Research on the Supervision Mechanism in Live-stream Selling Market: Based on Evolutionary Game

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Abstract. As an emerging e-commerce format, live stream sells have been favored by many consumers. However, this booming market is also accompanied by a series of regulatory problems: Such as misleading information and lagging traditional regulatory means. Aiming at the supervision of e-commerce live streaming market, this paper uses a tripartite evolutionary game model to analyze the strategy selection and interaction process among livestreaming anchors, e-commerce live platforms and government regulators, in order to reveal the regular pattern of three-party behavior strategies under the co-regulation of regulators and platforms. Results show that: (1) The co-regulation of reputation constraint, platforms' regulation and regulators' regulation can effectively constrain anchors' violation behavior. By improving the platform's penalty intensity, the compensation coefficient, liquidated damages or reputation loss, anchors will be more inclined to choose compliant behavior. (2) A moderate level of regulatory subsidies can promote platforms to choose active regulatory strategies, while low subsidy is not conducive to stimulate the enthusiasm of platforms' supervision. In the long term, excessive subsidy has obvious diminishing marginal effect on the incentive effect of platform, it also increases the burden of governments, which will reduce regulators regulatory enthusiasm. (3) The increase of government supervision frequency or reputation loss can promote the platform to implement active supervision strategy. The increase of social welfare, regulatory authorities' loss of reputation or the enhancement of accountability punishment will all promote the implementation of strict supervision strategy by government regulatory authorities. Therefore, this paper proposes that anchors can operate legally by improving the credit mechanism of e-commerce live broadcast market and strengthening the penalty for breach of contract. In addition, government departments can promote platforms to adopt active regulatory strategies by means of subsidies and punishment measures, so as to maintain market order.

Keywords: e-commerce; live streaming sells; regulatory mechanism; evolutionary game

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1 Introduction

"Live-stream selling", a new sales model which relies on intelligent terminals and internet streaming media technology, is guided by network anchors through live-stream platforms through internet to show and sell their goods. Since 2017, the market size of live streaming e-commerce in China has grown rapidly, and the ecosystem has become increasingly improved [1]. It has played an important role in activating consumption potential, promoting industrial upgrading, providing job opportunities and helping farmers get out of poverty. With the development of the "Internet +" economy, especially e-commerce economy, this new business model became more and more accepted and recognized by the majority of consumers [2]. However, it also brings much problems as data fraud, sales of fake products and other violations. It's widely known that " Inferior pan of Li Jiaqi", "Fake bird's nest soup of Xinba " and other incidents, which exposed the current live-stream selling market is filled with problems [3]. Faced with a variety of problems such as the difficulty to define the responsibility, the high cost of consumer rights' protection, laws and regulations are not perfect and so on, it's also difficult to take effective measures to maintain the order of this market. Therefore, how to create a healthy market atmosphere of live-stream selling market, has become a famous topic for academia and relevant regulatory departments.

E-commerce live-streaming platforms, sellers, online anchors and consumers are main roles in this market. Sellers entrust anchors to display and promote their products, consumers make their decisions based on the presentation of anchors, platforms provide necessary technical services and trading services for them. As a link in the supply chain, the value of anchors depends on improving the communication efficiency between the supplier and demanders, promoting the formation of transactions. Scholars point out that the identity and characteristic of anchor is the most important factor to affect consumer's decision [4]. Some scholars point out that it is easy to establish a close relationship between anchors and consumers in the interaction process[5]. Some scholars point out that some consumers can get more emotional value by buying the products of anchors that they trust [6]. Han pointed out that, anchors actually help consumers choose products and reduce their decision-making costs, that's the core value of anchors [7].

However, as a middleman between sellers and consumers, anchors may also take illegal actions, which is driven by their interests [8]. Such as exaggerated propaganda, selling fake goods, misleading statements and fictitious data [9].While under the current Laws and regulations' environment, it's difficult to draw a clear line between anchors' marketing behavior and illegal behavior [10]. Because of information asymmetry and the lack of effective means to find evidence, it is difficult for the injured consumers to safeguard their own rights and interests. Sometimes, anchors can obtain extra profits from their illegal actions, and the platform can also obtain certain profits under the free-rider effect. Driven by short-term interests and constrained by regulatory costs, the platform lacks sufficient motivation to take the initiative to implement effective regulatory measures. All above is the main reason for all kinds of problems in the e-commerce live-stream selling market.

Moever, few studies have focused on e-commerce live-stream selling markets [11]. Guo established a tripartite evolutionary game model of consumers, short video live-streaming platforms and celebrities based on the perspective of stakeholders to analyze the strategy selection and evolution process of each subject, which provides a new idea for the strategy selection of e-commerce live streaming goods supervision subject [12]. Li constructed a three-way evolutionary game model of supplier, platform and host with cargo under platform regulation, and clarified the important role of platform regulation strategy on the evolution of relevant stakeholders' strategy [13].

Researches mainly focus on the behavioral interaction process between merchants, consumers, platforms and the host broadcasting strategy [14]. But, few researches pay attention to the important role of the government. In fact, as the maker and defender of laws and regulations, the government's regulatory role has been ignored by scholars. Therefore, this paper takes the anchors, platforms and government as the research object to analyzes their behavioral motivation and interaction process. A tripartite evolutionary game model, which based on the bounded rationality assumption, is constructed to characterize this interaction, Finally, the supervision strategies in different situations are discussed through stability analysis and numerical simulation, in order to put forward relevant suggestions.

2 Construction of an evolutionary game model

This paper establishes an evolutionary game model according to the behavioral motivations of different stakeholders. In order to simplify the analysis, this paper takes the platform, the anchor and the government as the game subjects, and adds the consumer feedback mechanism into the model. Their relationship is shown in Fig.1:

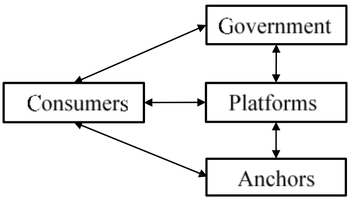

Fig. 1. The relationship among three parties (Diagram credit: Original)

2.1 Model specification

With the help of the platform's technical services, anchors facilitate the transaction between consumers and sellers. Once the deal is done, anchors and platforms would share part of proceeds, with a certain ratio of sales which they agreed in advance. In addition, both the platform and the government, as regulators, have the obligation to regulate the behavior of anchors and protect the legitimate interests of consumers.

Based on the above analysis, this paper puts forward the following hypotheses:

Assumption **1**:

Three core stakeholders, that is, online-selling anchors, live streaming e-commerce platform and the supervision department of government. To simplify the analysis, this paper call them anchors, platforms and government, all of the three agent have bounded rationality. X, Y and Z are used to represent anchors, platforms and government.

Assumption **2:**

Each agent only has two strategies, which is the most representative. For anchors, it includes legal strategy and illegal strategy, the latter refers to violations such as exaggerated propaganda, selling fake goods and so on. X1 and X2 are used to represent anchors' two strategies. For platforms, it includes positive regulation and negative regulation, the latter means that the platform takes a indulgent or shielding attitude to the illegal behavior of anchors. Y1 and Y2 are used to represent platforms' two strategies. For government, it includes strict supervision and loose supervision, the latter means that the government takes a laissez-faire or cover up attitude to the illegal behavior of anchors. Z1 and Z2 are used to represent government' two strategies.

Assumption **3:**

The probability that anchors choose legal strategy is x, and illegal strategy is 1−x. The probability that platforms choose positive regulation is y, and illegal strategy is 1−y. The probability that anchors choose strict supervision is z, and strict supervision is 1−z.Each probability parameter is unique functions of time t, which means x=x(t), y=y(t), and z=z(t). Besides, the values of x, y and z are between 0 and 1.

According to the above assumptions, there are nine situations among anchors, platforms and governments. Relevant parameters of the game model and the payoff matrix for the nine cases are shown in Table 1 and Table 2.

Table 1. Main parameters and its' description of the model (Diagram credit: Original)

Parameter	Description	Value
R_1	Revenue from anchor compliance strategy.	$R_1>0$
R_2	Revenue from anchor's illegal strategy.	$R_2>0$
C_1	Additional regulatory costs of platform's active regulation strategy.	$C_1>0$
C_2	Additional supervision costs of regulatory authorities' strict supervision.	$C_2>0$
L_1	The loss of consumer trust and the anchor's personal reputation,when anchor adopts illegal strategy.	$L_1>0$
l_2	The loss of consumer trust and the platform's reputation， when platforms choose postive regulation strategy to anchors' illegal strategy.	$L_2>0$
P	The maximum technical punishment for anchor's illegal behavior when the platform chooses active regulation strategy.	$P>0$
F	The liquidated damages deducted from the anchor's illegal behavior when the platform chooses active regulation strategy.	$F>0$
W	Subsidies and rewards given by regulatory authorities to platforms' active regulation strategy when they choose active regulation strategy.	$W>0$
G	When the supervision department strictly supervises, the platform has to pay a fine due to negative regulation of anchor violations.	$G>0$

V	When the supervision department strictly supervises and the platform actively regulates, the social welfare obtained by the supervision department is improved.	$V>0$
H	When the supervision department passively supervises and the platform passively regulates the anchor's illegal behavior, the reputation of the supervision department loses.	$M>0$
M	When the supervision department passively supervises and the platform passively regulates the anchor's illegal behavior, the supervision department is punished by the superior government.	$M>0$
η	Ratio of platform revenue and anchor revenue with goods	$0<\eta<1$
α	The ratio of the anchor's compensation to consumers due to violations, when the platform is actively regulated.	$\alpha>0$
θ	The technical punishment ratio for the anchor's illegal behavior is implemented, when the platform is actively regulated,	$0<\theta<1$
μ	When the supervision department is strictly supervised and the platform is negatively regulated, the proportional coefficient of the anchor's payment to consumers due to violations.	$\mu>\alpha$
β	The supervision department found the probability that the platform negatively regulated the anchor's illegal behavior, that is, the supervision frequency.	$0<\beta<1$

Table 2. The payoff matrix for nine cases (Diagram credit: Original)

Strategy Combination	Anchors(X)	Platforms(Y)	Government(Z)
$X1, Y1, Z1$	R_1	$\eta R_1 - C_1 + W$	$-C_2 - W + V$
$X1, Y1, Z2$	R_1	$\eta R_1 - C_1$	0
$X1, Y2, Z1$	R_1	ηR_1	$-C_2$
$X1, Y2, Z2$	R_1	ηR_1	0
$X2, Y1, Z1$	$R_2 - L_1 - \theta P - \alpha R_2 - F$	$\eta R_2 - C_1 + W + F$	$-C_2 - W + V$
$X2, Y1, Z2$	$R_2 - L_1 - \theta P - \alpha R_2 - F$	$\eta R_2 - C_1 + F$	0
$X2, Y2, Z1$	$R_2 - L_1 - \beta P - \mu R_2$	$\eta R_2 - L_2 - \beta G$	$-C_2 + \beta G$
$X2, Y2, Z2$	$R_2 - L_1$	$\eta R_2 - L_2$	$-M - H$

2.2 Expected income of game agents

In the game between anchors, platforms and government regulators, none of them is a completely rational agent. This means that each agent has to adjust its strategy by repeating the game many times. Therefore, this section tries to analyze the equilibrium solution of the evolutionary game, in order to provide the theoretical basis for the government and the platform's implement regulation. Their functions of income as follows:

The income of the anchor who adopts the legal strategy is U11, the income of the anchor who adopts the illegal strategy is U12, and the average income is U1, then

$$U_{11} = yzR_1 + y(1-z)R_1 + (1-y)zR_1 + (1-y)(1-z)R_1 \quad (1)$$

$$U_{12} = yz(R_2 - L_1 - \theta P - \alpha R_2 - F) + y(1-z)(R_2 - L_1 - \theta P - \alpha R_2 - F) + (1-y)z(R_2 - L_1 - \beta P - \mu R_2) + (1-y)(1-z)(R_2 - L_1)(2)$$

$$U_1 = xU_{11} + (1 - x)U_{12} \quad (3)$$

The income of the platform who adopts the positive regulation is U21, the income of the platform who adopts the negative regulation is U22, and the average income is U2, then

$$U_{21} = xz(\eta R_1 - C_1 + W) + x(1 - z)(\eta R_1 - C_1) + (1 - x)z(\eta R_2 - C_1 + W + F) + (1 - x)(1 - z)(\eta R_2 - C_1 + F) \quad (4)$$

$$U_{22} = xz(\eta R_1) + x(1 - z)(\eta R_1) + (1 - x)z(\eta R_2 - L_2 - \beta G) + (1 - x)(1 - z)(\eta R_2 - L_2) \quad (5)$$

$$U_2 = yU_{21} + (1 - y)U_{22} \quad (6)$$

The income of the government who adopts the strict supervision is U31, the income of the government who adopts the loose supervision is U32, and the average income is U3, then

$$U_{31} = xy(-C_2 - W + V) + x(1 - y)(-C_2) + (1 - x)y(-C_2 - W + V) + (1 - x)(1 - y)(-C_2 + \beta G) \quad (7)$$

$$U_{32} = (1 - x)(1 - y)(-M - H) \quad (8)$$

$$U_3 = zU_{31} + (1 - z)U_{32} \quad (9)$$

According to evolutionary game theory, when the payment or fitness of one strategy become more than the average fitness of the population, the number of this population will continue to grow up, which means the growth rate of this population is larger than 0. It is usually expressed by the equation of replication dynamics. Scholars usually use the function of replication dynamics to describe this process [15]. According to the tripartite payment functions obtained above, the following replication dynamic equations can be established

$$F(x) = \frac{dx}{dt} = x(1 - x)[(\theta P + \alpha R_2 + F)y + (\beta P + \mu R_2)(1 - y)z + R_1 - R_2 + L_1] \quad (10)$$

$$F(y) = \frac{dy}{dt} = y(1 - y)[\beta G(1 - x)z + Wz + (L_2 + F)(1 - x) - C_1] \quad (11)$$

$$F(z) = \frac{dz}{dt} = z(1 - z)[(H + M + \beta G)(1 - x)(1 - y) + (V - W)y - C_2] \quad (12)$$

2.3 Analysis of stability of the model

According to the method proposed by Friedman, the stability of the equilibrium points of a differential system can be derived from the local stability analysis of the Jacobian matrix of the system [16]. The jacobian matrix of system (10-12) as follows.

$$J=\begin{bmatrix}\frac{\partial F(x)}{\partial x} & \frac{\partial F(x)}{\partial y} & \frac{\partial F(x)}{\partial z}\\ \frac{\partial F(y)}{\partial x} & \frac{\partial F(y)}{\partial y} & \frac{\partial F(y)}{\partial z}\\ \frac{\partial F(z)}{\partial x} & \frac{\partial F(z)}{\partial y} & \frac{\partial F(z)}{\partial z}\end{bmatrix}$$

$$=\begin{bmatrix}(1-2x)\begin{bmatrix}(\theta P+\alpha R_2+F)y+\\ (\beta P+\mu R_2)(1-y)z\\ +R_1-R_2+L_1\end{bmatrix} & x(1-x)\begin{bmatrix}\theta P+\alpha R_2+F-\\ (\beta P+\mu R_2)z\end{bmatrix} & x(1-x)(1-y)(\beta P+\mu R_2)\\ -y(1-y)(L_2+F+\beta Gz) & (1-2y)\begin{bmatrix}\beta G(1-x)z+Wz\\ +(L_2+F)(1-x)-C_1\end{bmatrix} & y(1-y)[\beta G(1-x)+W]\\ -z(1-z)(1-y)(H+M+\beta G) & -z(1-z)\begin{bmatrix}(H+M+\beta G)(1-x)\\ +W-V\end{bmatrix} & (1-2z)\begin{bmatrix}(H+M+\beta G)(1-x)(1-y)\\ +(V-W)y-C_2\end{bmatrix}\end{bmatrix} \quad (13)$$

According to Lyapunov's method, the stability of the differential system can be judged according to the positive and negative characteristic roots of the equilibrium point [17]. When all eigenvalues of the equilibrium point are negative, the point is an evolutionarily stable strategy (ESS). For example, when the eigenvalues of E1 are all less than 0, that means (0,0,0) is the final evolution direction of the system. This means that the probability of the anchor taking legal strategies is 0, the probability of the platform's active supervision is 0, and the probability of the government's strict supervision is also 0, which is the worst situation for consumers.

The eight pure strategy points are substituted into the Jacobi matrix, and the corresponding eigen roots of the equilibrium points are obtained, as shown in the Table 3.

Table 3. Eigen roots of the equilibrium points (Diagram credit: Original)

Point	λ_1	λ_2	λ_3
E1(0,0,0)	$R_1-R_2+L_1$	L_2+F-C_1	$H+M+\beta G-C_2$
E2(0,0,1)	$\beta P+\mu R_2+R_1-R_2+L_1$	$\beta G+W+L_2+F-C_1$	$-(H+M+\beta G-C_2)$
E2(0,1,0)	$\theta P+\alpha R_2+F+R_1-R_2+L_1$	$-(L_2+F-C_1)$	$V-C_2-W$
E4(0,1,1)	$\theta P+\alpha R_2+F+R_1-R_2+L_1$	$-(\beta G+W+L_2+F-C_1)$	$-(V-C_2-W)$
E5(1,0,0)	$-(R_1-R_2+L_1)$	$-C_1$	$-C_2$
E6(1,0,1)	$-(\beta P+\mu R_2+R_1-R_2+L_1)$	$W-C_1$	C_2
E7(1,1,0)	$-(\beta P+\mu R_2+R_1-R_2+L_1)$	C_1	$V-C_2-W$
E8(1,1,1)	$-(\beta P+\mu R_2+R_1-R_2+L_1)$	$-(W-C_1)$	$-(V-C_2-W)$

In addition, considering the realistic background of the model, this paper assumes that:

$$R_2-R_1<min(\theta P+\alpha R_2+F+L_1,\beta P+\mu R_2+L_1) \quad (14)$$

$$V-C_2>W \quad (15)$$

Eq. (14) shows that the excess income obtained by anchors when they adopt illegal strategies is always less than the sum of various penalties, compensation, liquidated damages and residual losses. Only in this case, the illegal behavior of anchors can be effectively restrained. Eq.(15) shows that when the government adopts strict supervision and the platform adopts positive regulation, the social welfare obtained by the government is greater than the sum of regulatory cost and subsidy cost. All the following scenarios will be analyzed based on these assumptions.

The evolutionarily stable strategy requires that the eigenvalues at the equilibrium points are all negative, therefore, E2, E3 ,E4 E6,E7 are not stable strategies. Therefore, E1, E5, and E8 are evolutionarily stable strategies under different conditions. Under the previous assumptions, the stability of each point under different conditions is shown in Table 4.

As shown in Table 5, this paper is divided into four cases for discussion:

Situation 1:

Under the condition of situation 1, the volutionary game system will converge toward the equilibrium point E5(1,0,0). Therefore, it tends to implement the lenient regulation strategy, and finally the three-party game system will converge to the strategy set stably (Legal strategy, Negative regulation, Loose supervision).

Situation 2:

Under the condition of situation 2, the volutionary game system may converge toward the equilibrium point E5(1,0,0) or E8(1,1,1). Finally, the tripartite game system can converge to the strategies of (Legal strategy, Negative regulation, Loose supervision), or the strategies of (Legal strategy, Positive regulation, Strict supervision).Secific points of convergence depends on the initial strategy choice of three parties.

Situation 3:

Under the condition of situation 3, the volutionary game system will converge toward the equilibrium point E1(0,0,0). Eventually tripartite game system can steady convergence in the strategy of (Illegal strategy, Negative regulation, Loose supervision).

Situation 4:

Under the condition of situation 4, the volutionary game system will converge toward the equilibrium point E8(1,1,1). Finally, tripartite game system will eventually steady convergence strategy of (Legal strategy, Posttive regulation, Strict supervision).

Table 4. Analysis of stability (Diagram credit: Original)

Situation	Conditions	Points	Eigenvalues	Local stability
1	$R_2 - R_1 < L_1$, $W < C_1$	*E1*	(+,±,±)	Instability
		E5	(-,-,-)	ESS
		E8	(-,+,-)	Instability
2	$R_2 - R_1 < L_1$, $W < C_1$	*E1*	(+,±,±)	Instability
		E5	(-,-,-)	ESS
		E8	(-,-,-)	ESS
3	$L_1 < R_2 - R_1 < \theta P + \alpha R_2 + F + L_1$, $L_1 < R_2 - R_1 < \beta P + \mu R_2 + L_1$, $L_2 + F < C_1$, $H + M + \beta G < C_2$,$W < C_1$	*E1*	(-,-,-)	ESS
		E5	(+,-,-)	Instability
		E8	(-,+,-)	Instability
4	$L_1 < R_2 - R_1 < \theta P + \alpha R_2 + F + L_1$,	*E1*	(-,-,+),(-,+,-),(-,+,+)	Instability

$L_1 < R_2 - R_1 < \beta P + \mu R_2 + L_1$, $C_2 < M + \beta G \parallel L_2 + F < C_1$, $C_1 < W$	*E5*	(+,-,-)	Instability
	E8	(-,-,-)	ESS

3 Numerical simulation of the evolutionary game model

This section verifies the above analysis results through numerical simulation, and discusses the game paths and evolution results of anchors, platforms and governments.

3.1 Simulation of the evolution path

In order to show the evolution results of the three-party strategy, this section conducts simulation according to the corresponding parameter conditions. Under the four scenarios, the value of relevant parameters under the four scenarios are shown in Table 6.

Table 5. Parameters (Diagram credit: Original)

	R_1	R_2	L_1	L_2	C_1	C_2	P	F	W	G	V	H	M	η	α	β	θ	μ
(1)	4.5	5.0	1.0	3.0	2.5	3.0	3.0	3.0	2.0	3.0	5.5	4.0	4.0	0.2	0.2	0.5	0.2	0.5
(2)	4.5	5.0	1.0	3.0	2.5	3.0	3.0	3.0	3.5	3.0	8.0	6.0	6.0	0.2	0.2	0.5	0.2	0.5
(3)	4.0	7.0	1.0	3.0	5.0	6.0	3.0	1.5	2.0	3.0	8.5	2.0	2.0	0.2	0.2	0.5	0.2	0.5
(4)	4.0	7.0	1.0	3.0	2.0	4.0	3.0	3.0	2.5	3.0	8.5	2.0	2.0	0.2	0.2	0.5	0.2	0.5

Under the conditions of the above parameters, the initial values of x,y and z are respectively set to 0.1~0.9. The simulation results under the four scenarios are shown in Fig.2

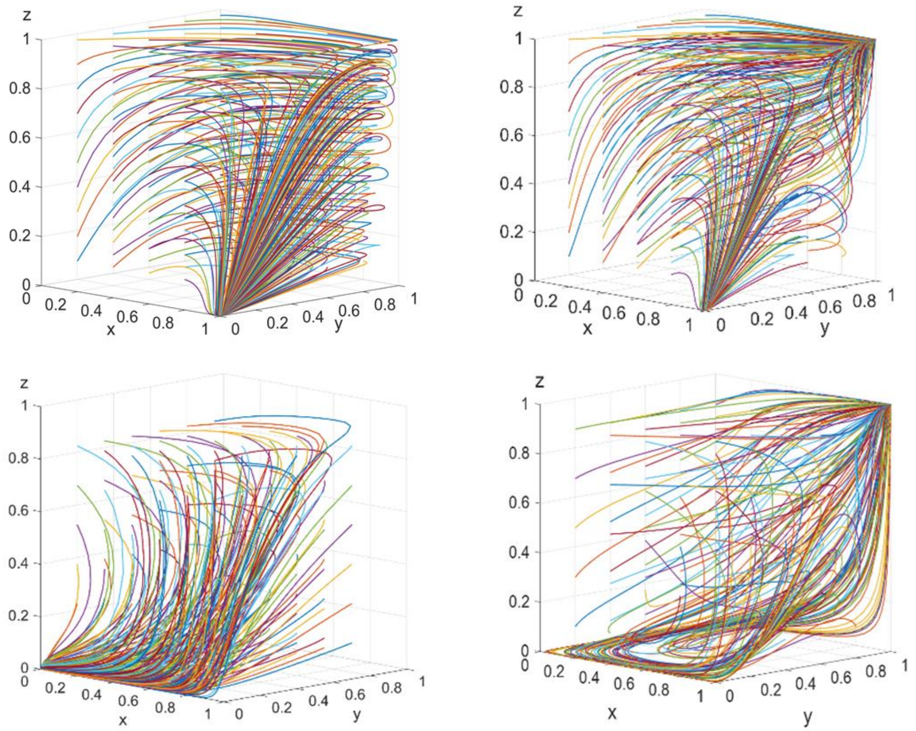

Fig. 2. Phase diagrams (Diagram credit: Original)

As shown in Fig. 2., the four cases of the preceding information are consistent with the evolution path in the phase diagram, the simulation results confirm the accuracy of the above analysis.

3.2 Sensitivity analysis of parameters

In order to analyze the influence of changes in relevant parameters on the evolution of the three-party strategy, this section conducts simulation based on situation 4.

(1) Impact of related parameter changes on platform strategy.

The impacts of regulatory subsidies, government regulation frequency and platform reputation loss on platform strategy evolution are shown in Fig.3., Fig.4. and Fig.5. Results show that, for the platform, the increase of subsidy cost, regulatory frequency and residual loss will encourage the platform to choose an active regulatory strategy.

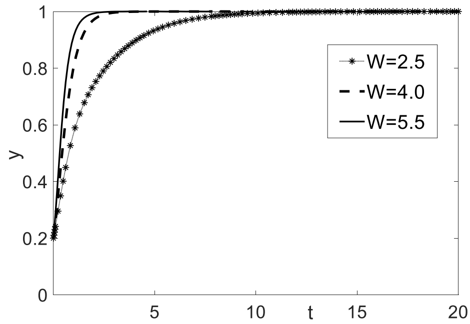

Fig. 3. The influence of government's subsidy to platforms' strategy (Diagram credit: Original)

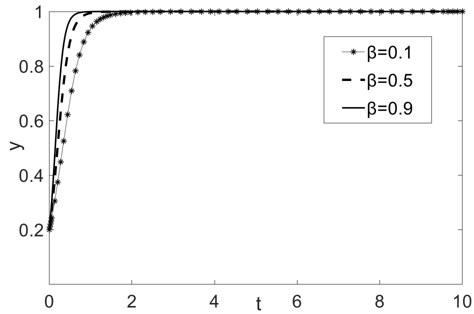

Fig. 4. The influence of supervision frequency to platform strategy (Diagram credit: Original)

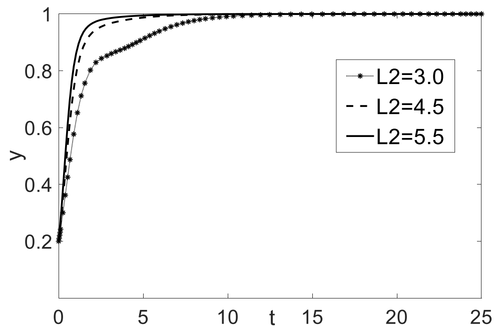

Fig. 5. Influence of reputation loss to platforms' strategy (Diagram credit: Original)

(2) The impact of changes in relevant parameters on government strategies.

The influences of regulatory subsidy cost, regulatory revenue and superior government punishment on government strategy evolution are shown in Fig.6, Fig.7 and Fig.8.

Obviously, poor subsidy is difficult to stimulate the initiative of platform supervision, and too high subsidy means the higher cost of government supervision, and the situation of strict supervision cannot be sustained for a long time, which is not conducive to the regulation of the market order. In order to promote the strategy evolution of relevant regulatory departments of the government in a positive direction, in order to achieve the long-term orderly development of the e-commerce live streaming industry.

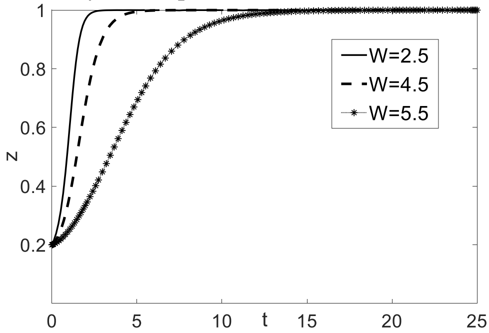

Fig. 6. Impact of subsidies (Diagram credit: Original)

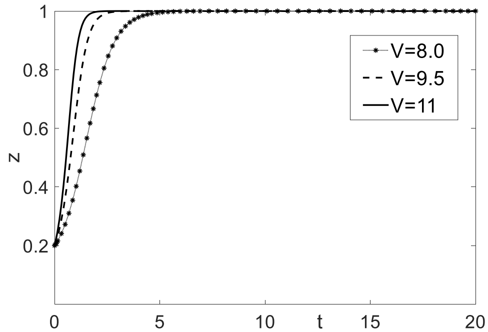

Fig. 7. Impact of supervisory benefits (Diagram credit: Original)

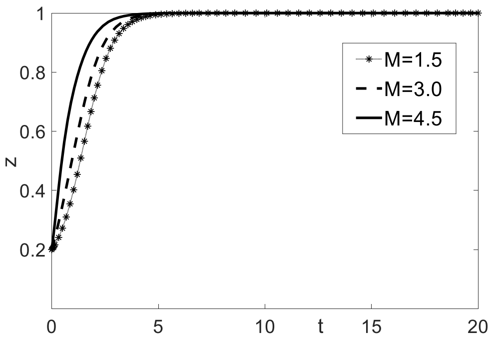

Fig. 8. Impact of superior penalties (Diagram credit: Original)

4 Conclusions

Regulating the order of the e-commerce live-stream selling market is the urgent demand of the majority of consumers and the government. Based on the evolutionary game theory, this paper modeled the three-party strategy interaction between the host broadcast of goods, platform and the government, theoretically analyzed the problems of the difficulty in regulating the market order of e-commerce live-selling markets.Results show:

(1) The behavior choice of the anchor, platform and the government not only depends on the income and cost of their own choice, but also is closely related to the strategic choice of other subjects. The three interact and influence each other. (2) The selection of anchors' strategy is mainly affected by the excess returns of the illegal behaviors: When the excess returns are small, the effective constraints on the illegal behaviors can be realized only by relying on the market reputation constraint mechanism. (3) The strategy selection of platforms is mainly influenced by regulatory subsidies: Without subsidies or at a low level of subsidies, platforms lack sufficient power to effectively regulate anchors' violations, and excessive regulatory subsidies have a significant editorial decreasing effect on the promotion of platform regulations. (4) The government's behavior is mainly affected by the cost of regulatory subsidies, regulatory benefits, and punishments from higher governments.

This paper constructs a three-party evolutionary game model for the three key subjects of the market order regulation of anchors, platforms and the government, and analyzes the evolution paths and interaction rules of the three behavioral strategies. In addition, the selection of relevant parameters in the numerical simulation could be subjective, and the reliability of relevant research results can be considered to be supported by real commercial data in the future.

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