:M04 and bursts at 2007:M08. Figure 1 shows that during the bubble period, FII increases from 1,341.45 to 2,911.38, which creates the largest index increase since 2000. The Chinese GDP growth rates for 2007Q1 and Q2 are 15% and 14.3%, respectively, and reach unprecedented peaks, which provide a strong basis for the film industry’s development. Due to economic development, the per capita disposable income growth rates in 2007Q1 and Q2 are 19.5% and 17.6%, respectively, which reach 3,934.9 and 3,117.1 RMB, respectively. The government also implemented the Outline of the National Cultural Development Plan for the 11th Five-Year Plan Period, which promotes the reform of the film industry’s system. The Chinese film industry, which has been suffering from capital shortages, finally ushered in a capital era in 2007. The amount of investment of eight VC and PE cases reached 93.37 million U.S. dollars, which was the highest level since 2001. Bona Film Group Co., Ltd., which is one of most famous private film enterprises, obtained US$93.37 million in foreign investment from Sequoia Capital and Susquehanna International Group (SIG). The Orange Sky Entertainment announced its acquisition of 24.78% of Hong Kong Golden Harvest Enterprise, becoming the largest shareholder and initiating the strategy of backdoor listings in Hong Kong. China Film Group Corporation and International Data Group jointly established the “IDG China Media Fund,” which

Figure 1. The BSADF test of film industry index.
Note. The shadows are subperiods with bubbles. BSADF = backward sup augmented Dickey–Fuller.

Table 1. Descriptive Statistics.

| Industry index | M    | Median | Maximum | Minimum | SD   | Skewness | Kurtosis | Jarque–Bera |
|----------------|------|--------|---------|---------|------|----------|----------|-------------|
| FII            | 2,736.28 | 1,366.39 | 11,596.61 | 549.29 | 2,652.97 | 1.44     | 2.03       | 91.68***    |

Note. FII = film industry index.
***Indicates significance at 1% level.

Table 2. The Results of GSADF.

| Industry index | Statistic | 10% | 5%  | 1%  |
|----------------|-----------|-----|-----|-----|
| FII            | 6.71***   | 1.87| 2.02| 2.29|

Note. Critical values of both tests are obtained from Monte Carlo simulation with 10,000 replications. GSADF = generalized sup augmented Dickey–Fuller; FII = film industry index.
***Indicates significance at 1% level.
planned to coproduce five to eight low-cost films in 2007–2008. The financial system, especially banks, started to provide loans to private film enterprises. For example, China Merchants Bank invested US$7.69 million for The Assembly. China Guangfa Bank provided US$10 million to fund King of Kung Fu. The Standard Chartered Bank also lent US$70 million to Red Cliff. Increasingly more diversified funds have been devoted to the flourishing Chinese film production, resulting in huge investments for the film industry. However, when the global financial crisis occurred, Chinese economic growth started to decline, short-term international capital sharply shifted (Ning & Zhang, 2018; Zou et al., 2018, 2019), and the stock market crash had a negative influence on the film industry’s environment. In addition, foreign films, especially from Hollywood, started to encroach on the market shares in China and subsequently produced huge competitive pressure for the Chinese film industry. The top popular films are Transformers, The Assembly, The Warlords, Spider-Man 3, and Harry Potter and the Order of The Phoenix, and only The Assembly was produced by a Chinese domestic enterprise. Hence, the influence of the global financial crisis and serious competition resulted in the bubble bursting.

The second bubble emerged at 2013:M07 and burst at 2013:M10. The good performance of the film industry contributed in the following aspects. Film quality improved significantly. For example, the Journal to the West: Conquering the Demons became the most popular film and surpassed Hollywood films such as Iron Man 3 in China. This film was made by the Chinese domestic enterprise Huayi Brothers Media Co. Ltd., and the enterprise’s stock price rose by 25% in six trading days. The policy is still an important tool. The National Film Funding Office published a special document called the Notice on Encouraging High-Quality Film Production and provides corresponding financial subsidies. In addition, film enterprises depend on capital operations to improve the industrial chain, expand their market shares, raise the threshold of competition, and maintain their dominant positions. For example, Huayi Brothers Media Co. Ltd. spent a total of US$203.38 million to acquire three related enterprises, including Yinhan Games Co. Ltd., Zhejiang Changsheng Co. Ltd., and Zhejiang Yongle Co. Ltd., thereby forming a complete industrial chain. Hence, the strong growth of Chinese films, financial subsidies, the perfection of the film industry’s chain, and capital operations triggered an industrial boom. However, in 2013, the average attendance rate of cinemas in China was only 15%. The film industry is still in the primary stage of extensive development, and growth and market risk coexist. In 2013, 638 domestic feature films were produced, which was a decrease of 107 films over the same period; the production bubble subsided and output achieved an equilibrium. Some tax incentive policies, such as the Notice on Several Tax Policies to Support the Development of Cultural Enterprises, which influences enterprises’ performance, were implemented at the end of 2013. Frequent short-term speculation arbitrage by institutions and individuals, which increase the market risk and uncertainties for industrial development, create huge fluctuations in the stock prices of listed film enterprises. The Chinese economic growth rate dropped to 7.7% in 2013Q4, which is almost the lowest level since the global financial crisis in 2008. Meanwhile, the per capita disposable income growth rate also changed from double digits to single digits, which directly affected people’s film consumption behavior. The abovementioned factors had negative influences on the film industry and led to bubble bursting at the end of 2013.

The third bubble starts at 2015:M4 and ends at 2015:M12. The government promulgated the “The Film Industry Promotion Law (draft)” in 2015, which promised to increase investment, reduce taxes, and reform the film market (Teo, 2019). The Regulations on Developing the National Film Industry clearly indicate that special funds are given to reward excellent domestic film production, distribution, and projection. The SARFT also established the Cinema Ticketing System Rules, which demonstrated that the institution gradually changed from managing film production to standardizing the film market. Continuous investment brings prosperity to the film industry. The value of the mergers and acquisitions (M&A) in the industry reached US$4.55 billion. The film industry accounts for 91 of the 147 total PE and VC investment events, and PE investment amounts to US$1.46 billion, an increase of 300% over the same period in the last year.Huayi Brothers Media Co. Ltd. launched several acquisitions, such as acquiring 70% of the shares of Meila Media and Dongyang Haohan, and the total value of the M&A was US$174.32 million. A recent phenomenon is that internet giants, including Alibaba Group, Baidu and Tencent, have started to enter the film industry. Due to these enterprises having enough cash reserves, the levels of M&As are huge and shocking (see Table 3). For example, Alibaba Group has invested approximately US$86 million in and holds approximately 10% of the shares in Bona Film Group Co., Ltd. These enterprises penetrate the industrial chain among production, distribution, and projection, which completes the industrial layout lacking from traditional film enterprises that do not achieve success. However, these internet giants do not perform well as expected. The Alibaba Pictures Group Ltd. has been in a state of losses. Its operating profits reached −414.66 million RMB and its corresponding growth rate was −86.38% in 2015. Other internet film enterprises such as Baidu Pictures, Tencent Pictures, Penguin Pictures and IQIYI Pictures experienced similar situations, which forced them to adjust their businesses. Meanwhile, Chinese economic growth rates further declined to 6.9% and 6.8% in 2015Q3 and Q4, respectively, which were the lowest rates since 1992. The Chinese stock market suffered its biggest crash since the 2008 global financial crisis. During the crisis period, the stock index fell more than 30% and this wiped out US$2.89 trillion in share value, which is equivalent to approximately 30% of China’s GDP in 2014. Therefore, the
unsatisfactory market performance of internet film enterprises, the slowdown in economic growth, and the stock crash caused the bubble to burst at the end of 2015. The last bubble is observed at 2018:M12 and burst at 2019:M03. Some iconic films appeared that greatly boost the performance of film enterprises. For example, *The Wandering Earth* was a milestone in Chinese science fiction film and it brought success for China Film Co., Ltd., Beijing Jingxi Culture & Tourism Co., Ltd., Shanghai Film Co., Ltd., and Cultural Investment Holdings Co., Ltd. The State Council issued the Regulations on the Transformation of Economic Cultural Institutions into Enterprises in the Reform of the Cultural System, which explicitly exempted film distribution income from the value-added tax. The Opinions on Accelerating the Construction of Cinema and Promoting the Prosperity and Development of the Film Market were also published to encourage cross-regional mergers and acquisitions (M&As) of film enterprises. Chinese high-quality films and supportive policies are important impetuses for the industry’s development. However, this industry faces unprecedented challenges and difficulties. Although film stars have a positive influence on film (F. Peng et al., 2019), some actors obtain unreasonably high rewards through sky-high remuneration and evade taxes through yin-yang contracts. Hence, the government implemented the Notice on Further Standardizing the Tax Order of the Film and Television Industry to legally promote paying taxes. The capital market entered a slump period. None of the 37 listed film enterprises achieved market value growth at the end of 2018, and the total market value fell by 35%. The average equity pledge rate of traditional top private film enterprises such as Huayi Brothers Media, Beijing Enlight Media, and Zhejiang Talent Television & Film reached more than 80%. Market alarms, including tax evasion, stock price crash and cross-border M&As, decrease investment willingness, make the market enter a bust era, and frequently appear in the film industry. Meanwhile, the China Securities Regulatory Commission (CSRC) announced that the cross-border film industry was not allowed to raise funds in the capital market. Furthermore, the CCP uses film as a medium for communicating the ideology of the one-party state, which creates an unfavorable environment for cultural creativity (W. Peng & Keane, 2019; Zhou, 2015). Although the film sector has been commercialized for decades, in 2018, the Central Propaganda Department directly took over all industry management, including censorship. The development of the Chinese film industry has been limited by strict government control over cultural and media institutions (Flew & Hartig, 2014; Sparks, 2014). In 2018, the China Film Administration implemented strict regulations for film ticket subsidies, which ends the era of a 9.9 RMB subsidy for watching a film and consequently influencing people’s consumption behaviors. Therefore, the influencing factors, such as filmmakers’ illegal activities, government regulation, capital market turbulence, poor enterprise performance and high film ticket prices, led to the bubble bursting at the beginning of 2019.

Regarding the tendency of prices during bubble episodes, most bubbles correspond to price increases, but some may correspond to a price decrease. Hence, we need to recognize different kinds of bubbles according to price movements during

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### Table 3. M&A Cases From Alibaba, Bidu, and Tencent in 2015.

| Time    | Alibaba                      | Bidu                  | Tencent                      |
|---------|------------------------------|-----------------------|------------------------------|
| March   | Beijing Enlight Media        | Lemon Media           |                              |
|         | (US$385.23 million)          | (US$16.05 million)    |                              |
| April   | Yueke software               |                       |                              |
|         | (US$133.23 million)          |                       |                              |
| May     | SMI Holdings Group           | SMI Holdings Group    |                              |
|         |                              | (US$32.11 million)    |                              |
| June    | Nuomi Website                |                       |                              |
|         | (US$3.21 billion)            |                       |                              |
| August  | Acfun                        |                       | Tang Media Partners          |
|         | (US$48.15 million)           |                       |                              |
|         | Heyi Group                   |                       |                              |
|         | (US$1.61 billion)            |                       |                              |
| September |                              |                       | Penguin Media               |
| October | Tudou Media                  | SMI Holdings Group    |                              |
|         | (US$4.82 million)            | (US$80.26 million)    | Tencent Media               |
| November| Taobao Media                 |                       |                              |
|         | (US$545.75 million)          |                       |                              |
| December| Bona Film Group              |                       | Bona Film Group             |
|         | (US$80.26 million)           |                       | Gewara Online Ticketing     |

*Note.* Brackets denote the amount of M&As, but some cases do not disclose specific amounts. M&A = mergers and acquisitions.
Table 4. The Results for Different Bubbles.

| Bubble time      | Length | Initial index | Average index | Positive or negative |
|------------------|--------|---------------|---------------|----------------------|
| 2007:M04–2007:M09 | 6 months | 1,966.74      | 2,418.44      | Positive             |
| 2013:M07–2013:M10 | 4 months | 3,371.91      | 4,166.78      | Positive             |
| 2015:M04–2015:M12 | 8 months | 3,832.12      | 9,766.83      | Positive             |
| 2018:M12–2019:M03 | 4 months | 3,735.15      | 3,697.51      | Negative             |

Note. Positive (negative) bubble indicates that film industry confronts upward (downward) development trend.

bubble periods. Following Etienne et al. (2014), positive (negative) bubbles are discussed in our article. Meanwhile, each bubble period is specified as the net of the impact and adjustment effects. An impact effect measures the largest magnitude of the price increases driven by a bubble. An adjustment effect indicates that the market mechanism adjusts the price back to its fundamental value. Regarding positive bubbles, the adjustment effect is greater, which demonstrates that the initial impact could be dissolved (adjusted) by the market mechanism. Conversely, with negative bubbles, the market mechanism is not effective at correcting the overvalued index back to its new market fundamental value. According to Table 4, there is one negative bubble in the period of 2018:M12–2019:M03 and the other three bubbles are positive bubbles. It is important to discuss what makes a market lose power when adjusting the industry’s development. We find that the negative (fourth) bubble is different from previous ones in terms of the following aspects. The trade war between China and the United States is becoming more intense, which is not limited to goods and also affects cultural service industries, especially film. The economic growth rates in 2018Q4 and 2019Q1 were 6.4%, which are the lowest levels in the most recent 30 years, and the slowing Chinese economy cannot provide a robust industrial environment. Tax evasion and sky-high remuneration for film stars have aroused unprecedented social discontent; hence, the government had to issue a special document to standardize the tax order in the film industry. However, the negative influence persisted in the following years and damaged the industrial development. In addition, large-scale capital outflows from the film industry, which never appeared in previous years, occurred. During the period, the total market value of the film industry lost US$26.49 billion, and no new enterprises were listed on the stock market. The mentioned factors result in a negative bubble that indicates that the industry is shrinking, which provides challenges for market practitioners.

We find that multiple bubbles exist and recognize their corresponding periods through the GSADF and BSADF tests. Meanwhile, three positive bubbles and one negative bubble are further identified through the method provided by Etienne et al. (2014). We discover that the common reasons in bubbles include industrial policies, government intervention, and economic growth. Furthermore, this study pays more attention to the characteristic factors in different bubbles, such as the global financial crisis in the first bubble, M&As in the second bubble, internet giants’ participation in the third bubble, and illegal incidents in the last bubble. The impacts of the film industry’s boom and bust are shown as follows. First, during the first bubble period from 2007:M04 to 2007:M08, the film industry’s concentration was reduced by the boom and bust of the film industry, and the monopoly of state producers via private capital was weakened (Jin, 2013). For example, China Film Group Corporation’s market share decreased from 28% in 2007 to 10% in 2010 and was replaced by private enterprises, such as Huayi Brothers Media Co. Ltd., Enlight Media, and Bona Film Group Co., Ltd. Second, for the bubble period from 2013:M07 to 2013:M10, the boom and bust of the film industry caused increasingly more private and state-owned Chinese companies to enter international film finance. For example, Wanda Co., Ltd. acquired both of Europe’s largest theater chains, Odeon & UCI and AMC Theaters. For a long time, China’s film industry experienced booms in international participation, investment, and production, especially as many Hong Kong enterprises entered the Chinese mainland market, increasing the risk of film investment (Davis, 2010; Yecies, 2016). Third, for the period from 2015:M04 to 2015:M12, the bubble in the film industry weakened China’s annual box office sales, which rose just 3% year over year in 2015 compared with 49% in 2014. Furthermore, due to an underdeveloped content creation system and the crazy bust of non-film-related capital, a considerable amount of capital was withdrawn from the film industry in 2016. Finally, the bubble from 2018:M12 to 2019:M03 accelerated the risk of investment in the film industry, which made it clear that in recent years, a greater number of private film and television enterprises have experienced crises due to capital chain ruptures. Furthermore, to regulate the film market, the National Radio and Television Administration (NRTA) introduced a superstar salary ceiling starting in 2018.

According to the empirical results, some policies are derived by this study. First, compared with foreign films, the poor quality of Chinese-made films is one of the reasons for the bubble bursting in the period from 2007:M04 to 2007:M08. Films’ content and connotation determine their industrial competitiveness; hence, producers should shoot high-quality films instead of bad ones that achieve short-term profits. Therefore, to avoid risk, movie investors can hire likable stars (particularly those who are widely known on social media) and find a good screenplay adapted from a famous novel, which guarantees a high-quality movie. Furthermore, to avoid the economic, social, political, and unknown risks in China, the best strategy is to invest in a movie that is suitable for all age groups. Second, the lack of diversity in the film industry and film makers’ illegal activities are the reasons for the bubble bursting in the period from 2018:M12 to 2019:M03. Regarding the issue of portfolio and asset management, movie investors should avoid the centralism of the investment
direction. Thus, they can focus on film derivatives such as images, services, products, brands, and trademarks and not be confined to film. Multiplied profits and diversified applications that use the same images, services, products, brands, and trademarks occur in this way. To maximize the value chain and influence of the film industry, it is necessary to satisfy the demands of consumers and further nurture and explore market segments. This diversified portfolio and asset management can ensure the stable cash flow of the film business and enhance the enterprises’ abilities to withstand investment risks.

**Conclusion**

This article uses a bubble model and the GSADF method to discover the boom and bust processes in the Chinese film industry during the period from 2001 to 2019. The empirical part reveals that four bubbles appear in 2007, 2013, 2015, and 2019, which is consistent with Hypothesis 1. The common influencing factors include the box office, economic growth, and industrial policies. Special reasons, such as huge capital inflows for the first bubble, excellent domestic films for the second bubble, The Film Industry Promotion Law for the third bubble and sky-high remuneration and yin-yang contracts for the last bubble also need to be considered. Furthermore, we follow Etienne et al. (2014), and the bubbles in 2007, 2013 and 2015 are found to be positive and the bubble in 2019 is found to be negative, which proves that Hypothesis 2 is correct. It is noticed that the negative bubble is uncovered, which means that the Chinese film industry confronted an unprecedented crisis. The Sino–U.S. trade war, the lowest economic growth rate the country has experienced, illegal incidents involving stars and large-scale capital outflows all predict the arrival of a downward turning point. Hence, we provide some policy implications to promote the sustainable development of the film market. First, government agencies, including the Ministry of Culture and the SARFT, have the responsibility to build a free environment for artistic creation. A perfect legal and regulatory framework should be constructed, which would standardize the market order for Chinese film producers, offer favorable tax and insurance treatments, and reduce the administrative costs in obtaining cinema approval. To provide legal protection for the administration of China’s film industry, it is urgent that legislative authorities speed up the enactment and legislative process of the Motion Picture Act. Second, to strengthen the competitive market environments of Chinese film and improve the highly oligopolistic film market, the government should gradually eliminate the barriers between industries and encourage the mergers and acquisitions of Chinese film enterprises. Enterprises should expand their industrial value chains, which can obtain tremendous profits from derivatives such as computer and mobile games, theme parks, dolls, and brands. Meanwhile, the outsourcing business of large enterprises can be accepted by small enterprises with differentiated, industrialized, and specialized business with the support of the government. The collaboration can maximize the comparative advantages of both small and large film enterprises, enhance the competitive market environments of Chinese film, and allow the film industry to achieve economies of scope and scale. Finally, a scientific financing system needs to be established. It not only contains diversified investors, including banks, funds, PE, and VC, but it also has open and effective channels for capital flows. Furthermore, the cross-border activities of internet giants such as Alibaba Group, Baidu and Tencent bring funds, technology, and audiences for the Chinese film industry. This has become a new development trend and produces challenges for existing film producers; hence, cooperation should be strengthened between internet giants and traditional film enterprises.

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