Journal of Media Economics

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/hmec20

Effects of China's "limited entertainment order" policy on program diversity: an analysis based on panel threshold model

Jingwei Cheng, Chen Wu & Jianyu Chi

To cite this article: Jingwei Cheng, Chen Wu & Jianyu Chi (2019) Effects of China's "limited entertainment order" policy on program diversity: an analysis based on panel threshold model, Journal of Media Economics, 32:1-2, 17-34, DOI: 10.1080/08997764.2021.1888210

To link to this article: https://doi.org/10.1080/08997764.2021.1888210

Published online: 24 Feb 2021.

JOURNAL OF MEDIA ECONOMICS
2019, VOL. 32, NOS. 1–2, 17–34
https://doi.org/10.1080/08997764.2021.1888210

Routledge
Taylor & Francis Group

Effects of China's "limited entertainment order" policy on program diversity: an analysis based on panel threshold model

Jingwei Cheng[a], Chen Wu[b], and Jianyu Chi[a]

[a]School of Economics and Management, Communication University of China, Beijing, China; [b]School of Business, Plymouth State University, Plymouth, New Hampshire, USA

ABSTRACT

"Competitive duplication" is widespread in China's broadcasting market due to fierce competition. To address this issue, the National Radio and Television Administration instituted the "Limited Entertainment Order" (LEO) in 2011 with the purpose of increasing the diversity of television programs. This study employs a Panel Threshold Model and data on 32 provincial TV stations between 2009 and 2014 to examine the effectiveness of the LEO on program diversity. The descriptive statistics reveal a temporary increase in program diversity immediately following implementation of the LEO, which drops quickly thereafter. The empirical findings suggest the policy has been ineffective in promoting the genres of programs offered by provincial broadcasters. In contrast, the individual fixed effects, rating share, and advertisement dependence of TV stations have significant effects on the level of program diversity.

Introduction

Governments all over the world impose institutional constraints on the television (TV) industry because of the externality and high visibility of TV programs. These constraints include market entry permissions, regulation of industry structures, and policies on program content. A major goal of broadcasting regulation is to promote program diversity, which is an important factor in assessing media performance (Napoli, 1997; Owen, 1976). It is worth noting that we use the term "program diversity" to mean different genres of programs like sports, news, science, entertainment, and documentaries, etc. within individual TV stations (Owen & Wildman, 1992). It is different from "program number," which refers to the number of programs within and across genres. The distinction is important because program diversity is the focus of this study. However, no matter the program genres or program numbers, more specific policy objectives are often embedded in the broader pursuit of media diversity. For example, to promote specific cultural values, regulations encourage TV stations to broadcast more "good programs" as per policymakers because such programs tend to be rarely chosen by TV stations without government interventions. In so doing, regulations have become a means to improve the ecology of screen content and convey social values, different from the general promotion of diversity.

Due to the strong competition in China's TV broadcasting market, stations tend to duplicate each other's program genres and thus cause the problem of "competitive duplication," a phenomenon where the competing TV stations have highly similar program genres, patterns, and contents (Doyle, 1996). Meanwhile, homogeneity in viewer preferences reduces the consumer demand for diversity, which also contributes to the tendency toward competitive duplication. Media economists have developed program choice models to understand competitive duplication. The Steiner Model

CONTACT Chen Wu cwu@plymouth.edu Plymouth State University, 17 High Street, Plymouth, NH 03264.

(Steiner, 1952) and Beebe Model (Beebe, 1977), which can be summarized as the Principle of Minimum Differentiation and Least Common Denominator, have concluded that competitive content providers tend to provide more popular genres and lead to a low level of diversity. This is largely attributed to the monopolistic competition in media products, i.e. the consumption of one TV program in a particular program genre may not reduce a viewer's demand for another program in that same genre. Therefore, the promotion of program diversity has become an important part of the broadcasting regulation system in China.[1]

To address and possibly counteract the phenomenon of competitive duplication, the National Radio and Television Administration (NRTA, formerly the State Administration of Press, Publication, Radio, Film and Television of China until March 2018) issued two policies. On October 24, 2011, the NRTA announced the "Opinion Concerning Further Strengthening Comprehensive Satellite Television Channel Program Management" (commonly known as "Limited Entertainment Order," LEO), which provided guidelines on regulating the quantity and airtime of seven popular program genres, namely matchmaking, talent, emotional story, game, variety, talk, and reality. In addition, the NRTA required satellite TV stations to develop programming in education, science, and news, with the goal of promoting traditional virtues and socialist core values.

Specifically, in this round of program regulation by the LEO, the NRTA stipulated a vague control on the total broadcast airtime of some popular but duplicate (or redundant) programs, especially the excessive number of shows in the genres of matchmaking, talent show, emotional story, game, variety, talk, and reality. It proposed to adjust the structure of programs with similar types to prevent excessive program homogenization. Meanwhile, the LEO mandated a minimum broadcast time for news programs encouraged by the NRTA, such that the integrated channels of all 32 satellite TV stations must broadcast news programs for no less than two hours daily (6:00– 24:00), and there must be more than two self-run 30 min (or longer) news programs between 18:00 and 23:00. Moreover, it was stipulated by the LEO that each integrated channel of satellite TV must set up ideological and moral construction column that promotes the Chinese traditional virtues and the core value system of socialism. All provincial TV stations adjusted their program schedules in direct response to the LEO mandates.

On October 12, 2013, the NRTA issued the "Notice on the Arrangement and Register of Comprehensive Channel of Satellite TV in 2014" (commonly known as "Reinforced Limited Entertainment Order," RLEO). The RLEO placed constraints on introducing copyrighted programs from other countries, adjusted guidelines for the airtime of singing shows, and clarified the mandatory broadcasting proportions of various program genres including news, economy, culture, children's, sports, and documentary.

In contrast with the ambiguous control of total airtime for program genres by the LEO, the RLEO stipulated specific program quotas and broadcast time for the purpose of curtailing excessive entertainment and preventing duplication waste. First, the RLEO required that each provincial TV station shall broadcast no more than one newly-introduced overseas copyrighted program every year and the program shall not be broadcast between 19:30, 22:00. Second, every quarter the NRTA will select one singing talent show to arrange for broadcast at prime time, and the rest shall not be scheduled to broadcast between 19:30, 22:30. Third, the NRTA will regulate and control TV parties and galas such that in principle no more than three TV parties/galas per day shall be broadcast during important festivals and holidays. Last, the RLEO required each provincial TV station to further expand the broadcasting ratio of news, economy, culture, science and education, life services, children and animation, documentary, and agriculture programs. The total broadcast time of the above-encouraged genres should not be less than 30% on a weekly basis.

[1]It is worth noting that in many national contexts, regulations at the level of individual program types have been in decline. This is because the increased media options and channel capacity have made users easily exposed to more content, and as a consequence, the quota-type regulations have shifted to focus more on the country of origin of content rather than genre (Broughton, 2013).

By implementing quota policies, the NRTA aimed to decrease the duplication of program genres. Do these quotas work? In other words, can the external regulations affect program diversity? To shed light on this question, we compared the program diversity of China's provincial TV stations before and after the LEO/RLEO by sampling the program genres of 32 provincial Satellite TV channels in the period 2009– 2014. Both the descriptive statistics and the Panel Threshold model estimation are employed to investigate the policy effectiveness. Our empirical findings suggest that although the LEO/RLEO has moderate effects on program diversity, it is not the dominating factor. Broadcasters respond to regulation by increasing program diversity in the short term, but in the long term, the overall diversity declines because broadcasters chase ratings and market demand set by customers.

This study contributes to the sparse research on China's program quota policy. The dual structure of the Chinese TV station system determines that its management relies on administrative power while its revenue objectives (mainly from advertising) are market-oriented. Therefore, media regulations in China are important functions of the government system and are often based on administrative intuition rather than market logic. The program quota policy mainly targets excessive entertainment in China's media ecology as opposed to those in the Western countries that aim to protect domestic culture. By examining the effectiveness of the LEO/RLEO policies on the program diversity, this study offers meaningful implications for the media regulatory practices in China. Specifically, our findings from the fixed-effect estimation and the Panel Threshold model estimation do not suggest significant structural changes in program diversity associated with the quota policy. The individual effect associated with the differential positioning of each provincial TV explains a substantial amount of the variation in program diversity. This warrants further discussion on how explicit mandates fail to increase program type diversity. Among all possible reasons, we highlight the contradiction of provincial satellite TV following public (or social) interest while maximizing their private (or market) interest.

Related literature

Within broadcasting regulation practices, program quota is typically used in the area of content regulation to promote certain tastes of the audience or to protect domestic culture. Crampes and Hollander (2008) argued for rationalizing content rules including the deficiency in audience tastes, and they note that regulators set both upper and lower limits of hours for which broadcasters can run sports, reality shows, news, and current affairs, etc. The quota system has strong consideration of public benefits because programs can convey social values and shape common cultural and moral attitudes. As a way to protect domestic culture, the quota system has also been applied in Europe (Broughton, 2013), France (Ranaivoson, 2007), Korea (Lee & Bae, 2004), and Canada (Richardson, 2004a). The quota systems in all of these countries have strong political objectives, make domestic content a priority, and improve content diversity.[2]

One economic argument supporting quota systems lies in the high sunk costs of cultural content, which usually occur in the first production, and afterward, the marginal costs are extremely low. A large market can burden these kinds of costs and benefit from a large potential demand (Perona, 2010). Therefore, quotas can bring the possibility of lowering costs and promoting demand by restricting imported cultural products. Other arguments in favor of quotas rest on the externalities. The first is the production externalities of programs. Some programs, such as public affairs, have positive externalities, but the programs contain violence and crime, which can have negative effects on viewers. Consequently, there are calls for "corrective action to encourage programming that caters to more refined tastes," since broadcasters tend to devote excessive time to content that has mass appeal (Crampes & Hollander, 2008). Unlike the European program quota system that aimed to protect its

[2]Take Europe for example, the 1989 Television Without Frontiers Directive (TWF Directive) was enacted by the European Commission. It required member states to ensure that at least 50% of the transmission time of TV stations (excluding news, sports events, games, advertising, and teletext and teleshopping services) is reserved for European works.

own culture, the LEO and RLEO were more focused on correcting the trend of excessive entertainment on TV screens in China, increasing the positive externalities of TV programs and reducing the negative ones. The second is the preference externalities of viewers (Waldfogel, 2003). It is observed that when the first preference of a minority audience group is not satisfied in the market, they will turn to programs that are popular to the majority, which further increases the market share of popular programs. Therefore, niche tastes tend to be underserved in various media sectors, and promoting the production of niche programs through a quota system seems necessary.

Regarding the relationship between the degree of competition and program diversity, most research is built upon the theoretical foundations set by the Principle of Minimum Differentiation as well as Hotelling's (1929) Linear City Model. Among the earliest attempts to investigate the issue of program diversity, Steiner (1952) built on Hotelling (1929) and proposed a TV program selection model in which two competing TV stations that both rely on advertisement revenues will produce programs that meet popular tastes to cater to the audience, while a monopolistic TV station will provide program types that are more in line with social interests. The shortcoming of this model is that it assumes the audience will quit watching when their preferences are not satisfied. Wiles (1963) and Beebe (1977) modified Steiner (1952) and proposed the Least Common Denominator Selection model, which showed that as the number of channels increases, the competition between channels intensifies; this will make the niche program types more popular and thus reduce the "least common denominator" type of programs. Wildman and Lee (1989) established a two-stage model and argued that with the increase of channel capacity, the cost of program production will become lower and lower, and that program producers tend to copy popular program types. Built on the classic Salop. (1979) circle model of product location by adding the consumer utility and program selection behavior factors, Papandrea (1997) proposed a circular model of program selection which found that compared with a monopolistic broadcast and television system, a competitive system is more inclined to provide duplicate program types.

Different from the public broadcasting systems of the Western countries, China's provincial TV stations are state-owned. The publicity department of the provincial government hosts provincial TV. On the one hand, it broadcasts government decrees, local news (including provincial leadership activities, local economic development, and livelihood-related news); on the other hand, the provincial TV also broadcasts programs that audiences like to watch, such as TV series, entertainment programs, etc. Therefore, the source of income includes both provincial financial appropriation and its advertisement revenues. Because provincial satellite TV has achieved national coverage, one of its main business goals is to compete for the audience nationwide through attractive programs and thereby increase advertising revenue. Meanwhile, provincial satellite TV is the propaganda window of the province for the national audience, so there is no exit mechanism: even if its advertising revenue is less than sufficient, there is provincial budgetary funding to maintain it. Therefore, it has become the norm for more than 30 provincial TVs to compete for audiences in the national market in recent decades. According to the circular model of program selection by Papandrea (1997), a high degree of competition will lead to the duplication of program genres and thus reduce the diversity of programs.

As for the question of whether program quotas work in promoting diversity, economists tend to agree that they harm program diversity. According to the program choice model (Owen & Wildman, 1992), broadcasters tend to reduce the programming of less popular genres and increase the more popular ones. Under the quota system, popular contents have more opportunities to be aired, even repeatedly aired, but the number of different contents that are broadcast at equilibrium is reduced, which leads to a lower level of program diversity (Perona, 2010). Another reason why quotas harm program diversity is that broadcasters are unwilling or unable to bear the financial burdens. For example, the European quota system aims to produce content through the exclusion of news and sports events, which broadcasters have few possibilities to commission or purchase externally. Because European quotas are based on program quantity rather than program quality and there is no restriction on the repeatable content, European broadcasters ended up choosing the most inexpensive ways such as relying heavily on in-house production to fulfill the quotas. As a result, European quotas

neither fostered the spread of European works nor created a domestic market with a high level of diversity (Broughton, 2013).

The LEO and RLEO are essentially quota policies intended to improve the diversity of programming by increasing the proportion of science and moral and educational programs and decreasing entertainment programs (Crampes & Hollander, 2008). Specifically, China's broadcasting market is strictly regulated by the NRTA and has many administrative barriers for entry. At the same time, provincial TV stations are supported by advertisement revenue, creating fierce competition between TV stations for audiences. Will TV stations, as per regulations of the LEO and RLEO, increase the "good" programs that are encouraged by the NRTA but not so popular with the audience in sacrifice of potential advertising revenues? The present study aims to help answer this question by comparing the level of program diversity between the pre- and post-LEO eras, and adopts a Panel Threshold Model to test whether these policies play a significant role in the dynamics of program diversity.

Empirical methodology and data description

Hypotheses

In this research, we hypothesize that programming quotas (such as the LEO and RLEO) would increase program diversity.

H1: Programming quotas are positively related to the diversity of programs.

In addition to program quotas, there are other factors that determine program diversity.

Advertising dependence

The literature reveals that TV stations that rely on adverting revenues tend to compete intensively in program quality and adopt duplicate strategies, including similar program genres and contents (Bourreau, 2003; Einstein, 2004b). Due to the dependence on the success of advertisements, TV stations seem to focus on attracting the largest possible audience. According to the Hotelling Model, two competing firms will tend to output products of "excessive sameness" (Hotelling, 1929). Thus, TV stations tend to decrease the range of program genres to appeal to a mass market. This study predicts that advertising dependence will decrease the diversity of programming.

H2: The extent of dependence on advertising revenues is negatively related to the diversity of programming.

Market share

Due to the phenomenon of "competitive duplication" in broadcasting, it has been argued that a discriminating monopolist with a higher market share can provide better services to the public in comparison to that in a competitive market (Doyle, 1996; Steiner, 1952). Some studies state that there is a negative relationship between the number of channels and the quality of programs because TV stations tend to provide low-cost program types or copy popular programs (Noam, 1987; Wildman & Lee, 1989). An increase in the number of channels means a decrease in the market share for each channel. This research predicts that the market share of TV stations will increase program diversity.

H3: The market share is positively related to program diversity.

The primary purpose of this study is to test the effectiveness of the LEO/RLEO. Particularly, we focus on the threshold effect that appears if the implementation of a policy initiated a sudden and radical change in the phenomenon of program diversity.

H4: In 2011, when the LEO took effect, the policy had a threshold effect on program diversity.

Sampling of data

To test the aforementioned hypotheses, we selected the satellite TV channels of 31 provinces as well as autonomous regions and the Xinjiang Corp TV, which is also broadcast throughout China.[3] We analyzed the program guides of these 32 TV stations through equal interval sampling. To assure that each day of the week was sampled, we selected the first Monday in January, the first Tuesday in February, the first Wednesday in March, and so on. Consequently, the data sample includes 12 days for each TV station per year. Thus, the sample is made of 2,304 days of programming for 32 TV stations over 6 years (2009–2014), which comprises a balanced panel data of 32 TV stations of 6 years. Since the LEO and RLEO mainly regulated the program genres during prime time, this study therefore used the "18:30–23:00" prime time for the sample.

In order to test the program diversity, we classified the program genres into 16 categories following the classification system used in the LEO and the RLEO, as shown in Table 1. Specifically, the program classification standards refer to the program genres restricted (namely, matchmaking, talent show, emotional story, game show, variety show, talk show, and reality show) and encouraged (namely, news, economy, social services, citizen moral, science, education and history, children and cartoon, documentary) in the LEO and the RLEO. In order to further refine the classification by matching the characteristics of prime time programs, this study merged news with the economy, divided it into news magazine and news report, and added two genres, namely sports and movies.

Dependent variable

It is important to adopt a clear and consistent definition of diversity throughout the study. The Federal Communications Commission (FCC) adopted "vertical diversity" in 1976 to measure the balance in program genres provided by TV stations. Using the Herfindahl Hirshman Index (HHI), vertical diversity measures the level of concentration among program genres within an individual media outlet: the higher the value, the more concentration of programs of a few types, thus the lower the vertical diversification; the lower the value, the more programs of different types, thus the higher the vertical diversification. Litman (1979) used "horizontal diversity" to measure the variety of programs available to the audience during prime time. This indicator calculates the average number of programs per half hour of all channels during prime time to obtain the program genres owned by each half hour during prime time.

As explained above, vertical diversity focuses on the richness of program genres provided by each individual TV station, while "horizontal diversity" focuses on the program genres available to viewers at the same time. Because the purpose of this study is to investigate whether the LEO and RLEO have the expected impacts on program type diversity within individual TV stations, the diversity discussed

Table 1. Classification of program types.

Program Types			
News Magazine	News Report	Talent Show	Talk Show
Matchmaking Show	Emotional Story Show	Game Show	Variety Show
Reality Show	Citizen Moral	Social Service	Science, Education,and History
Sports	Movies	Documentary	Children and Cartoon

[3]These channels include: Anhui TV, Beijing TV, XinJiang Corp TV, Chongqing TV, Oriental TV, Southeast TV, Guangdong TV, Guangxi TV, Gansu TV, Guizhou TV, Hebei TV, Henan TV, Heilongjiang TV, Hubei TV, Hunan TV, Jilin TV, Jiangsu TV, Jiangxi TV, Liaoning TV, Travel TV, Inner Mongolia TV, Ningxia TV, Qinghai TV, Shandong T, Shaanxi TV, Shanxi TV, Sichuan TV, Tianjin TV, Tibet TV, Xinjiang TV, Yunnan TV, Zhejiang TV.

in this study belongs to the vertical diversity category and is collectively referred to as "program diversity" throughout.[4]

Grant (1994) and McDonald and Lin (2004) adapted the Simpson's Diversity Index (Simpson's D). Simpson's D index is similar to the Herfindahl-Hirschman index (HHI), but HHI has a negative directional value, which means that a high HHI will dictate low diversity. In contrast, the Simpson's D index is positively directional in value: the higher the Simpson, the higher the program diversity.

$$\mathrm{G} = \mathrm{Simpson's\ D} = 1 - \sum_{i=1}^{n} P_i^2$$

G is the index of program diversity and P_i is the share of a program category in the whole market. In this study, prime time (18:30–23:00) is divided into eight half hour periods.[5] If only one kind of program is broadcast across all eight periods, on one station, $P_i^2 = 1$ and Simpson's D = 0. If eight different kinds of program are broadcast over eight periods, $P_i^2 = 0.125$ and Simpson's D = 0.875. Therefore, Simpson's D index is always between 0 and 1. The higher the Simpson's D index, the higher the program diversity.

It is worth noting that the Simpson's D index is likely to be affected by the number of channels at different levels and thus is not suited to a horizontal comparison. For example, assuming that there are four broadcasting networks and 20 channels in the cable system of America, the horizontal comparison using Simpson's D index might lead to a bias. To avoid this error, we selected TV stations that are on the same level (i.e. provincial). Thus, the Simpson's D index can be used for a horizontal comparison in this case.

Independent variables

Average annual market shares of TV stations (*share*): This indicator represents the competition intensity. Data is from CSM Media Research.

Advertisement Dependence (*ad*): Because data on TV stations' income from advertisement is not in the public realm, we adopted the advertisement income of the provincial broadcasting industry as a whole to proxy for a provincial TV station's advertisement income. We then computed the ratio of advertisement income to a provincial TV station's total revenues to measure advertisement dependence.[6] Data is drawn from the 2010–2014 Report on Development of China's Radio, film and Television.

Policy (*policy*): Before the LEO (2009–2011), there was no quota policy, and after the LEO (2012–2014), the quota policy took effect. Thus, we set a dummy variable to represent the policy. *Policy* =0 before the LEO and *Policy* =1 after the LEO.

Table 2 lists the descriptive statistics of all variables. *Trend* indicates the changing social-economic environment from the first year to the sixth year. To facilitate any potential meta analyses, a matrix of correlation coefficients between the variables is reported in Table 3. The program diversity index is positively (negatively) correlated with the market share (advertisement dependence) variable at the 10% significance level, indicating that TV stations with higher market shares and lower dependence on advertisement revenues are correlated with higher program diversity. In contrast, the correlation

[4]On a related note, since this study focuses on whether the LEO/RLEO changed the genres of programs provided by TV stations, the vertical diversity measure adopted here is thus from the perspective of program suppliers (i.e. TV stations). The other aspect of vertical diversity (in the case of exposure diversity) refers to the degree of diversity within the consumption patterns of an individual audience (Helberger et al., 2018) and is beyond the scope of this research.

[5]18.30-19.00; 19.30-20.00; 20.00-20.30; 20.30-21.00; 21.00-21.30; 21.30-22.00; 22.00-22.30, 22.30-23.00. 19:00-19:30 is not included in the research because CCTV news is mandatorily broadcast on every TV station during this time.

[6]We used data on all of the provincial satellite TV channels that can be received throughout the country. There are also local TV channels which cannot be received outside the province, but the advertisement income of provincial TV stations is mostly from satellite TV channels. In other words, the advertisement income of the provincial broadcasting industry relies on satellite TV channels.

Table 2. Descriptive statistics.

variable	Mean	median	sd	min	Max	N
index	0.620	0.626	0.101	0.339	0.859	192
ad	0.334	0.342	0.117	0.0430	0.602	192
share	0.851	0.600	0.783	0.0200	3.540	192
trend	3.500	3.500	1.712	1	6	192
policy	0.500	0.500	0.501	0	1	192

Table 3. Correlations.

	index	share	ad	policy
index	1.000			
share	0.142*	1.000		
ad	−0.163*	0.442***	1.000	
policy	0.004	0.058	−0.143	1.000

*, **, *** indicate the statistical significance at 10%, 5% and 1% levels, respectively.

between program diversity index and the LEO policy variable is negligible in magnitude and statistically insignificant.

Methodology

Following the literature, we considered, primarily, the following control variables: the market competition, the dependence on advertising revenues, and the effects of policy. The empirical specification is as follows:

$$index_{it} = \beta_0 + \beta_1 share_{it} + \beta_2 ad_{it} + \beta_3 policy_t + \varepsilon_{it} \quad (1)$$

In Equation (1), *index* is the program diversity index of a satellite TV station, *share* is the household share, *ad* is the extent of advertisement dependence. The symbolεis the error term. i denotes the individual satellite TV station and ranges from 1 to 32. t denotes the year and ranges from 2009 to 2014. *Policy* is a dummy variable which equals 1 after the LEO was issued (2012– 2014), and equals 0 before the LEO was issued (2009– 2011).

We estimate Equation (1) in the linear model rather than a log-log model which is typically used to interpret the elasticity type of relationship, i.e. the percentage change in the dependent variable associated with a one percentage change of the independent variable. The main purpose of this research, however, is to see whether the independent variable (quota policy) has any significant impact on the dependent variable (program diversity); the magnitude of the impact is not the focus. Meanwhile, the policy variables of primary interest are dummy variables, which are not suitable for the log-log model.

Furthermore, we utilize the Panel Threshold Model to investigate whether there was change in program diversity when the LEO was issued in 2011. To this end, it is necessary to verify whether there is a threshold variable working as a break point after which the diversity changed. Because the time spans a six-year period, we select the single threshold model and set up the model as the following equation:

$$index_{it} = \mu_i + \beta_1 share_{it} + \beta_2 ad_{it} + \theta_1 trend_{it} I(year \leq \gamma) + \theta_2 trend_{it} I(year > \gamma) + \varepsilon_{it} \quad (2)$$

Where *year* is the threshold variable, γ is the given threshold value, μ is the individual effect reflecting the characteristics of a given TV station, and $I(\bullet)$ is an indicator function.

To examine whether the time effect on diversity depends on different TV shares of satellite TV stations, we constructed the panel threshold model and viewed the share as the threshold variable, as in the following equation:

$$index_{it} = \mu_i + \beta_1 share_{it} + \beta_2 ad_{it} + \theta_1 trend_{it} I(share \leq \gamma) + \theta_2 trend_{it} I(share > \gamma) + \varepsilon_{it} \quad (3)$$

Data description

Table 4 displays the percentage of program types and diversity of TV stations. Focus is placed on changes in the regulated programming proportion after the LEO/RLEO. In the post-LEO period, TV stations increased the proportion of news magazine, news report, talent, reality, social service, science, education and history, and documentary categories and decreased the proportion of talk, matchmaking, game, variety. citizen moral, movie, and cartoon. Notably, the NRTA regulated two genres of programs in June 2010, in particular, matchmaking and emotional story. However, the proportion of emotional story programs declined modestly from 2.83% to 2.44% and increased to 3.86% in 2011. Meanwhile, the proportion of matchmaking programs was on the rise before the LEO. This shows that the regulation policy issued in 2010 and aimed at these two program types had no obvious effect on reducing their broadcasting during prime time.

Compared to 2012, the percentage of social service, game, and reality programs increased substantially in 2013, while the percentage of news magazine, talent, variety, and citizen moral programs decreased. However, from 2013 to 2014, the percentage of news report, talk show, matchmaking, variety, and social service, science, and education and history programs decreased and the percent of news magazine, talent, emotional story, game, reality, and documentary programs increased. These changes were, on one hand, caused by the change of audience viewing demand. There was a high percentage of variety shows before 2011, but it was limited by the LEO, so audiences transferred their attention to other programs including reality shows, which made them even more popular. The increased quantity of similar reality shows produced after the LEO then caused the increasing percentage of those shows, even if reality shows are also limited by the LEO.

On the other hand, these changes reflect the role of regulation. In general, the proportion of program genres regulated in the LEO such as matchmaking, emotional story, game, reality, and documentary programs decreased immediately after the LEO. However, this reduction was only temporary. The rating-chasing TV stations adjusted programming to satisfy the demand of the

Table 4. Percentage of program types (%) and overall program diversity index for prime time.

Program Types	2009	2010	2011	2012	2013	2014
News Magazine	4.36	1.27	2.08	3.03	1.14	3.55
News Report	15.85	18.00	14.45	16.96	16.34	13.77
Talent Show	2.54	1.24	1.40	2.34	0.75	1.33
Talk Show	2.67	4.65	5.40	3.94	3.91	2.54
Matchmaking Show	0.03	0.59	2.34	1.43	1.43	0.98
Emotional Story Show	2.83	2.44	3.16	2.38	1.43	2.05
Game Show	1.53	0.94	1.14	0.88	1.04	1.99
Variety Show	8.20	9.38	9.77	6.54	5.63	3.65
Reality Show	0.00	0.75	1.86	2.05	2.83	3.03
Citizen Moral	0.29	0.00	1.37	0.75	0.29	0.68
Social Service	3.94	3.78	1.79	3.91	6.45	3.65
Science, Education and History	0.98	2.73	3.16	3.71	3.26	1.27
Sports	1.20	0.00	0.00	0.00	0.00	0.16
Movies	0.55	0.13	1.01	0.91	0.55	0.75
Documentary	2.15	0.91	0.39	0.55	0.65	1.99
Children and Cartoon	0.81	0.39	0.52	0.36	0.00	0.49
TV Series	52.05	52.77	50.16	49.51	54.30	58.14
Simpson's D	0.691	0.675	0.711	0.714	0.667	0.636
Simpson's D_{max}	0.938	0.938	0.938	0.938	0.938	0.938

audience and market by offering popular programs (even those regulated by the LEO) in the long-term. For example, the proportion of reality shows has continuously increased since 2009, while the proportion of news, science, education and history, and social service programming increased in 2012 and 2013 but decreased in 2014. Meanwhile, the proportion of citizen moral was extremely low. This is potentially due to the low ratings of these program types.

Table 4 also shows the broadcasting of TV series on provincial TV stations increased gradually after the LEO. TV series were not included in the LEO, but the increasing percentage of TV series indicates that the LEO/RLEO lowered the motivation of TV stations to develop their own programming and thus they tended to buy existing TV series to avoid both the market and policy risks. Generally, TV series have high ratings and thus generate considerable advertising revenues for TV stations.

As far as the overall program diversity of the 32 TV stations is concerned, the Simpson's D equals 0.714 in 2012, which is higher than 2011. However, it started declining in 2013 to values that are even lower than those in the pre-LEO period and reached their lowest level in 2014 (0.636). If Simpson's D equals 0.636, then the HHI will be equal to 3640 ((1–0.636)*1000), meaning the program genres of TV stations were highly concentrated during prime time in 2014.[7]

Table 4 demonstrates that TV stations defer to institutional constraints in the short term and provide more diversified program types after regulations have been enforced. However, in the long term, it is clear that because they are dependent on revenues from advertising, TV stations broadcast the most popular programs, which lowers the level of program diversity. Even when the RLEO was

Table 5. Program diversity index (Simpson's D) of 32 provincial satellite TVs for prime time, 2009–2014.

TV	2009	2010	2011	2012	2013	2014
Anhui TV	0.416	0.497	0.564	0.550	0.443	0.339
Beijing TV	0.659	0.677	0.668	0.699	0.678	0.627
XinJiang Corp TV	0.600	0.475	0.651	0.439	0.444	0.702
Chongqing TV	0.617	0.534	0.824	0.795	0.557	0.594
Oriental TV	0.806	0.738	0.809	0.784	0.629	0.678
Southeast TV	0.634	0.613	0.669	0.694	0.708	0.589
Guangdong TV	0.750	0.561	0.418	0.666	0.600	0.606
Guangxi TV	0.592	0.612	0.629	0.653	0.575	0.581
Gansu TV	0.735	0.666	0.678	0.692	0.706	0.647
Guizhou TV	0.455	0.521	0.570	0.710	0.643	0.623
Hebei TV	0.486	0.481	0.477	0.574	0.484	0.590
Henan TV	0.573	0.560	0.548	0.597	0.658	0.569
Heilongjiang TV	0.588	0.501	0.571	0.484	0.582	0.566
Hubei TV	0.798	0.705	0.790	0.701	0.720	0.645
Hunan TV	0.795	0.829	0.859	0.661	0.685	0.646
Jilin TV	0.600	0.540	0.542	0.667	0.677	0.696
Jiangsu TV	0.698	0.698	0.717	0.633	0.624	0.619
Jiangxi TV	0.602	0.588	0.666	0.758	0.695	0.640
Liaoning TV	0.666	0.609	0.601	0.653	0.566	0.605
Travel TV	0.732	0.640	0.577	0.792	0.756	0.849
Inner Mongolia TV	0.728	0.710	0.705	0.685	0.707	0.553
Ningxia TV	0.599	0.662	0.762	0.795	0.642	0.486
Qinghai TV	0.663	0.606	0.581	0.689	0.605	0.638
Shandong TV	0.625	0.568	0.666	0.458	0.489	0.427
Shaanxi TV	0.413	0.379	0.406	0.660	0.570	0.475
Shanxi TV	0.541	0.689	0.682	0.677	0.544	0.526
Sichuan TV	0.676	0.551	0.662	0.682	0.520	0.489
Tianjin TV,	0.597	0.551	0.624	0.612	0.692	0.587
Tibet TV	0.673	0.563	0.636	0.534	0.669	0.672
Xinjiang TV	0.638	0.716	0.585	0.724	0.529	0.581
Yunnan TV	0.520	0.375	0.426	0.427	0.464	0.551
Zhejiang TV	0.661	0.603	0.702	0.753	0.699	0.668

[7]According to the HHI criteria (Baseman & Owen, 1982), it indicates a high level of concentration with HHI above 1800. HHI between 1000 and 1800 indicates moderate concentrations. It is an unconcentrated market with HHI below 1000.

issued in 2013, TV stations did not become innovative or produce new programs; instead, they adopted a conservative programming strategy to simply duplicate programs within genres.

Table 5 illustrates the program diversity index of the 32 TV stations for prime time based on the percentage of program types. The program diversity index of 19 (13) TV stations appeared to rise (decline) while those of 13 TV stations appeared to drop after the LEO. But after the RLEO, the index of 20 (12) satellite TV stations appeared to go down (up). This indicates that the majority of TV stations did not switch from the popular program genres to the program types encouraged by the LEO/RLEO, because if they did, the diversity level should have increased. Instead, they tended to duplicate each other's program categories.

Empirical results

Results of OLS regression

Tables 6 and 7 show the estimation results of the linear regression for Equation (1). According to Model 1, there is a negative and significant relationship between advertising dependence and program diversity. The coefficient of the market share is positive and significant, indicating the higher the market share, the higher the diversity level because a higher TV share enables the TV station to decrease the duplicate program genres. The trend term is added in Model 2 and is not significant. This means the diversity level does not present the tendency of rising or falling over the six-year period.

By adding the 31 dummy variables that capture the individual provincial effect to Model 1, Model 3 obtains an adjusted R^2 that substantially rises from 0.074 in Model 1 to 0.445. The result of a likelihood-ratio test is significant (Chi-Square value is 132.692 and p is 0.000). The province-specific effect measures the characteristics of a given TV station and is an important factor which can explain 37% of the variation in program diversity. Furthermore, the time effect is also likely to affect diversity. We added the four-year dummy variables in Model 4. Albeit the result of the likelihood-ratio test is significant (Chi-Square value is 11.720 and p is 0.039), the adjusted R^2 of Model 4 is only slightly higher than that of Model 1, indicating the time effect is far less significant than the individual effect. Because the effect of the LEO/RLEO is included in the time effect, this may also indicate the policy has little effect on program diversity. We added both the individual effect and the time effect in Model 5 and the results barely differed from Model 3. The above models reveal that the time effect, which includes the policy effect, has limited influence on diversity, and in contrast, the individual uniqueness of every TV station plays a more important role.

Table 6. Estimation results for effect factors of diversity.

	model 1	model 2	model 3	model 4	model 5
	OLS	LOS	FE	YEAR	FE+Year
ad	−0.240***(−3.61)	−0.261***(−3.87)	−0.002(−0.02)	−0.263***(−3.94)	−0.034(−0.30)
share	0.034***(3.42)	0.037***(3.64)	−0.050(−1.41)	0.036***(3.66)	−0.055(−1.50)
trend		−0.007(−1.60)			
policy dummy					
_cons	0.671***(31.70)	0.699**(25.34)	0.555***(6.05)	0.697***(25.49)	0.694***(13.46)
N	192	192	192	192	192
r^2_adjust	0.074	0.081	0.445	0.105	0.483
r^2_w					
F	8.577	6.613	5.636	4.190	5.701
FeChi^2			132.692		
FeChi^{2}p			0.000		
YrChi^2				11.720	
YrChi^{2}p				0.039	
Mean VIF	1.24	1.20	3.82	1.58	3.82

[a]***denotes significance at the 1% level; **denotes significance at the 5% level; *denotes significance at the 10% level.
[b]Values in parentheses are *t* test statistics for the estimation of the variable coefficients.

An explanation for this finding is that provincial satellite TVs are positioned for differentiated groups of audience and advertising markets. For example, Hunan Satellite TV is positioned for the theme of "Happy China" and a leading platform for the entertainment programs; Jiangsu Satellite TV is positioned for the " Harmonious China" theme and focuses on matchmaking and emotional story programs; Dragon TV relies on its locational advantage of Shanghai being an international metropolis and positions itself for the elite viewers by focusing on financial and economic programs; Shandong Satellite TV is themed for "Country China" and targets rural residents and the middle-aged and elderly population as its primary audience. Is there a significant change in the program diversity before and after the implementation of the LEO in 2011? To answer this question, we adopted the fixed effect model to estimate Equation (1). We used the heteroscedasticity-consistent (HC) standard error to calculate the t value in Model 6, which is a one-way fixed effects model including the individual effect as with Model 3 (See Table 6). The estimated values and significance of coefficients are the same with Model 3. By adding the dummy variable of *policy* to capture the effects of LEO in Model 7, its estimated coefficient is positive but not statistically significant. This means the diversity of programming of satellite TV stations has no significant change before and after the LEO. To overcome the heteroscedasticity and serial correlations in the group, we used bootstrapping to obtain the standard error and t value of each coefficient in Model 8 and Model 9. The regression results are close to those in Model 6 and Model 7. The dummy variable *policy*, however, remains insignificant, verifying the lack of policy effects on increasing the programming diversity.

Even though the policy itself does not seem to directly affect the program diversity, the control variables (i.e., market share and advertisement dependence) may affect the program diversity differently under the moderation of the LEO/RLEO. To test this moderating effect of quota policy, the interaction terms, *ad*policy* and *share*policy*, are included in Model 10 and Model 11, whose coefficients are estimated to be positive and negative, respectively, as shown in Table 7. This means that after the implementation of the LEO/RLEO, the program diversity of TV stations that rely more on the advertising revenue tended to increase, but TV stations with a greater share of audience tended to reduce their program diversity. A possible explanation is that under the LEO/RLEO regulations, it is

Table 7. Estimation results for effect factors of diversity (cont.).

	model 6	model 7	model 8	model 9	model 10	model 11	model 12	model 13
	FE	FE	BS	BS	FE	FE	FE	FE_ROBUST
ad	−0.002	0.021	−0.002	0.021	−0.102	−0.075	0.015	0.015
	(−0.02)	(0.13)	(−0.02)	(0.19)	(−0.69)	(−0.54)	(0.13)	(0.13)
share	−0.050	−0.056	−0.050	−0.056	−0.006	−0.008	−0.048	−0.048
	(−1.59)	(−1.64)	(−1.27)	(−1.42)	(−0.18)	(−0.24)	(−1.37)	(−1.10)
trend								
policy		0.007		0.007	−0.017			
		(0.50)		(0.49)	(−0.53)			
*ad*policy*					0.194*	0.147***		
					(1.80)	(2.46)		
*share*policy*					−0.052***	−0.051***		
					(−3.56)	(−3.56)		
dummy							0.004	0.004
							(0.90)	(0.70)
_cons	0.663***	0.657***	0.663**	0.657***	0.660***	0.651***	0.649***	0.649***
	(11.97)	(11.25)	(12.42)	(12.76)	(11.44)	(11.70)	(12.83)	(11.81)
N	192	192	192	192	192	192	192	192
r^2_adjust	0.541	0.442	0.012	0.014	0.472	0.475		
r^2_w							0.018	0.018
F	0.12	0.75	−0.19	−0.20	3.09	2.33	0.93	0.52
Mean VIF	1.24	1.20	1.24	1.20	6.23	2.88	1.82	1.82

[a]***denotes significance at the 1% level; **denotes significance at the 5% level; *denotes significance at the 10% level.
[b]Values in parentheses are *t* test statistics for the estimation of the variable coefficients.

difficult for businesses to continue in advertising intensively on TV stations' popular programs; instead they are forced to place advertisements on a variety of programs, which has promoted the diversity of TV programs. However, TV stations with a larger audience share tend to lower their program diversity in order to maintain their viewing shares because they are targeting a broader group of viewers whose viewing preferences tend to be consistent over time, according to the theory of competitive duplication (Doyle, 1996).

A valid concern about our empirical estimation is the potential multi-collinearity among the explanatory variables, especially that Table 3 shows a rather high and significant correlation between *ad* and *share*. Therefore, it is important that the Variance Inflation Factor (VIF) is adopted to examine the degree of multi-collinearity. We calculate VIF values for all explanatory variables and report the mean VIF for each model in the last rows of Tables 6 and 7. Values of mean VIF vary from 1.20 to 6.23 across the models, but all are below the empirical threshold of 10, which indicates the multi-collinearity is problematic. To further demonstrate, Table 8 reports VIF values for all explanatory variables in our benchmark Model 7, which includes the dummy variable of quota policy. The fact that VIF values are between 1.04 and 1.29 suggests the multi-collinearity problem is not severe enough to warrant corrective measures.[8]

Results of the panel threshold model

All regression results so far do not provide evidence for any significant effect of the LEO on program diversity. However, in Model 7 and Model 9, we subjectively set the dummy variable *policy* due to the LEO issued in 2011. In fact, it is possible that there is no structural alternation in the time effect. In other words, the program diversity has no sudden change as time goes on. Furthermore, even if structural change does take place, it does not necessarily happen in 2011. Therefore, it is important to test whether there is a structural change over time. If there is, we need to test whether a sudden change happens in 2011. If these hypotheses cannot be rejected, we can conclude that the sudden change is caused by the LEO, which does have a significant effect on the program diversity of TV stations.

First, we need to test whether there is a single threshold for the *year*. We estimate Equation (2) under the assumption of a single threshold. The results are shown in Table 9. Neither the single threshold nor the dual threshold is significant. The *p* values of the bootstrap are higher than 0.4. The results of this test suggest there is no threshold effect in the 5-year sample range. The diversity level did

Table 8. Multi-collinearity test for model 7.

Variable	VIF
ad	1.29
share	1.27
policy	1.04
Mean VIF	1.20

Table 9. Estimation results of panel threshold model.

	Year		*Share*	
Threshold variable	Single Threshold	Dual Threshold	Single Threshold	Dual Threshold
F	13.655	5.562	8.596**	7.604**
P	0.500	0.467	0.020	0.047
BS	100	300	100	300
1% critical value	37.718	30.732	9.697	12.624
5% critical value	32.360	17.018	5.633	7.474
10% critical value	26.750	15.099	3.738	5.406

[a]*P* value and critical value are obtained by bootstrap.

[8]Specific results of VIF test for all models are available upon request to the authors.

not change suddenly before or after the LEO. This further verifies that the policy has not affected the program diversity of TV stations.

Following this, we constructed another panel threshold to test if the influence of time effect on diversity varies with the market *shares*. Viewing the *share* as a threshold variable, we estimated Equation (3). The results are also shown in Table 9. It is evident that the *P* value of a single threshold is significant (0.020) and that of a dual threshold is also significant (0.047).

Table 10 shows the estimation value and a 95% confidence interval of single threshold. Using the likelihood-ratio function diagram shown in Figure 1, we can understand the estimation of the threshold value and construction of the confidence interval. The estimated values of threshold parameters mean the γ value when the value of LR equals zero. In the single threshold model, the value of γ equals 0.540. In the dual threshold model, the two thresholds are 0.550 and 0.560. Because the two values are very close to each other, we combined them into one threshold value: 0.550. According to the threshold value, we divided TV stations into two groups: high TV share (share>0.550) and low TV share (share≤0.550).

Table 11 lists the amounts of high-share group (share>0.550) and the low-share group (share≤0.550) in each year, respectively, between 2009 and 2014. The amounts remain roughly stable in the sample range according to the group standard based on threshold effect.

Model 12 shown in Table 7 adds the dummy variable (*dummy*) and calculates the t-value using the ordinary standard error. Model 13 calculates the t-value using the HC standard error. There is almost

Table 10. Estimation results of threshold value.

	Estimation Value	95% Confidence Interval
Single Threshold Value	0.540	[0.050, 3.530]
Dual Threshold Value	0.560	[0.050,3.520]
	0.550	[0.520,3.520]

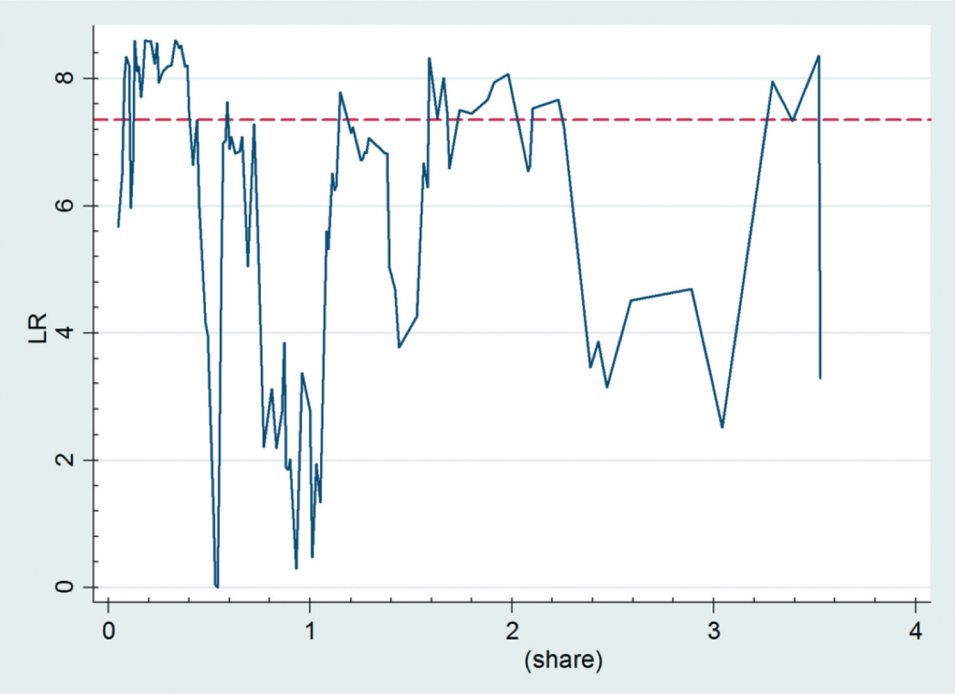

Figure 1. Estimation value and 95% confidence interval of single threshold.

Table 11. Amounts of two group satellite TVs in 2009–2014.

	2009	2010	2011	2012	2013	2014
Share≤0.550	16	13	16	15	14	14
Share>0.550	16	19	16	17	18	18
Total	32	32	32	32	32	32

no difference between these two models. The coefficient of *dummy* generated by the threshold value is positive but not significant in both Model 12 and Model 13, suggesting that the level of programming diversity of TV stations with high shares are likely to be higher than that of the TV stations with low shares, but the result is not statistically significant.

Conclusion

The LEO aims to increase the broadcasting time of "good" programs such as education, science, and news programs. If it works, the Simpson's D index indicating program diversity would be increased. According to the descriptive statistics, there is a short-lived increase in program diversity immediately following the issue of the LEO, which drops quickly thereafter. The tendency toward a lower diversity becomes stronger after the RLEO because TV stations copied each other by airing the most popular category, namely, the star reality shows. The program quotas can temporarily limit popular programming categories; however, in the long term, broadcasters continue to pursue the high-demand programming to attract the maximum audience and thus the maximum advertising incomes.

According to the econometric analysis, the time fixed-effects including policy influence do not have a significant effect on the level of program diversity of TV stations. Instead, the unique positioning and characteristics of a provincial satellite TV, which means every provincial TV has its aimed audience and its unique program strategies to fulfill its positioned theme, is the main factor for program diversity. In addition, the rating share and advertisement dependence are estimated to have significant positive and negative effects on the level of program diversity, respectively. The high rating share ensures that TV stations are adequately funded and are thus able to develop diverse program genes. TV stations that heavily rely on advertisements have to maximize their audience by chasing after only the most popular program types.

The reasons for the inefficiency of the LEO and RLEO on program diversity are multiple. Theories state that the competitive duplication is caused by the profit model of advertisement dependence (Doyle, 1996; Wildman & Owen, 1985). This study provides some evidence by showing the negative relationship between the level of program diversity and advertisement dependence. Another reason for the lack of program diversity is that there are too many satellite TV channels, and they compete in the national market. Can the Chinese broadcasting market hold so many channels? The studies of Steiner (1952), Spence and Owen (1977), Noam (1987), and Bourreau (2003) suggest that TV stations are inclined to compete excessively and tend to provide low-cost programs with a hike in channel numbers.

The third reason for low program diversity is that most TV stations tend to broadcast the programs produced by themselves. A mature market where high-quality programs can be traded does not exist yet in China. Programs produced by private enterprises have difficulty in hitting the scene. TV stations produce programs themselves to fill up all the broadcast hours, which causes either high cost or low quality. When the popular program genres are limited by the LEO/RLEO, there are not enough programs to choose from. TV stations must air duplicate programs, which sacrifices diversity.

Moreover, difficulties also occur in the policy implementation and enforcement process. China's radio and television system is a public, state-owned system. Similar to the FCC in the United States, the NRTA regulates and guides the communication industry by implementing and enforcing China's communications law and regulations. However, the provincial governments own the personnel appointment and dismissal rights of provincial satellite TV, and have considerable influence on the

program content of local satellite TV. This determines that the NRTA has limited ability to intervene in the specific broadcasting decisions of TV stations. When the provincial government's administrative order conflicts with the NRTA's industry guidelines, in most cases, the TV administrations will follow the former.

Therefore, when the LEO and RLEO were released, TV stations were under immediate administrative pressure to comply with the constraints in the short term. In the long run, however, when the program genres that were encouraged by the LEO/RLEO (for example, science and education) reduced audience ratings and thus the income sources of satellite TV, it may endanger the performance assessment of the people in charge and force them to go back to the popular program genres even they were restricted by the LEO/RLEO. Meanwhile, although the NRTA is empowered to impose punishment on TV stations, it rarely does so on a large scale, unless the content broadcast by a satellite TV station incurred negative social impact (for example, the wrong value orientation), and then the NRTA will execute its power to punish the station by suspending or ceasing the involved program. Therefore, it is observed that TV stations, although subject to restrictions by the LEO/RLEO, act as if under the "deception motive" of a "cartel": as long as my programs do not cross the red line of "dangerous content," broadcasting more entertainment programs will not be punished. This degrades the regulation policy into some invalid agreements between cartel members. Each TV station has the incentive to cheat on the agreement by broadcasting entertainment programs to raise its audience share while hoping the others abide by the regulations.

The enforcement mechanism is further challenged by the penalty ceiling imposed upon the NRTA, whose penalty power is restricted to reporting violations and suspending the involved programs of a violating TV station, instead of suspending its broadcasting qualification. In China, a provincial satellite TV station is the propaganda window of its provincial government and its channel resources for national broadcasting are granted by the central government, whereas the NRTA does not possess the authority to force TV stations to enter and exit the industry.

Therefore, the failure of program quotas like the LEO and RLEO is rooted in the dual nature of provincial satellite TV in China: not only do the stations need to follow the social public interest (i.e. restrict excessive entertainment), but they also need to face the contradictions arising from their own market interest (i.e., entertainment generates revenue).

In fact, the NRTA soon became aware of the limited effects of quota type policies such as the LEO and RLEO from the observable ecology of program content. First, due to the limited effect of the LEO, TV stations obeyed the letter of the LEO but violated its spirit by "modifying" the singing talent shows and copyright introduction programs that resulted in new popular program genres. Then, the NRTA issued the RLEO to restrict new entertainment programs. However, after its implementation, the "Celebrity Parent-Child Reality Show" (represented by "*Where Are We Going? Dad*") became popular on Chinese TV screens. Using the private lives of celebrity families as the main selling point, this type of program displays the daily trivial life and values of the celebrities to arouse the audience's enthusiasm. The NRTA issued the "Limited Child Order" in April 2016 to restrict reality shows that featured the lives of children.

After that, "Idol Development" programs became popular on Chinese TV screens and the main battlefield of Chinese entertainment programs had switched from TV stations to online streaming platforms. For example, "*Idol Producer*" (produced by iQIYI) was China's first idol development program and soon became the most popular program genre in China. It uses singing and dancing performances as the content and the trainee system as the platform to select and train all-round entertainers. In July 2018, the NRTA implemented the "Limited Idol Order" to restrict the excessive idol-cultivating programs, especially those that promoted certain idols through fundraising among fans.

In conclusion, when it comes to the production and broadcasting of entertainment programs, the NRTA, TV stations, and video streaming websites seem to have been playing a cat and mouse game. If the profit motivation of TV stations persists, using only administrative regulations will fail to solve the problem of excessive entertainment on China's TV screen. In addition to the effective anti-monopoly

regulation by the government, it is also necessary to rely on the economic power to (1) separate the commercial attributes of TV stations from their public attributes, (2) establish a flexible market entry and exit mechanism, and (3) facilitate a market-driven program circulation system in which TV stations compete through a virtuous circle.

This study warrants an important caveat. The LEO/RLEO regulations explicitly required each satellite TV to set up column for the purpose of promoting Chinese traditional virtues and the core value system of socialism. The ideological aspect of the regulations runs counter to the diversity principle that is being pursued on the program type front, i.e. the diversity of viewpoints. To the extent that this paper focuses on the fairly superficial measure of program genre diversity, an interesting extension would create a relatively deeper indicator of viewpoint diversity and investigate if the regulations under study were effective to promote both measures of program diversity, or fostered one type of diversity but at the same time worked in opposition to another.

Acknowldgements

We are grateful to the Editor and referees for thoughtful comments that substantially improved the article. All errors are our own.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Fundamental Research Funds for the Central Universities of China (CUC2019B025).

Notes on contributors

Jingwei Cheng, Ph.D., is Associate Professor of Economics and Chair of the Department of Media Economics in the School of Economics and Management at Communication University of China.

Chen Wu, Ph.D., is Associate Professor of Economics and Director of Graduate Programs in the School of Business at Plymouth State University.

Jianyu Chi, Ph.D., is Associate Professor of Economics in the School of Economics and Management at Communication University of China.

References

Baseman, K. C., & Owen, B. M. (1982). *A framework for economic analysis of electronic media concentration issues* (The National Cable Television Association, FCC No. 82–434). Economists Inc.

Beebe, J. H. (1977). Institutional structure and program choices in television markets. *Quarterly Journal of Economics*, *91* (1), 15–37. https://doi.org/10.2307/1883136

Bourreau, M. (2003). Mimicking vs. counter-programming strategies for television programs. *Information Economics and Policy*, *15*(1), 35–54. https://doi.org/10.1016/S0167-6245(02)00071-9

Broughton, M. S. (2013). Content quotas: What and whom are the protecting? Originally published In K. Donders, C. Pauwels, & J. Loisen (Eds.), *Private television in Western Europe: Content, markets, policies* (pp. 245–259). Palgrave Global Media Policy and Business. Palgrave Macmillan.

Crampes, C., & Hollander, A. (2008). The regulation of audiovisual content: Quotas and conflicting objectives. *Journal of Regulatory Economics*, *34*(3), 195–219. https://doi.org/10.1007/s11149-008-9068-x

Doyle, G. (1996). *Understanding media economics*. Sage Publications.

Einstein, M. (2004b). The financial interest and syndication rules and changes in program diversity. *Journal of Media Economics*, *17*(1), 1–18. https://doi.org/10.1207/s15327736me1701_1

Grant, A. E. (1994). The promise fulfilled? An empirical analysis of program diversity on television. *Journal of Media Economics*, *7*(1), 51–64. https://doi.org/10.1207/s15327736me0701_4

Helberger, N., Karppinen, K., & D'Acunto, L. (2018). Exposure diversity as a design principle for recommender systems. *Information, Communication & Society*, *21*(2), 191–207. https://doi.org/10.1080/1369118X.2016.1271900
Hotelling, H. (1929). Stability in competition. *Economic Journal*, *39*(1), 41–57. https://doi.org/10.2307/2224214
Lee, B., & Bae, H. (2004). The effect of screen quotas on the self-sufficiency ratio in recent domestic film markets. *Journal of Media Economics*, *17*(3), 163–176. https://doi.org/10.1207/s15327736me1703_3
Litman, B. R. (1979). The television networks, competition and program diversity. *Journal of Broadcasting*, *23*(4), 393–410. https://doi.org/10.1080/08838157909363949
McDonald, D. G., & Lin, S. (2004). The effect of new networks on U.S. television diversity. *Journal of Media Economics*, *17*(2), 105–121. https://doi.org/10.1207/s15327736me1702_3
Napoli, P. M. (1997). Rethinking program diversity assessment: An audience-centered approach. *Journal of Media Economics*, *10*(4), 59–74. https://doi.org/10.1207/s15327736me1004_4
Noam, E. M. (1987). A public and private-choice model of broadcasting. *Public Choice*, *55*(1–2), 163–187. https://doi.org/10.1007/BF00156816
Owen, B. M. (1976). The economics of diversity in broadcasting. *Administrative Organizatio*, 1–12. https://files.eric.ed.gov/fulltext/ED122768.pdf
Owen, B. M., & Wildman, S. S. (1992). *Video economics*. Harvard University Press.
Papandrea, F. (1997). Modelling television programming choices. *General Information*, *9*(96), 203–218. https://doi.org/10.1016/S0167-6245(96)00026-1
Perona, M. (2010). *How broadcasting quotas harm program diversity* (MPRA Paper 19860). University Library of Munich.
Ranaivoson, H. (2007). *How to support cultural diversity in the cultural diversity in the cultural industries? The case of the French music industry*. Conference of the ESA research network. New frontiers in arts sociology: Creativity, support and sustainability, Lüneburg, Germany, March/April..
Richardson, M. (2004a). *Cultural quotas in broadcasting I: A model* (ANUCBE school of Economics Working Papers 2004-442). Australian National University, College of Business and Economics, School of Economics.
Salop., S. (1979). Monopolistic competition with outside goods. *The Bell Journal of Economics*, *10*(1), 141–156. https://doi.org/10.2307/3003323
Spence, M., & Owen, B. (1977). Television programming, monopolistic competition, and welfare. *The Quarterly Journal of Economics*, *91*(1), 103–126. https://doi.org/10.2307/1883140
Steiner, P. O. (1952). Program patterns and preferences, and the workability of competition in radio broadcasting. *Quarterly Journal of Economics*, *66*(2), 194–223. https://doi.org/10.2307/1882942
Waldfogel, J. (2003). Preference externalities: An empirical study of who benefits whom in differentiated product markets. *The RAND Journal of Economics*, *34*(3), 557–568. https://doi.org/10.2307/1593746
Wildman, S. S., & Owen, B. M. (1985). *Program competition and diversity in the new video industry*: Columbia institute for tele-information, columbia business school. In E. M. Noam (Ed.), *Video media competition: Regulation, economics, and technology (pp. 244–279)*. Columbia University Press.
Wildman, S. S., & Lee, N. Y. (1989). *Program choice in a broadband environment*. Center for Telecommunications and Information Studies.
Wiles, P. (1963). Pilkington and the theory of value. *The Economic Journal*, *73*(290), 183–200. https://doi.org/10.2307/2228532