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The influence of artificial intelligence technology judicial decision reasoning on contract performance in manufacturing supply chain: A simulation analysis using Evolutionary Game approach

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ABSTRACT

Today's world revolves around technology, which has a total impact not only on human life but also on manufacturing companies. Many companies have embraced artificial intelligence (AI) in the form of powerful computers, applications, or software that can screen job applicants, alert when a machine is about to break down, and read legal contracts. However, the rapid expansion of AI and its use in legal settings, such as contract performance, in a company is a major challenge on the judicial side. This article, thus, establishes an evolutionary game model of whether manufacturing suppliers are performing contracts or not when the court chooses to use artificial intelligence (AI) technology. Considering the complexity of choosing manufacturers' AI strategy, the method constructs a simulation analysis model of manufacturers' contract enforcement behaviour with the participation of several subjects. We can simulate the influence of the factors selected on the strategy chosen by both parties (manufacturers and court) by changing the different influence factors and studying the evolutionary law of different court guidance and regulation strategies on the production behaviour of green products. The results show that the choice of the court and manufacturers to use the AI technology strategy or not is based on the rate of error reduction, through the computational implementation of multi-subject modelling.

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1. Introduction

Over time, the problems and expectations of human life have become increasingly complex. Solving these problems has brought us into the current technological era, where there are constant attempts to make machines smarter than humans, or at least to make them at the same level of intelligence as humans [1]. This is how AI was born, which can be defined as the branch of advanced engineering that allows inducing intelligence in computers, mainly to improve those sectors of activity that lag in providing services to consumers. It is also a branch of computer science that focuses on the development of intelligent machines that think and work like humans. In today's business world, AI has become a serious topic. Hence, as predicted to be the next technological disruption, AI is redefining business growth strategies [2]. In this regard, many

companies have already followed suit and are recognizing the benefits of AI within their operations. With the implementation of additive manufacturing technologies, manufacturing executives will make a strategic decision based on the ability to predict the impact of this investment on improving the company's competitive advantage [3]. AI is emerging as a competitive advantage, while some areas of information technology are reduced to a position of competitive necessity [4]. Blockchain technology enables organisations to develop a more responsible and flexible supply chain and to overcome internal and external challenges at all levels [5]. Production in manufacturing companies has been optimized thanks to machine learning, which allows robots to perform all kinds of calculations in real-time to adapt the production rate, increase the occupancy rate of the machines, support an operator on the production line, and optimally manage inventory [6]. Briefly speaking, AI increases productivity, accelerates production, reduces costs and delays. Therefore, many manufacturing companies have moved from remote monitoring to AI-based control, optimization, and advanced autonomous systems to improve their functionality [7]. In [8], the LMDI (logarithmic mean divisia index) decomposition model was used to decompose the influencing factors of carbon emission from five aspects: energy structure, energy intensity, economic efficiency, industrial structure, and employee scale. AI offers solutions for generating content, predicting sales, and also optimizing advertising strategies. The ability to deliver content, or personalized advertising to a target market, allows sales/marketing teams to centralize their efforts to better follow the customer through the buying process. Thus, by integrating AI into customer relationship management (CRM), service and product companies benefit from improved sales and financial performance. Future releases of CRM systems such as salesforce will enable sales, marketing, and digital managers to meet and exceed their goals. In addition, AI, combined with big data, which generates data on purchase history, consumption habits, etc., allows a company's prospects to be better identified and thus optimize qualified leads. Artificial intelligence provides faster, simpler, and more accurate solutions. More recently, AI is also being used in the judicial field. Using AI in law, decision support systems have been developed and decisions are now easier for legal professionals to make. AI is also used to manage risk and perform heavy legal research tasks [9]. As future research has many potential benefits for existing and new businesses, companies should not lose sight of the future of AI [10].

The significant opportunities, realistic impact assessment, challenges, and potential research agenda posed by the rapid emergence of AI in several areas: business and management, government, public sector, and science and technology are presented in [11]. However, it is limited to an overview of AI technology and its impact on the future of industry and society based on the societal and industrial influence on the pace and direction of AI development. It did not take into consideration the impact of AI on the core workforce of the company. The importance of decision support systems and the application of AI in supply chain risk management is presented in [12], but it limited its research in the domain that manages risks that affect the supply chain. The literature [13] outlines the key challenges and their analysis, as well as the opportunities presented by AI, IoT, and blockchain, but has specifically considered the cooperation of legislators, developers, and businesspeople to grow businesses in the face of this technological boom. How the practice of law will be affected by artificial intelligence is proposed in [14]. Here, recent developments in artificial intelligence that have enabled lawyers to make objective and accurate predictions on discrete legal issues have been demonstrated. However, the limitations that lawyers face have not been highlighted, and the predictions made have not proven to be 100 % reliable. A contractual control in the supply chain is described in [15]. It examines the legal steps that a limited number of multinationals are taking in practice to govern their supply chains in terms of CSR, providing valuable insights into which companies are aiming to improve the CSR performance of their supply chains and acting accordingly. However, technology, i.e., AI, has not been integrated into this research, not only at the contractual level but also at the judicial level.

The objective of this paper is to demonstrate the influence of artificial intelligence technology judicial decision reasoning on contract performance in manufacturing supply chain. An evolutionary game model between the court and manufacturers is constructed to determine whether manufacturing suppliers will choose to enforce contracts or not when the court uses AI or not. Section 2 presents the literature review of the evolutionary game model. Section 3 presents the

problem description by pointing out the basic assumptions of the evolutionary game model and an analysis of the evolutionary game of the court choice. The research method describing the phase diagram of the evolutionary game is presented in Section 4. The simulation results and discussion are shown in Section 5, while the conclusion is presented in Section 6.

2. Literature review: Analysis of the evolutionary game of AI

The benefits of AI include the improvement of quality, faster response, and reduction of costs [16]. It has been shown that the neural network model can handle the production management and control problem of a discrete manufacturing job shop, based on ant colony optimisation (ACO) [17]. Artificial intelligence companies continue to find ways to develop technologies that can handle laborious tasks in different industries with greater speed and accuracy. AI, in the legal profession, has already found its place in helping lawyers and clients. Thus, the judicial method chose and the manufacturer's decision have different responsibilities in the choice of the final strategy that will be adopted by the judge, and the relationship between them is an evolutionary game, promoting the integration of AI into the judicial system [18]. However, the decision focus of both, the court and the manufacturers, is different. Courts typically focus on reducing error rates, while companies aim to improve their key performance indicators (KPIs) and maximize their profit. The relationship between the two parties is a kind of competition to achieve good performance. Therefore, the court and companies are in a state of competition and cooperation when deciding whether to implement AI or not. Both the court and the companies need AI technology. AI helps the court system automate, increasing efficiency within an affordable budget [19]. In many industries, AI has helped reduce costs, increase revenues and improve assets. It also helps companies optimize R&D and increase lower cost, higher quality manufacturing, achieve 100 % accurate customer demand projections and forecasts. AI enables supply chain managers to ensure real-time tracking and error-free production, achieve efficient designs to eliminate waste, and facilitate process cycle time reduction [20]. The implementation of an AI system in the supply chain can synchronize the production rates and sales. It also allows firms to improve their profits by acting on the sharing contract [21].

The use of AI in the courts involves the application of mathematical and computational techniques to make the law more manageable, predictable, understandable, and accessible. This makes judicial decisions more reliable. Thus, the implementation of AI in court decisions attracts many manufacturers to submit individual cases or issues to the AI-driven court. Today, smart contracts are the future of contract analysis. There is no doubt that AI is highly beneficial in reviewing, comparing, and writing contracts, saving time, money, and effort. An integrated knowledge-based system including rule-based reasoning and cases for acquisition or transfer of real estate according to the Indian legal domain using Win Prolog VisiRule IDE was developed. It can help build a large knowledge base system with a mix of rules that is useful to practicing lawyers and ordinary people for making legal decisions [22]. Case analysis of numerous companies such as Adam Nguyen, Ned Gannon, and LawGeex shows that these companies are using artificial intelligence technology that dramatically reduces costs and saves time, making it easier to summarize, review, manage, and compare [23]. For the environment of an economic system, the quality of judicial procedures determines the level of the business environment favourable to the development of entrepreneurship and the acceleration of economic growth. Overall, the quality of legal procedures influences the investment attractiveness of the economy [24]. Therefore, they have a cooperative relationship and are interdependent.

3. Problem description

3.1 Model assumptions

The basic assumptions of the evolutionary game model between manufacturers and the court in the use of AI technology for contract performance are as follows:

- R_c represents the court benefit of using AI technology; R_M represents manufacturers' revenues from the use of AI in court; D represents the company's deposits for the use of AI technology in court; $-D$ represents the company's deposits for not using AI technology in the court;
- T_{ai} is the cost of using AI technology in the courtroom; P is the penalty given to manufacturers by the court for breach of contract for using AI technology; L represents losses due to wrongful conviction cases as a result of not using AI technology;
- B is the court's gain from the default when manufacturers breach the contract; H represents the manufacturers' gain in credit enhancement due to the court's use of AI technology.
- α symbolizes the error reduction rate in the AI technology approach; the probability of default not being detected when the AI technology is used by the court is symbolized by β, where $0 \le \alpha \le 1$, $0 \le \beta \le 1$.
- Suppose x represents the proportion of the court to use AI technology, 1-x represents the proportion of the court that decides not to use AI technology, y represents the proportion of manufacturers that have decided to breach a contract, 1-y represents the proportion of manufacturers that have decided to implement AI technology, with $0 \le x \le 1$, $0 \le y \le 1$.
- The payment matrix for courts and manufacturing based on the above assumptions is presented in Table 1.

Table 1 Courts and manufacturing companies payment matrix

Court \ Manufacturer	Manufacturer Contract breach	Manufacturer implementation
Use of AI	$R_c - T_{ai} - D + P - \alpha * L, R_M + D - P + \beta * B$	$R_c - T_{ai} - D, R_M + D + H$
No use of AI	$R_c - L, R_M + B$	$R_c, R_M + H$

3.2 Matrix game pay-off

According to the above assumptions described, the analysis of the evolutionary game of court choice is as follows:

(1) Payment when the court chooses to use AI technology strategy:

$$W_1 = y(R_c - T_{ai} - D + P - \alpha * L) + (1 - y)(R_c - T_{ai} - D) \quad (1)$$

Payment when the court chooses to NOT use AI technology strategy:

$$W_2 = y(R_c - L) + (1 - y)(R_c) \quad (2)$$

Average payment of the court:

$$\overline{W} = xW_1 + (1 - x)W_2 \quad (3)$$

Thus, the equation presented below represents the dynamic differential equation of the court:

$$\frac{dx(t)}{dt} = x(W_1 - \overline{W}) = x(1 - x)\{[(1 - \alpha)L + P]y - T_{ai} - D\} \quad (4)$$

and

$$F(x) = x(1 - x)\{[(1 - \alpha)L + P]y - T_{ai} - D\} \quad (5)$$

Therefore,

$$F'(x) = (1 - 2x)\{[(1 - \alpha)L + P]y - T_{ai} - D\} \quad (6)$$

Based on the stability principle: If $F'(x^*) < 0$, x^* will be in a stable state.

$\frac{dx(t)}{dt} = 0 \Rightarrow x_1 = 0,\ x_2 = 1,\ y = \frac{T_{ai}+D}{(1-\alpha)L+P}$

Then, an evolutionary stable state analysis is performed for the three points:

a) When $y = \frac{T_{ai}+D}{(1-\alpha)L+P}$, $\frac{dx(t)}{dt}$ is always zero (0), meaning that x doesn't change over time;

b) When $y > \frac{T_{ai}+D}{(1-\alpha)L+P}$, $F'(x) < 0,\ x = 1$. This is an evolutionary stable state, which means that through continuous imitation and learning, the proportion of the AI technology strategy chosen by the court tends to be 100 %.

c) When $y < \frac{T_{ai}+D}{(1-\alpha)L+P}$, $F'(x) < 0,\ x = 0$. This is an evolutionary stable state, which means that through continuous imitation and learning, the proportion of the court's decision not to choose AI technology strategy tends to be 100 %.

(2) Payment when the manufacturer chooses to breach the contract:

$$U_1 = x\left[(R_M + D - P + \beta * B\right] + (1 - x)(R_M + B) \tag{7}$$

Payment when the manufacturer chooses to implement AI technology strategy:

$$U_2 = x[R_M + D + H] + (1 - x)(R_M + H) \tag{8}$$

The manufacturer average payment:

$$\bar{U} = yU_1 + (1 - y)U_2 \tag{9}$$

Thus, the manufacturer enterprise dynamic differential equation:

$$\frac{dx(t)}{dt} = y(U_1 - \bar{U}) = y(1 - y)\{[(\beta - 1)B - P]x + B - H\} \tag{10}$$

and

$$F(y) = y(1 - y)\{[(\beta - 1)B - P]x + B - H\} \tag{11}$$

So,

$$F'(y) = (1 - 2y)\{[(\beta - 1)B - P]x + B - H\} \tag{12}$$

Based on the principle of stability: If $F'(y^*) < 0$, y^* is a stable state.

$\frac{dy(t)}{dt} = 0 \Rightarrow y_1 = 0,\ y_2 = 1,\ x = \frac{H-B}{(\beta-1)B-P}$

Then, an evolutionary stable state analysis is performed for the three points:

a) When $x = \frac{H-B}{(\beta-1)B-P}$, $\frac{dx(t)}{dt}$ is always zero (0), meaning that y does not change over time;

b) When $x > \frac{H-B}{(\beta-1)B-P}$, $F'(x) < 0,\ y = 1$. This is an evolutionary stable state, which means that through continuous imitation and learning, the proportion of manufacturer enterprise that chooses to breach the contract tends to be 100 %.

c) When $x < \frac{H-B}{(\beta-1)B-P}$, $F'(x) < 0,\ y = 0$. This is an evolutionary stable state, which means that through continuous imitation and learning, the proportion of manufacturer enterprise that chooses to implement the AI technology strategy tends to be 100 %.

(3) Stability strategy of the evolutionary game system

By combining Eq. 4 and Eq. 10, a system of differential Eq. 13 is obtained, which represents the whole system game evolution process:

$$\begin{cases} \dfrac{dx(t)}{dt} = x(1-x)\{[(1-\alpha)L+P]y - T_{ai} - D\} \\ \dfrac{dy(t)}{dt} = y(1-y)\{[(\beta-1)B-P]x + C - H\} \end{cases} \tag{13}$$

Make $\begin{cases} \dfrac{dx(t)}{dt} = 0 \\ \dfrac{dy(t)}{dt} = 0 \end{cases}$ to obtain the possible equilibrium point of the system K(*0,0*), L(*0,1*), M(*1,0*), N(*1,1*), O$\left(\frac{H-B}{(\beta-1)B-P}, \frac{T_{ai}+D}{(1-\alpha)L+P}\right)$, which is the Evolutionary Stable Strategy (ESS) point. Based on the method of how to calculate the local stability of the system created by Friedman in 1991, in this paper, the Jacobi matrix of the equations of evolutionary systems can be analyzed [25].

The partial derivatives of the two equations, from Eq. 13, are obtained as shown in Eq. 14.

$$J = \begin{vmatrix} \dfrac{\partial F(x)}{\partial x} & \dfrac{\partial F(x)}{\partial y} \\ \dfrac{\partial F(y)}{\partial x} & \dfrac{\partial F(y)}{\partial y} \end{vmatrix} \tag{14}$$

$$\frac{\partial F(x)}{\partial x} = (1\text{-}2x)\{[(1-\alpha)L+P]y - T_{ai} - D\} \tag{15}$$

$$\frac{\partial F(x)}{\partial y} = x(1\text{-}x)[(1-\alpha)L+P] \tag{16}$$

$$\frac{\partial F(y)}{\partial x} = y(1-y)[(\beta-1)B-P] \tag{17}$$

$$\frac{\partial F(y)}{\partial y} = (1-2y)\{[(\beta-1)B-P]x + B - H\} \tag{18}$$

K, L, M, N, and O, the local equilibrium points, are put into the Jacobi matrix and det *J* and tr *J* can be obtained to get the Evolutionary Stable Strategy (ESS) of the system.

The matrix determinant is:

$$\det J = \left(\frac{\partial F(x)}{\partial x} \times \frac{\partial F(y)}{\partial y} - \frac{\partial F(y)}{\partial x} \times \frac{\partial F(x)}{\partial y}\right) > 0 \tag{19}$$

The matrix trace is:

$$\mathrm{tr}\, J = \left(\frac{\partial F(x)}{\partial x} + \frac{\partial F(y)}{\partial y}\right) < 0 \tag{20}$$

4. Research method: The evolutionary game phase diagram

The above five points (K, L, M, N, and O) are respectively put into the trace and determinant of the matrix, and further, analyze the strategy behaviour trend and system stability state of the evolutionary game system according to the symbol of sum:

- As shown in Fig. 1, when $x = 0, y = 0$, the determinant and trace of matrix *J* is:

$$\begin{cases} \det J = (-T_{ai} - D)(-1)(B-H) \\ \mathrm{tr}\, J = (-T_{ai} - D) - (B-H) \end{cases} \tag{21}$$

and the result is presented in Table 2.

Table 2 Result of (0,0)

$-T_{ai}-D>0, B-H>0$	$\det J>0$， $\mathrm{tr}\, J>0$	Instability
$-T_{ai}-D>0, B-H<0$	$\det J<0$， $\mathrm{tr}\, J$ not sure	Saddle point
$-T_{ai}-D>0, B-H>0$	$\det J<0$， $\mathrm{tr}\, J$ not sure	Saddle point
$-T_{ai}-D>0, B-H<0$	$\det J>0$， $\mathrm{tr}\, J<0$	Stability (ESS)

When the model parameters respectively take the following values: α = 0.5, L = 5, P = 1, T_{ai} = 2, D = 2, β = 1, B = 0.3, H = 2, when the losses due to wrongful convictions are high, and the cost of using AI in court is also slightly high, this gives manufacturers an incentive to breach the contract with the court. The court then tends not to use AI technology. At this time, the ESS point is (contract breach, no use of AI).

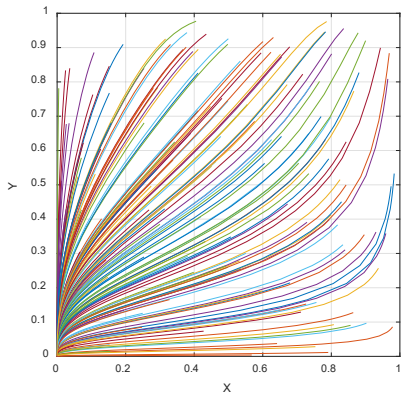

Fig. 1 (0, 0) Evolutionary equilibrium

- As shown in Fig. 2, when $x = 0, y = 1$, the determinant and trace of matrix J is:

$$\begin{cases}\det J=(-1)([(1-\alpha)L+P]-T_{ai}-D)(B-H)\\ \mathrm{tr}\, J=(B-H)-([(1-\alpha)L+P]-T_{ai}-D)\end{cases} \tag{22}$$

and the result is presented in Table 3.

Table 3 Result of (0,1)

$[(1-\alpha)L+P]-T_{ai}-D$， $(B-H)>0$	$\det J<0$， $\mathrm{tr}\, J$ Instability	Saddle point
$[(1-\alpha)L+P]-T_{ai}-D>0$， $(B-H)<0$	$\det J>0$， $\mathrm{tr}\, J>0$	Instability
$[(1-\alpha)L+P]-T_{ai}-D<0$， $(B-H)>0$	$\det J<0, \mathrm{tr}\, J<0$ not sure	Stability (ESS)
$[(1-\alpha)L+P]-T_{ai}-D<0$， $(B-H)<0$	$\det(J)>0, \mathrm{tr}\, J$ Instability	Saddle point

When the model parameters respectively take the following values: α = 0.7, L = 2, P = 1, T_{ai} = 3, D = 4, β = 1, B = 0.3, H = 1, when the cost of using AI in court is high, and the company's deposits are also high, this tends to force the manufacturers to breach the contract with the court. The court, therefore, chooses not to use AI technology. At this time, the ESS point is (contract breach, no use of AI).

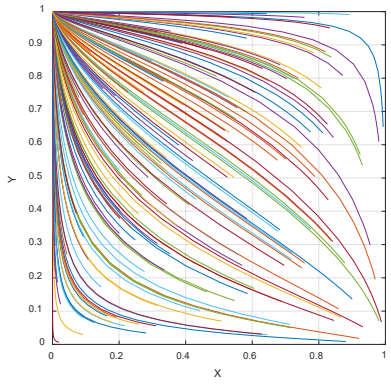

Fig. 2 (0, 1) Evolutionary equilibrium

- As shown in Fig. 3, when $x = 1, y = 0$， the determinant and trace of matrix J is:

$$\begin{cases}\det J = (-1)(-T_{ai} - D)\{[(\beta - 1)B - P] + B - H\} \\ \text{tr}\, J = \{[(\beta - 1)B - P] + B - H\} - (-T_{ai} - D)\end{cases} \tag{23}$$

and the result is presented in Table 4.

Table 4 Result of (1,0)

$(-T_{ai} - D) > 0$， $\{[(\beta - 1)B - P] + B - H\} > 0$	$\det J < 0$, $\text{tr}\, J$ not sure	Saddle point
$(-T_{ai} - D) > 0$， $\{[(\beta - 1)B - P] + B - H\} < 0$	$\det J > 0$， $\text{tr}\, J < 0$	Stability (ESS)
$(-T_{ai} - D) < 0$， $\{[(\beta - 1)B - P] + B - H\} > 0$	$\det J > 0$， $\text{tr}\, J > 0$	Instability
$(-T_{ai} - D) < 0$， $\{[(\beta - 1)B - P] + B - H\} < 0$	$\det J < 0$, $\text{tr}\, J$ not sure	Saddle point

When the model parameters respectively take the following values: $\alpha = 0.7$, $L = 2$, $P = 1$, $T_{ai} = 1$, $D = 1$, $\beta = 0$, $B = 4$, $H = 6$, the cost of using AI in court is low, which tends to encourage manufacturers to choose implementation. With the low cost of using AI, the court chooses not to use AI technology. At this time, the ESS point is (implementation, no use of AI).

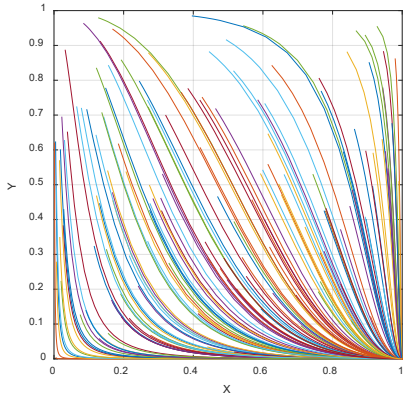

Fig. 3 (1, 0) Evolutionary equilibrium

- As shown in Fig. 4, when $x = 1, y = 1$, the determinant and trace of matrix J is:

$$\begin{cases}\det J = \{[(1 - \alpha)L + P] - T_{ai} - D\}\{[(\beta - 1)B - P] + B - H\} \\ \text{tr}\, J = (-1)\{[(1 - \alpha)L + P] - T_{ai} - D\} + (-1)\{[(\beta - 1)B - P] + B - H\}\end{cases} \tag{24}$$

and the result is presented in Table 5.

Table 5 Result of (1,1)

$\{[(1 - \alpha)L + P] - T_{ai} - D\} > 0$， $\{[(\beta - 1)B - P] + B - H\} > 0$	$\det J > 0$， $\text{tr}\, J < 0$	Stability (ESS)
$\{[(1 - \alpha)L + P] - T_{ai} - D\} > 0$， $\{[(\beta - 1)B - P] + B - H\} < 0$	$\det J < 0$， $\text{tr}\, J$ not sure	Saddle point
$\{[(1 - \alpha)L + P] - T_{ai} - D\} < 0$， $\{[(\beta - 1)B - P] + B - H\} > 0$	$\det J < 0$， $\text{tr}\, J$ not sure	Saddle point
$\{[(1 - \alpha)L + P] - T_{ai} - D\} < 0$， $\{[(\beta - 1)B - P] + B - H\} < 0$	$\det J > 0$， $\text{tr}\, J > 0$	Instability

When the model parameters respectively take the following values: $\alpha = 0.5$, $L = 4$, $P = 1$, $T_{ai} = 0.5$, $D = 0.5$, $\beta = 0.5$, $B = 4$, $H = 1$, the cost of using AI in court is low, which tends to encourage manufacturers to choose implementation. The losses due to wrongful convictions and the court's gain from default are high, encouraging the court to choose to use AI technology to improve courtroom efficiency. At this time, the ESS point is recorded (implementation, use of AI).

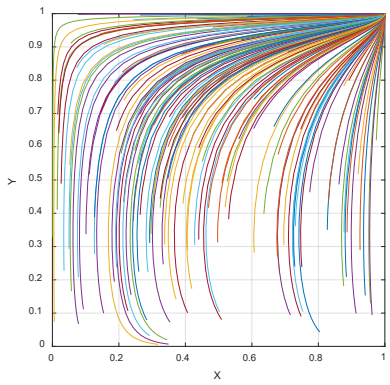

Fig. 4 (1, 1) Evolutionary equilibrium

- Then, since tr $J = 0$, at point O, there is no stable point.

5. Simulation results and discussion

- The influence of the error reduction rate in the AI technology approach on the evolutionary game between both sides is given in Fig. 5.

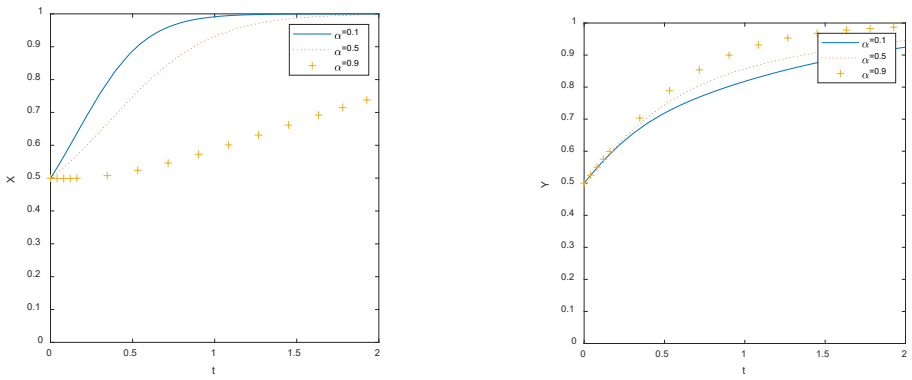

Fig. 5 Different error reduction rates of the court

Figure 5 shows that compared to manufacturers, the value of the error reduction rate has an impact on the court. When the value of the error reduction rate increases, the cost of using AI increases, and the value of the error reduction rate may induce manufacturers to maintain the status quo. However, the court tends to reduce the value of the error reduction rate due to the existence of a speculative effect; manufacturers are stimulated by the value of the error reduction rate, and the lack of use of AI technology tends to slow down.

- The influence of the losses due to wrongful conviction cases on the evolutionary game between both sides is given in Fig. 6.

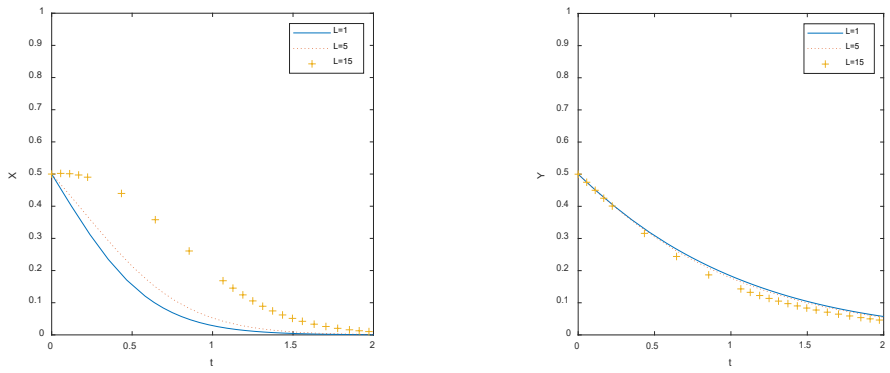

Fig. 6 Different losses due to error conviction cases of the court

Fig. 6 shows that as the value of error conviction cases increases, the court will choose to use AI technology to resolve cases. However, the increase in the value of wrongful conviction losses will not have as much of an effect on the choice of manufacturers who will still choose to breach the contract to reduce their risk of lost profits.

- The influence of the penalty for breach of contract on the evolutionary game between both sides is given in Fig. 7.

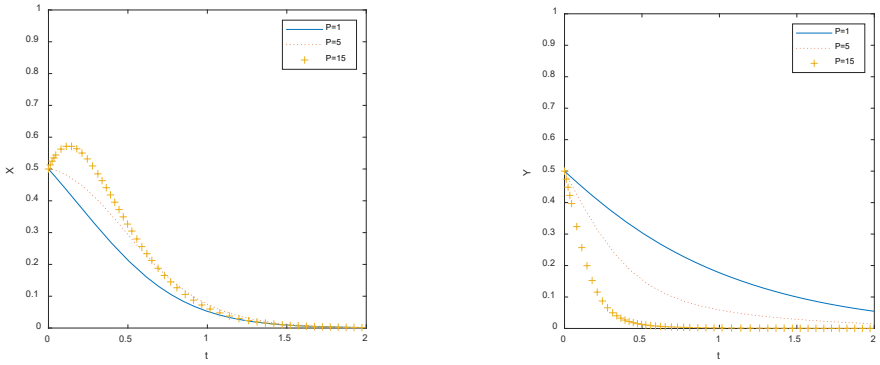

Fig. 7 Different penalties for breach of contract of manufacturers

From Fig. 7, it can be seen that the increase in the value of the penalties for breach of contract will induce the court to choose the use of AI technology, and after a long time, it will choose not to use AI technology; At the same time, the increase in the value of the penalties for breach of contract will have a slight effect on the decision of the manufacturers but will not make them change their decision on whether to breach the contract.

- The influence of the cost of using AI technology in the courtroom on the evolutionary game between both sides is given in Fig. 8.

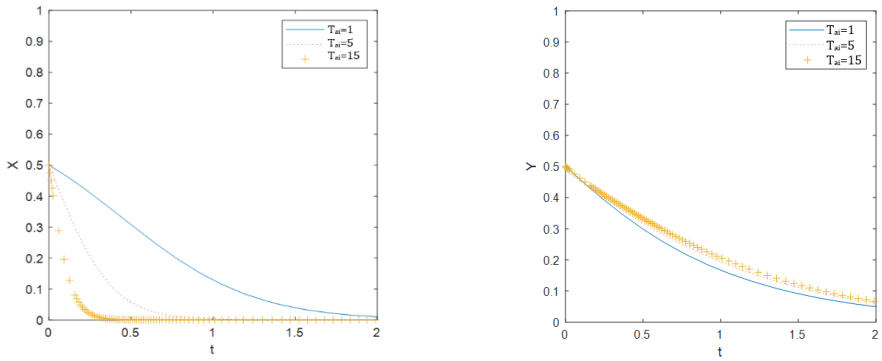

Fig. 8 Different costs of using AI technology of the court

Fig. 8, shows that the increase in the value of the cost of using AI technology will lead manufacturers to breach the contract. With the increase in the value of the cost of using AI technology, the court chooses not to use the AI technology strategy.

- The influence of the cost of using AI technology in the courtroom on the evolutionary game between both sides is given in Fig. 9.

From Fig. 9, it can be seen that the increase in company's deposits will induce manufacturers to implement the use of AI technology, but after a period, they will choose to breach the contract, while the increase in company's deposits will not affect the choice of the court's to not use AI technology strategy.

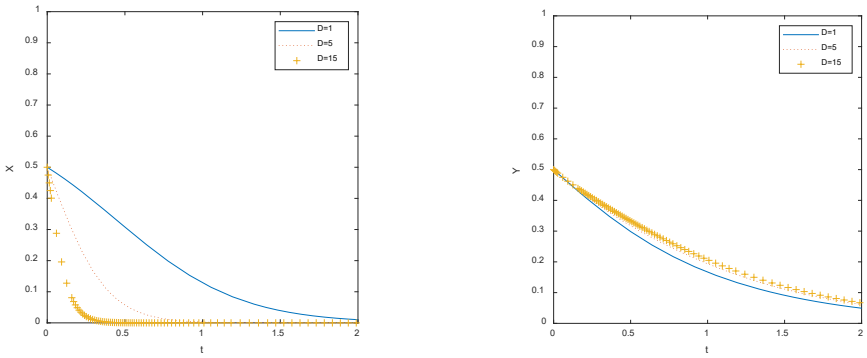

Fig. 9 Different company's deposits

- The influence of the probability of default not being detected on the evolutionary game between both sides is given in Fig. 10.

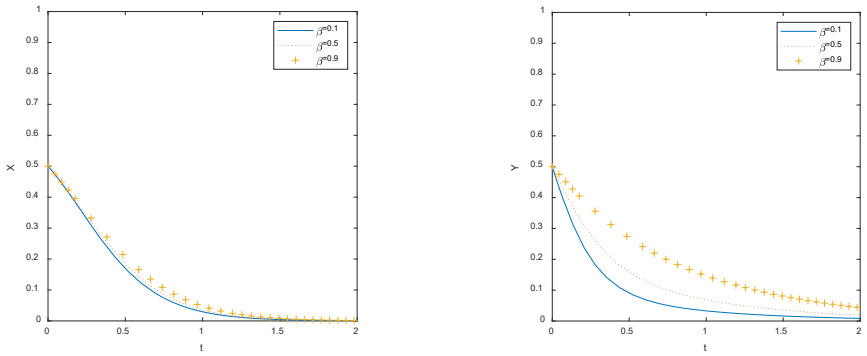

Fig. 10 Different error not being detected probabilities

From Fig. 10, it shows that, with the increase of possibility β of the court's default not being detected, the court tends not to use the strategy of AI technology to avoid losses due to error conviction cases, but the change of the intensity of this measure is not obvious. With the improvement of β, manufacturers will choose to breach the contract, to reduce the possible error penalty.

- The influence of the court's gain from the default on the evolutionary game between both sides is given in Fig. 11.

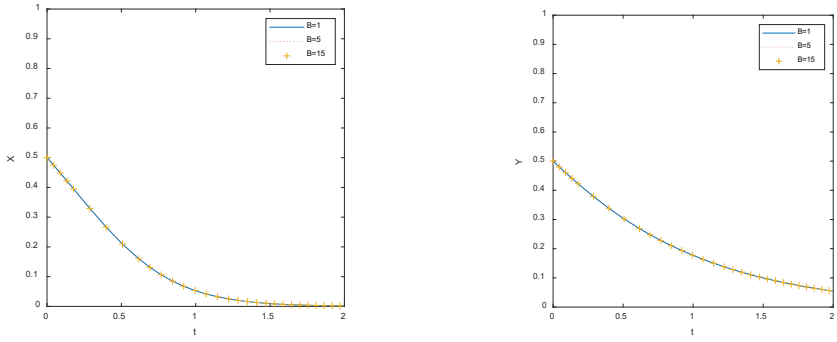

Fig. 11 Different error gains of the court

From Fig. 11, it shows that, with the increase of the error gains (B), the court tends not to use the strategy of AI technology, so that it may get more benefits from the error. With the improvement of B, manufacturers choose to breach the contract.

- The influence of the benefit from credit enhancement on the evolutionary game between both sides is given in Fig. 12.

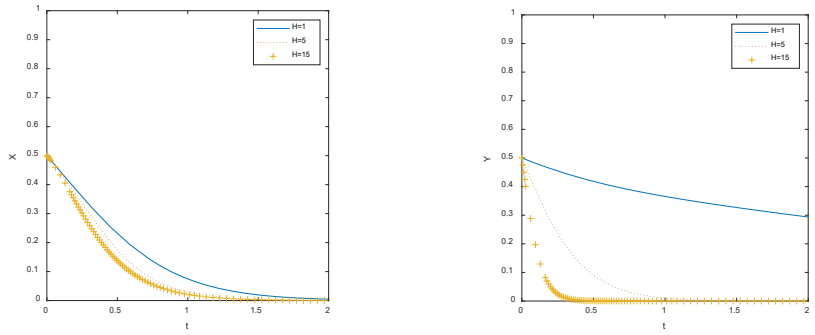

Fig. 12 Different benefits of credit enhancement of manufacturers

It can be seen from Fig. 12 that the increase in credit enhancement benefits for manufacturers will slow down manufacturers' strategy to implement the AI technology strategy, while it will cause the court not to adopt the AI technology strategy.

6. Conclusion

We can see that through the simulation, the evolutionary equilibrium points (0,0) and (1,1) are crossed by the parameter adjustment. The increase in losses due to wrongful convictions shows the determination of the court to use the AI technology strategy. The increase in error reduction rates will stimulate the willingness of manufacturers to choose the AI technology strategy, while the increase in losses due to wrongful convictions and penalties will encourage manufacturers to break the contract. The increased costs of using AI technology and the value of the company's deposits influence manufacturers' decisions and also influence the court's decision whether to use the AI technology strategy to resolve cases. For manufacturers, the increase in the probability of the default not being detected and the increase in the gain from the default do not influence their decision to breach the contract. The evolution of the benefits of credit enhancement plays a role in the court's strategic decision to use AI technology or not, and also influences the decision of manufacturers.

Therefore, by proving that by choosing AI technology to solve problems, the error rate will be minimized, manufacturers will be able to implement this strategy because only the reduction of the error rate has a significant impact on both parties.

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