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Research on Multi-Departmental Coordination Mechanism of Government Administration Based on Dynamic Planning

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Abstract The increase of governmental functions in modern society leads to the increasing number of departments, while the lack of interdepartmental coordination causes administrative inefficiency. This study addresses the problem of multi-departmental coordination in government administration and uses dynamic programming and XGBoost algorithm to construct an assessment model to explore the key factors affecting the coordination of government departments and their role mechanisms. Based on the data from the Spike Good Office platform in Guangdong Province, the study analyzes the effects of four key variables, namely cognitive bias, imbalance of power and responsibility, lack of institutional protection and government support, on the coordination effect. The results show that the XGBoost model has a high-precision prediction ability with an accuracy of 98.13%, an AUC value of 96.37%, and a KS value of 85.24%, which can effectively differentiate the advantages and disadvantages of multi-sectoral coordination effects; the SHAP analysis reveals that cognitive bias has the most significant effect, with an average SHAP value of 0.102458, followed by lack of safeguards and imbalance of power and responsibility, with an average SHAP values of 0.033274 and 0.01894, respectively; partial dependency plots further reveal that the effect of multisectoral coordination is more stable when the cognitive bias is in the 3.0%-3.4% range, the imbalance of power and responsibility is in the 7-10 years range, and government support is greater than 13.5%. The study is of practical guidance for improving the government multisectoral coordination mechanism.

Index Terms government administration, multidepartmental coordination, dynamic programming, XGBoost algorithm, SHAP analysis, partial dependency graphs

I. Introduction

According to general management principles, the division of labor in society for the purpose of improving efficiency is the beginning of management, and in the public sphere, the division of labor means that the government is divided into many different departments, each of which is responsible for different administrative matters [1]. In an era when government and society together recognized small government, with few departments and relatively homogeneous administrative affairs, interdepartmental coordination may not have been a problem. When society is in an era of rapid change and veritable administrative dominance from cradle to grave, the number of functions performed by the government is increasing, and with it the number of corresponding government departments [2], [3]. In this case, the better the division of labor and coordination, the higher the administrative efficiency, on the contrary, the coordination mechanism is not sound, there will inevitably be mutual constraints, tug of war and push the phenomenon of temptation, resulting in low efficiency [4], [5]. There is an inconsistency in the division of responsibilities and resource allocation between different departments, through the establishment of a multi-sector coordination mechanism, it can effectively integrate the resources of all parties to achieve the optimal configuration, improve the efficiency of resource utilization, promote the coordination and consistency of policies to ensure that the implementation of individual policies to maximize the effect of the implementation of each policy, and improve the quality of decision-making [6]-[9]. Moreover, each department inevitably involves the same information and data in the process of independent work, and the establishment of a multi-departmental coordination mechanism can realize the sharing and interoperability of information, reduce the duplication of information collection, improve the efficiency of the work, better solve the social problems and meet the needs of the public, and enhance the public's trust in and support of the government [10]-[13].

With the continuous development of society, administration plays an important role in modern society. Within a country or region, administration needs to coordinate between all levels of government in order to maximize the public interest. However, two prominent problems exist in the current multisectoral coordination, on the one hand, there are too many temporary coordinating bodies, the operation of temporary coordinating bodies is not

standardized, and the division of powers and responsibilities between departments is not clear, which negatively affects the exercise of normal departmental powers and responsibilities, which indicates the large number of coordinating activities in the administrative operation [14], [15]. On the other hand, although there are a large number of coordinating agencies and coordinating activities, under the dynamic demand for resource allocation, the coordination is not standardized and the effect of coordination is not satisfactory due to the lack of a good coordination mechanism, so there is also a need to improve the mechanism of inter-departmental coordination and cooperation [16], [17]. In order to ensure the smooth progress of government work, it is necessary to establish a set of scientific multi-sectoral coordination mechanism management.

According to the general principles of management, the division of labor in society for the purpose of improving efficiency is the beginning of management, and in the public sphere, the division of labor means that the government is divided into a number of different departments, each of which is responsible for different administrative matters. With society in an era of rapid change and a veritable administrative dominance of government from the cradle to the grave, the number of functions performed by government is increasing, and with it the number of corresponding government departments. In this case, the better the division of labor and coordination, the higher the administrative efficiency, on the contrary, the coordination mechanism is not sound, there will inevitably be mutual constraints, tug of war to push the phenomenon of temptation, resulting in low efficiency. There is an inconsistency in the division of responsibilities and resource allocation between different departments, through the establishment of multi-sectoral coordination mechanism, can effectively integrate the resources of all parties to achieve the optimal configuration, improve the efficiency of resource utilization, promote the coordination and consistency of policies, to ensure that the implementation of individual policies to maximize the effect, and to improve the quality of decision-making. Moreover, in the process of working independently, each department inevitably involves the same information and data. The establishment of a multi-departmental coordination mechanism can realize information sharing and interoperability, reduce the duplication of information collection, improve work efficiency, better solve social problems and meet the needs of the public, and enhance the public's trust in and support of the government. With the continuous development of society, administration plays an important role in modern society. Within a country or region, administration requires coordination between all levels of government to maximize the public interest. However, two prominent problems exist in the current multisectoral coordination. On the one hand, there are too many temporary coordinating bodies, the operation of temporary coordinating bodies is not standardized, and the division of powers and responsibilities between departments is not clear, which negatively affects the exercise of normal departmental powers and responsibilities, which indicates the large number of coordinating activities in the administrative operation. On the other hand, although there are a large number of coordinating bodies and coordinating activities, the lack of a good coordinating mechanism has led to irregular coordination and unsatisfactory coordinating results under the dynamic demand for resource deployment, so there is also a need to improve the mechanism for inter-departmental coordination and cooperation. In order to ensure the smooth operation of government work, a scientific set of multi-sectoral coordination mechanism management needs to be established.

Based on the dynamic planning theory and machine learning method, this study constructs an assessment model of multi-departmental coordination mechanism of government administration. First, through literature research and practice survey, key factors affecting government department coordination are identified, including four dimensions: cognitive bias of government department coordination culture, imbalance of authority and responsibility of government department coordination organization, lack of guarantee of government department coordination system, and insufficient support of government department coordination environment. Second, the coordination effect assessment model is constructed based on the XGBoost algorithm, and the degree of influence and mechanism of each factor on the coordination effect are analyzed using the model interpretability methods SHAP and PDP. Finally, based on the empirical results, countermeasure suggestions are proposed to improve the coordination mechanism of governmental multi-departmental administration, including strengthening the concept of overall coordination, clarifying the boundaries of departmental authority and responsibility, improving the institutionalized coordination channels, and strengthening the participation of social supervision, aiming at enhancing the efficiency of governmental administration and the quality of public services.

II. Based on an assessment of the effectiveness of multisectoral coordination in government administration

II. A. Factors affecting the problem of coordination mechanisms in municipal government departments

II. A. 1) **Perceived bias in the culture of coordination in the government sector**

(1) Insufficient cognition of the overall coordination concept

The premise of the implementation of the policy is to understand the policy, public the policy implementation subject only fully understand the policy objectives and intentions, it is possible to effectively implement the policy. The goal of smart city construction is the wisdom of government management and public services, is the overall coordination of the construction, need to form a unified overall cognition of the executive branch.

(2) Excessive promotion of departmental-oriented concepts

Sector-based thinking in government sectoral coordination is a state of mind that takes sectoral interests as the starting point and foothold, and does not consider or ignores the interests of other sectors and the overall interests. Excessive departmental concept leads to inaction, inaction is the subject of governance does not perform or not fully perform the corresponding duties, negative attitude, do not think of progress or dare not take responsibility for a phenomenon.

(3) Awareness of system trust cognitive indifference

Institutional trust is the trust in the system, meaning that believe in the system, believe that the system is favorable to themselves, believe that the system can be effectively implemented, the core is the rule of law consciousness, rule consciousness and the spirit of contract respect. The opposite of institutional trust is interpersonal trust. The purpose of government departmental coordination is to form cooperation and implement policy implementation, coordination is only a means. However, excessive interpersonal trust in coordination will inevitably counteract human feelings, but the resulting coordination costs are paid by government departments, in essence, disguised as encouraging the private use of public tools, to guide the poor professional ethics of the personnel, the coordination as a means of deepening and extending personal friendship, rather than a means of realizing the public interest.

II. A. 2) **Imbalance of authority and responsibility in the organization of government sectoral coordination**

(1) Fuzzy departmental coordination responsibilities

Responsibility according to need, according to the responsibility of authorization is one of the basic principles of the configuration of responsibility and power, departmental responsibility is the department to obtain the basis of the corresponding power. The lack of a clear definition of responsibility, so that the allocation of power is not based on, either resulting in more power than responsibility, or lead to the responsibility of the power is small, both are not conducive to the fulfillment of the responsibility, the former may bring about the abuse of power, the latter impede the fulfillment of the responsibility.

(2) Government departments have inappropriate rights and responsibilities

Equal power and responsibility is the basis of effective government administration, government departments to fulfill certain administrative responsibilities should have the corresponding power to protect, have the power to dispose of the corresponding funds, personnel and other resources. Although the Big Data Administration has not been established for a long time, a number of professional and technical talents equivalent to the level of technical supervisors have left the department to work in Internet enterprises. Government departments bear direct responsibility for the construction of smart cities, but different departments are facing the difficulties of insufficient funds and talents to different degrees, which affects coordination and policy implementation.

(3) Higher Departments Abandon Responsibility

Based on the assumption that government departments are “rational economic beings”, higher-level departments will rationally choose more power and resources while shirking as much responsibility as possible. The Chinese government is vertically “isomorphic” in terms of responsibilities, showing layers of control and layers of authorization, and the “pressure” generated by this system provides the impetus for the rational choice of the higher level of government to retain power and abandon responsibility. This unbalanced allocation of full responsibility further increases the difficulty of coordination among government departments, as higher-level departments are required to retain the power of coordination.

II. A. 3) **Lack of guarantees for a coordinated system of government departments**

(1) Inadequate institutionalized coordination among government departments

A single institutionalized channel makes it difficult for government departments to exchange information, build platforms and facilitate cooperation. The departmental coordination carried out by government departments by virtue of personal relationships enriches the form of government departmental coordination. Coordination of smart city construction projects that are not directly related to the Big Data Bureau Administration is generally carried out by the main responsible department or the lead department to convene a joint departmental meeting with the relevant departments.

(2) Lack of government departmental coordination and supervision system

In the implementation of urban planning, different government departments show different attitudes towards coordination, some government departments can be “justified” by the lack of manpower in the department to carry

out less coordination work, not to carry out coordination work, for the implementation of the smart city policy assessment does not involve the coordination of government departments. Only a scientific and effective supervision system can make the policy implementation not to be deformed or out of shape, and can convey the value of the policy objectives.

II. A. 4) Inadequate support for a coordinated environment in the government sector

(1) Insufficient participation in the construction of social subjects

The relationship between the government and society is not only a management relationship, service relationship, but also a mutual support relationship, especially under the conditions of socialist market economy, the government continues to deepen the decentralization of government, the market plays a decisive role in resource allocation, and the social vitality is fully stimulated. This requires cooperation between the government and social capital, but the existing proportion of social capital participation in the construction of smart cities in N City is low. When the financial funds cannot meet the construction demand, the cooperation between the government and social capital as a solution to raise project funds has been considered feasible in the practice of infrastructure project construction in China.

(2) Insufficient external supervision of social subjects

Citizenship is the self-knowledge of citizens about their political and legal power and responsibility. The process of modernization and the updating of information dissemination carriers have accelerated the awakening of citizens' consciousness, and in fact, citizens have strengthened the protection of their own rights and the supervision of government power in the process of social construction, social supervision and social governance. Transparent government requires that all acts of the government that are not classified should be proactively monitored by citizens. The main body of the implementation of smart city planning is the government, and the coordination of government departments is governmental behavior, and the purpose of coordination is to promote public interests. Due to the lack of knowledge, most social groups can only intuitively feel the results of government coordination, but do not have the ability to rationally analyze and evaluate the process of government coordination.

II. B. Model of XGboost algorithm based on government administration

II. B. 1) CART Principles

CART [18] is one of the decision tree algorithms that can be used for classification and regression problems. The specific algorithm flow is as follows:

In the input space of the training set, binary decision tree is constructed by recursively dividing each region into two regions and deciding the output value of each subregion. First, the optimal cut-off variable j and cut-off point s are selected and solved:

$$\min_{j,s}\left[\min_{c_1}\sum_{x_i\in R_1(j,s)}(y_i-c_1)^2+\min_{c_2}\sum_{x_i\in R_2(j,s)}(y_i-c_2)^2\right] \tag{1}$$

where c_1 denotes the fixed output value of the output in region R_1 and c_2 denotes the fixed output value of the output in region R_2.

Since the above loss function is as small as possible, the optimal value (j,s) is selected by exhaustively enumerating the cut-off variable j and scanning the cut-off point s. Then divide the region according to the optimal solution and output the result:

$$R_1(j,s)=\left\{x\middle|x^{(j)}\le s\right\} \tag{2}$$

$$R_2(j,s)=\left\{x\middle|x^{(j)}>s\right\} \tag{3}$$

$$\hat{c}_m=\frac{1}{N_m}\sum_{x_i\in R_m(j,s)}y_i, x\in R_m, m=1,2 \tag{4}$$

The above steps are carried out again for the two subregions that have completed the first level of slicing until the stopping condition set by the model is triggered; finally, the input space is partitioned into M regions $R_1,R_2,\cdots,R_m$ to generate the CART tree:

$$f(x)=\sum_{m=1}^{M}\hat{c}_m I(x\in R_m) \tag{5}$$

II. B. 2) Boosting Class Algorithms

Boosting algorithm [19] is one of the integration algorithms in machine learning.Integration learning is the process of taking multiple weak classifiers and combining them through a certain combining strategy so as to form a strong

learner. Similarly, Boosting is also an algorithm for assembling weak classifiers to improve the accuracy, which is done through the majority voting mechanism of the weak classifiers.The basic idea of Boosting algorithm is:

1) First define that each training sample has the same probability; and

2) Then perform N iterations to increase the weight of misclassified samples so that more attention is paid to these samples in the next iteration;

3) Until a predetermined accuracy is reached or the maximum number of iterations is reached.

Then, N base models are obtained, the weight of each base model is determined as a function of its probability of correct classification, and finally all models are linearly combined to obtain the integrated model.

II. B. 3) Modeling the XGBoost Algorithm

XGBoost [20] is a kind of Boosting class algorithm, and the base learner of XGBoost is CART regression tree, so, XGBoost can be simply understood as a series of CART regression tree combinations. The principle of the specific algorithm is as follows:

$$\hat{y}_i = \sum_{k=1}^{K} f_k(x_i), f_k \in F \tag{6}$$

where K denotes the number of CART trees, F denotes all possible CART trees, and f denotes a specific CART tree.

Objective function of the model:

$$obj = \sum_{i}^{n} l(y_i, \hat{y}_i) + \sum_{k=1}^{K} \Omega(f_k) \tag{7}$$

The first part of the objective function is the loss function, which consists of the error between the predicted value and the actual value, generally speaking, the larger the loss function is, the more prone to error the model is; the second part is the regular term, which is used to control the complexity of the model, in order to prevent overfitting, that is, it introduces a kind of penalty mechanism to the optimization process, and the higher the complexity of the model, the larger the penalty is.

The XGBoost algorithm starts from the first CART tree and optimizes the objective function through step-by-step optimization, the whole process is shown below:

Initial value: $\hat{y}_i^{(0)} = 0$

First tree: $\hat{y}_i^{(1)} = f_1(x_i) = \hat{y}_i^{(0)} + f_1(x_i)$

Second tree: $\hat{y}_i^{(2)} = f_1(x_i) + f_2(x_i) = \hat{y}_i^{(1)} + f_2(x_i)$

.....

The t th tree: $\hat{y}_i^{(t)} = f_1(x_i) + \cdots + f_t(x_i) = \hat{y}_i^{(t-1)} + f_t(x_i)$

The next step substitutes $\hat{y}_i^{(t)}$ into the loss function, which changes form:

$$\begin{aligned} obj^{(t)} &= \sum_{i=1}^{n} l(y_i, \hat{y}_i^{(t)}) + \sum_{i=1}^{n} \Omega(f_i) = \sum_{i=1}^{n} l(y_i, \hat{y}_i^{(t-1)} \\ &+ f_t(x_i)) + \Omega(f_t) + cons\tan t \end{aligned} \tag{8}$$

where constant is the sum of the regular terms of the first $t-1$ trees; to further optimize the objective function, it is necessary to derive f_t, and the objective function is expanded by a second-order Taylor expansion to obtain an approximate objective function:

$$obj^{(t)} \approx \sum_{i=1}^{n} \left[l\left(y_t, \hat{y}_l^{(t-1)}\right) + g_i f_t\left(x_i\right) + \frac{1}{2} h_i f_t^2\left(x_i\right) \right] + \Omega\left(f_t\right) + cons\tan t \tag{9}$$

where g_i and h_i are the first and second order derivatives of l with respect to $\hat{y}_i^{(t-1)}$, respectively. The fundamental forms of f_t and Ω are then defined as:

$$f_t(x) = \omega_{q(x)} \tag{10}$$

$$\Omega(f_t) = \gamma T + \frac{1}{2} \lambda \sum_{j=1}^{T} \omega_j^2 \tag{11}$$

where q is the node ordinal number and is substituted into the objective function (with the constant term removed):

$$\begin{aligned} obj^{(t)} &\approx \sum_{i=1}^{n}\left[g_i f_t\left(x_0\right)+\frac{1}{2}h_i f_t^2\left(x_i\right)\right]+\Omega\left(f_t\right) \\ &=\sum_{i=1}^{n}\left[g_i \omega_q\left(x_0\right)+\frac{1}{2}h_i \omega_q^2\left(x_i\right)\right]+\gamma T+\frac{1}{2}\lambda\sum_{j=1}^{T}\omega_j^2 \\ &=\sum_{j=1}^{n}\left[\left(\sum_{i\in I_j} g_i\right)\omega_j+\frac{1}{2}\left(\sum_{i\in I_j} h_i+\lambda\right)\omega_j^2\right]+\gamma T \end{aligned} \tag{12}$$

Order:

$$G_j=\sum_{i\in I_j} g_i \tag{13}$$

$$H_j=\sum_{i\in I_j} h_i \tag{14}$$

Optimization derivation leads to:

$$\omega_j^*=-\frac{G_j}{H_j+\lambda} \tag{15}$$

$$obj=-\frac{1}{2}\sum_{j=1}^{T}\frac{G_j^2}{H_j+\lambda}+\gamma T \tag{16}$$

After determining the tree-based structure, the XGBoost model minimizes the loss function and thus the optimal disaggregated variables and optimal disaggregated values under that stage by exhaustively enumerating the individual variables, a step that is consistent with the specific principles of the CART tree mentioned above. the Gain function takes the following form:

$$Gain=\frac{1}{2}\left[\frac{G_L^2}{H_L+\lambda}+\frac{G_R^2}{H_R+\lambda}-\frac{(G_L+G_R)^2}{H_L+H_R+\lambda}\right]-\gamma \tag{17}$$

where γ denotes the slicing threshold, the larger the slicing threshold set, the more the sliced objective function is required to fall, which is used to control the complexity of the tree structure.

II. C.Interpretable machine learning methods for models

II. C. 1) **SHAP**

The SHAP model [21] is a more all-inclusive approach to model interpretability. The method is applicable to both global and local interpretations, and is able to explore the potential relationship between model predictions and specific sample features. The basic idea lies in calculating the marginal contribution of a feature when it is added to the model and considering the average of the different marginal contributions of that feature under all feature sequences. Specifically, for the j th feature of the i th sample x_i is x_{ij}, the marginal contribution of the feature is mc_{ij}, and the weights of the edges are w_j; and its SHAP value $f(x_{ij})$ is expressed as the sum of the products of the marginal contribution of the feature and the corresponding weights. For example, the SHAP value of the j th feature of the i th sample is calculated as follows:

$$f(x_{ij})=mc_{i1}w_1+\cdots+mc_{ij}w_j \tag{18}$$

In the SHAP framework, the model's predicted value y_i for a sample is determined by the sum of the baseline y_{base} (the mean of the target variable for all samples) and the individual feature SHAP values $f(x_{ij})$. The SHAP value for each feature reflects the change in model predictions when conditioned on that feature.The SHAP value obeys:

$$y_i=y_{base}+f(x_{i1})+f(x_{i2})+\cdots+f(x_{ik}) \tag{19}$$

where, $f(x_{i1})$ is the contribution value of the 1st feature in the i th sample to the final predicted value y_i. When $f(x_{i1})>0$, it means that the feature enhances the predicted value and has a positive effect; on the contrary, it means that the feature makes the predicted value lower and has a negative effect.The biggest advantage of the SHAP value is that it can accurately reflect the influence of each feature in the sample on the prediction result, and explicitly point out the positivity and negativity of the degree of its influence.

II. C. 2) PDP

The basic principle of Partial Dependency Plots (PDP) [22] is to observe the variation of the model output with one or more specific input variables by fixing the other input variables. By selecting specific features and generating a series of potential values to be taken while keeping other variables constant, model predictions are made.PDPs are able to reveal the intrinsic connection between specific input variables and model outputs, which not only helps to measure the marginal effect of one or two features on the prediction results of a machine learning model, but also intuitively demonstrates whether the relationship between the target and the features is linear, monotonic, or a more sophisticated characteristics. Its calculation formula is:

$$\hat{f}_{X_D}(X_D)=\frac{1}{n}\sum_{i=1}^{n}\hat{f}\left(X_D,X_R^{(i)}\right) \tag{20}$$

where X is the set of all features; D is the feature of interest; R is the rest of the features except the feature of interest; and $\hat{f}(\cdot)$ is the machine learning function.

III. Results and analysis of multisectoral governmental administrative coordination

III. A. Performance evaluation of the XGBoost model

In this study, in order to observe the effectiveness of the model, the following assessment methods were used: accuracy, ROC curve and AUC value, K-S curve and KS value. In order to better explain the evaluation indexes, confusion matrix is introduced. In this paper, the training and evaluation process of the XGBoost-based government administration scoring model is investigated by detailing the administrative data of multi-departmental coordination provided free of charge by the Spike Good Office platform in Guangdong Province.

The latest government administration data since 2023 is selected: the government administration data of 2023 as well as the first three quarters of 2024. A total of 65,400 samples in the sample were screened to obtain four characteristic variables. A random sampling method was used to select 80% of the samples as the training set and the remaining 20% as the test set.

III. A. 1) Optimization of model parameters

A grid search method is used to optimize the two parameters max_depth of tree structure and learning_rate learning_rate in XGBoost model. Where the interval to be selected for each parameter is as follows:

max_depth: 2-11;

learning_rate: 0.01-0.5.

The effect of max_depth on the accuracy of XGBoost model is shown in Figure 1. With the change of the maximum depth max_depth, the model accuracy rate shows a gradually decreasing trend of change, when the maximum depth is 4, the accuracy rate of the model is the highest 0.98575; when the maximum depth is increased to 11, the accuracy rate of the model decreases to 0.8763.

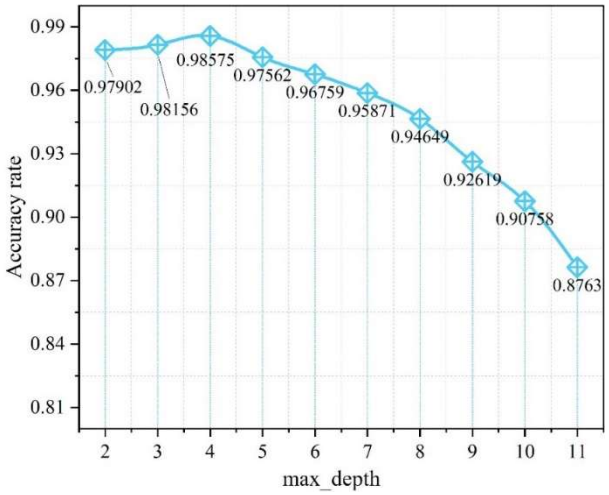

Figure 1: The impact of max_depth on the accuracy of XGBoost model

The effect of learning rate on the accuracy of the XGBoost model is shown in Figure 2. The results show that the accuracy of the model reaches 0.98026 when the learning rate is at 0.05, and the accuracy of the XGBoost model is the lowest (0.88309) when the learning rate is increased to 0.5.

In summary, it can be seen that the optimal combination of parameters after optimization is: max_depth=4, learning_rate=0.05.

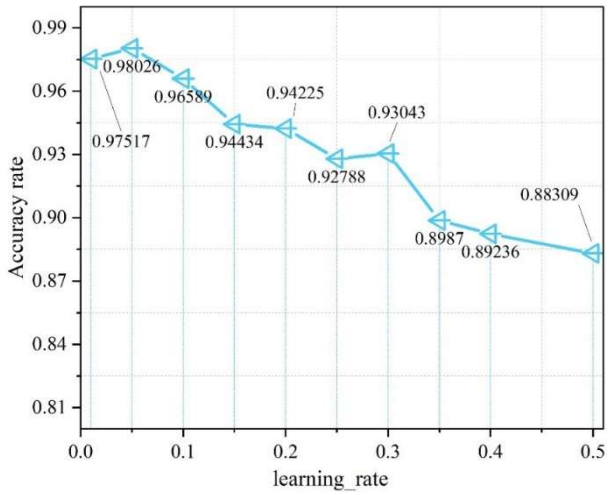

Figure 2: The impact of learning_rate on the accuracy of XGBoost model

III. A. 2) **Evaluation of models**

(1) Confusion matrix

A classification algorithm or model is a better classifier if it separates categories well. The vast majority of accuracy measures for classification models can be represented by the confusion matrix. It summarizes the number of correct and incorrect classifications, and its rows and columns correspond to the true and predicted classes, respectively.The results of the confusion matrix for the XGBoost model are shown in Table 1.

Table 1: The confusion matrix result of the XGBoost model

	Forecast for "0"	Prediction for "1"
Label for "0"	9934	201
Label for "1"	927	2018

(2) Accuracy

Accuracy rate is used to measure the ability of the model to accurately judge the samples, i.e. the ability to judge good samples as good and bad samples as bad. It takes values between 0 and 1, the larger the better.

(3) AUC value

The area enclosed by the ROC curve and the x-axis is called the AUC value. Its value is taken between 0-1, the larger the value, the better the model is able to categorize.

(4) KS value

The KS value is used to assess the model's ability to discriminate between good and bad samples. Its value range is 0-1, the larger the KS value, the better the model's ability to distinguish between good and bad samples.The accuracy, AUC value and KS value of XGBoost model are shown in Table 2. The results show that the accuracy rate and AUC value of the XGBoost model are above 95%, and the KS value is 0.8524. Overall, the model has a very strong ability to discriminate between good and bad samples.

Table 2: The accuracy, AUC and KS value of the XGBoost model

Evaluation index	Accuracy rate	AUC value	KS value
XGBoost	0.9813	0.9637	0.8524

III. B. Empirical analysis of feature interpretability of XGBoost model

III. B. 1) **PDP results**

Partial Dependency Plots (PDPs) are used to analyze the interpretability of the four important characteristic variables affecting the government's multi-departmental administrative coordination management.The PDPs of the XGBoost model on the four important characteristic variables of the government's multi-departmental administrative coordination management, namely “cognitive bias, imbalance of authority and responsibility, lack of protection and government support”, are shown in Figures 3 to 6. The PDPs are shown in Figures 3 to 6.

In the sample interval, the coordinated management of multi-departmental government administration increases with the cognitive bias (10-year government bond yield), and the growth rate of corporate bond spreads is relatively low when the cognitive bias is between 3.0% and 3.4%.

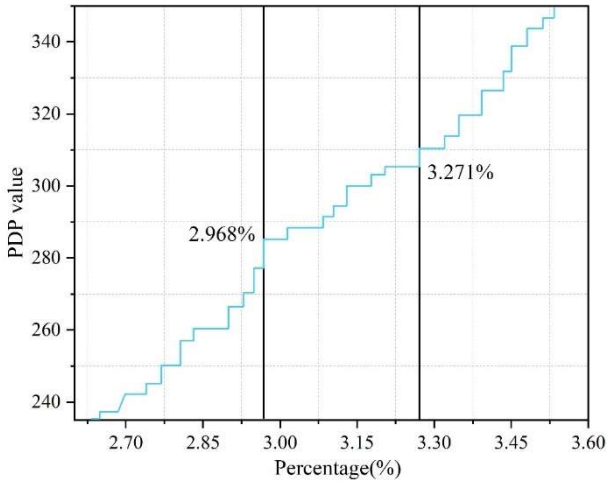

Figure 3: The XGBoost model is a PDP for cognitive bias

Over the sample interval, governmental multisectoral administrative coordination management increases with increasing power and responsibility imbalances, and power and responsibility imbalances cause less fluctuation in governmental multisectoral administrative coordination management when the power and responsibility imbalances are 7-10 years old.

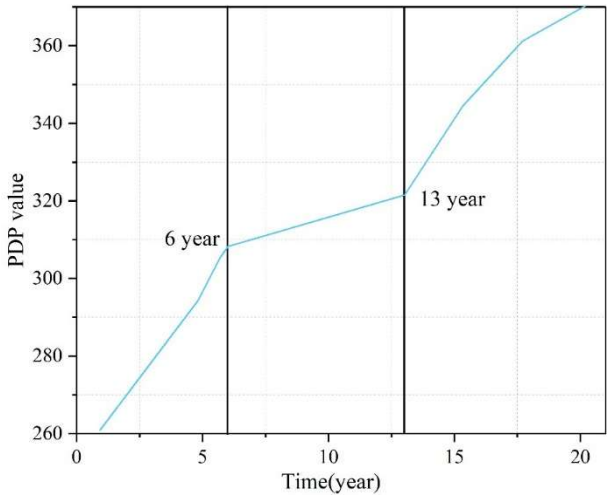

Figure 4: The XGBoost model is responsible for the imbalance of the PDP

Over the sample interval, the GMA decreases as the protection deficit (the difference between the 10-year and 1-year Treasury yields) increases and declines most rapidly when the long- and short-term spreads are in the range of 08% to 0.9%, while its decline is slowest when the protection deficit is below 0.3%.

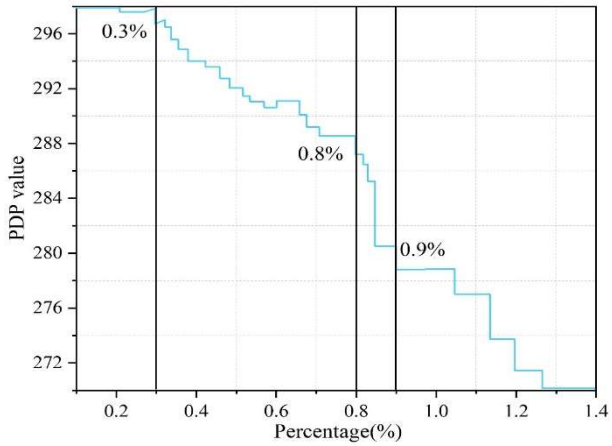

Figure 5: The XGBoost model is the PDP of the barrier

Government multi-sectoral administrative coordination management decreases overall with the increase of government support (month-on-month growth in value added of industry above designated size). When government support is in the range of 8.5%-13.5%, the instability factor of government multi-sectoral administrative coordination management decreases sharply, while when government support is greater than 3.3% and less than 6.2%, the instability factor of government multi-sectoral administrative coordination management increases sharply. When government support is greater than 13.5%, the fluctuation of government multi-sectoral administrative coordination management tends to stabilize.

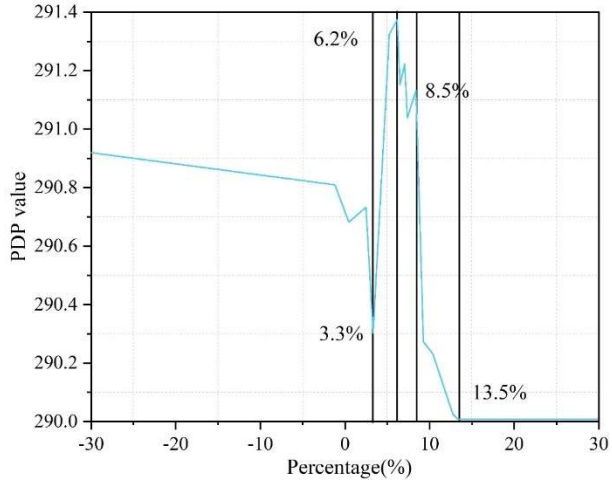

Figure 6: The xgboost model is the PDP for the government

III. B. 2) **General Characterization of SHAP**

Figure 7 shows the SHAP values of the XGBoost model for administrative coordination and management of multiple government departments. Where the horizontal axis coordinates correspond to the size of SHAP values corresponding to individual features under all sample data points, and the vertical axis coordinates indicate the SHAP value ordering of all features, with decreasing SHAP values from top to bottom. Secondly, the vertical axis as a positive and negative dividing line indicates that there are positive and negative SHAP values of individual features under different sample points, the positive value represents the positive influence of individual features under the sample point on the government's multi-departmental administrative coordination and management, and the negative value represents the negative influence of individual features under the sample point on the government's multi-departmental administrative coordination and management.

It can be seen that Cognitive bias has the largest mean SHAP value and putable has the smallest mean SHAP value. The differences in Cognitive bias, Protection deficiency, and Balance of responsibility have the most significant effect on the model, with mean SHAP values of 0.102458, 0.033274, and 0.01894, respectively. and the The differences in the characteristics of the stock market index (ln_stock), exchange rate level (e), inflation level

(cpi), money supply (m2), and government support (government support) have a more significant effect on the model, as shown by the fact that the exchange rate level (e), which has the lowest average SHAP value among the characteristic variables, is much higher than that of liquidity (current) with an average SHAP value of 0.0002458, 0.033274, and 0.01894, respectively. Specifically, the larger the average SHAP value, the greater the impact of the feature on the government's multi-sectoral administrative coordination management, and therefore, the feature variables with the top 8 average SHAP values are the most important to the government's multi-sectoral administrative coordination management.

In addition, cognitive bias, power-responsibility imbalance, and stock market index have a significant positive impact on government multisectoral administrative coordination management, and their SHAP values increase as the value of the characteristics increases. The lack of security and exchange rate have an overall negative effect on the coordination of governmental multisectoral administration, which is reflected in the fact that their SHAP decreases with the increase of the eigenvalue.

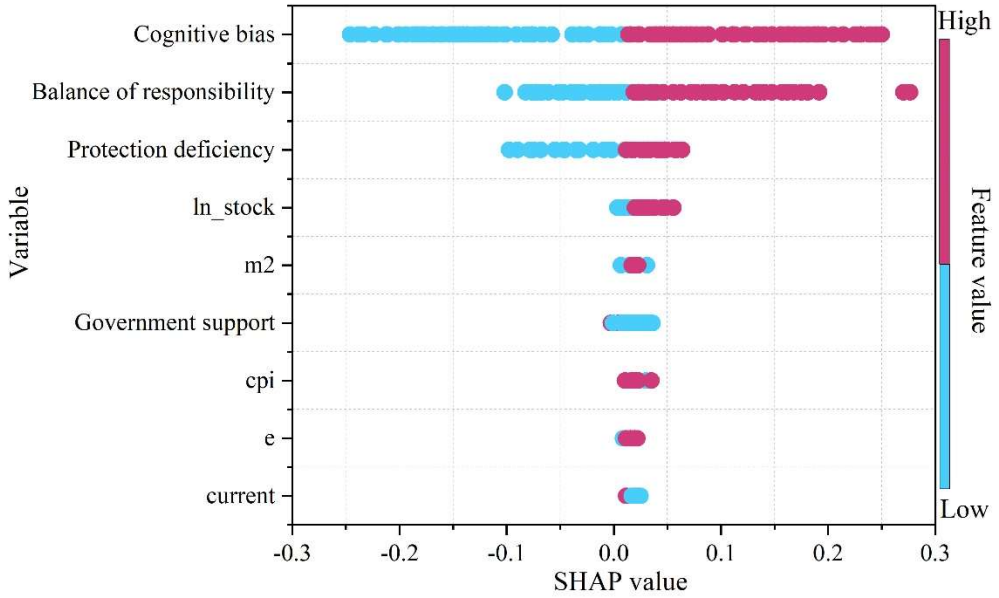

Figure 7: The XGBoost model is a SHAP value for government management

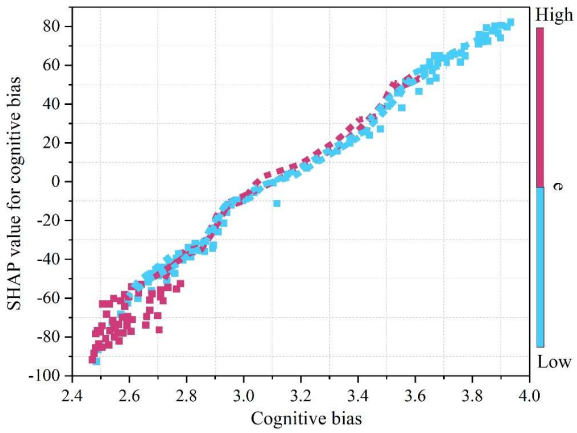

Figure 8: Cognitive bias and exchange rate interaction

III. B. 3) **Interaction analysis of features of SHAP**

The interaction between cognitive bias and exchange rate is shown in Figure 8. The effect on the exchange rate caused by an increase from 6.2567 to 7.0938 when cognitive bias is selected as a characteristic. When the value of cognitive bias is low, the SHAP value of the exchange rate is greater than 0, which indicates that an increase in cognitive bias drives the expansion of the government's multisectoral administrative coordination and management, i.e., elevating cognitive bias under the interaction of cognitive bias and the exchange rate leads to an increase in

the government's multisectoral administrative coordination and management. On the contrary, when the value of cognitive bias is high, the value of SHAP of exchange rate is less than 0, which indicates that when cognitive bias is high and exchange rate is low, it will make the obstacle of government multisectoral administrative coordination management decrease.

The interaction effect of the weights and responsibilities imbalance and the lack of protection is shown in Figure 9. It can be seen that the SHAP value is larger for higher inflation rates, suggesting that for corporate bonds with 7 to 10 years of imbalance, an increase in inflation rate leads to an expansion of their credit spreads. When the weighted imbalance is less than 5 years, the SHAP value of the sample point with higher inflation rate is smaller, indicating that for corporate bonds with a weighted imbalance of less than 7 years, the inflation rate negatively affects their credit spreads. The compensation claimed for the risk associated with a rise in the inflation rate is lower and does not become larger as it rises.

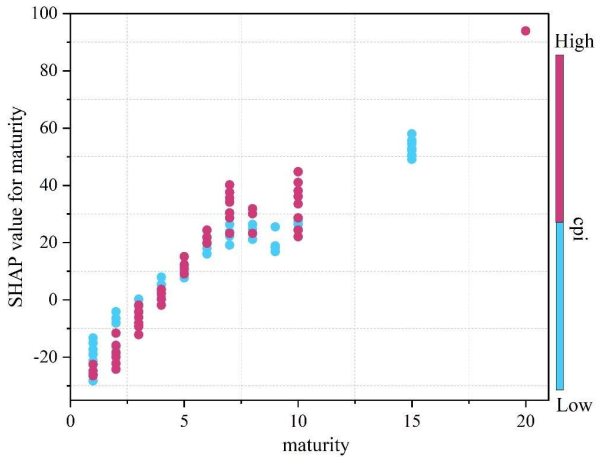

Figure 9: The impact of the imbalance of responsibility and the lack of securityBalance of responsibility

IV. Conclusion

In this study, the dynamic programming theory and XGBoost algorithm were applied to construct an assessment model of the multi-departmental coordination mechanism of government administration, and the key factors affecting the coordination effect were systematically analyzed. The following conclusions are drawn through empirical research:

The XGBoost model can effectively assess the coordination effect of governmental multi-departmental coordination, and the accuracy of the model after parameter optimization is as high as 98.13%, with an AUC value of 96.37%, which shows a strong prediction ability. The optimal parameter combination is that the maximum depth of the tree (max_depth) is 4 and the learning rate (learning_rate) is 0.05, under which the model has the strongest ability to distinguish between good and bad samples, with a KS value of 85.24%.

Based on the SHAP analysis, it is found that the coordination of government departments is most significantly affected by cognitive bias, with an average SHAP value of 0.102458, which is much higher than other factors; the imbalance of authority and responsibility and the lack of safeguard are the next most important factors, with the values of 0.01894 and 0.033274, respectively.The interaction analysis of cognitive bias and exchange rate shows that, when the value of cognitive bias is low, the exchange rate increase has a positive promotion effect on the coordination; while when the value of cognitive bias value is high, exchange rate rise has a negative effect.

Partial Dependency Plot (PDP) analysis shows that the coordination effect increases with cognitive bias, with a slower growth rate when cognitive bias is in the range of 3.0%-3.4%; it increases with the increase of power-responsibility imbalance, and is more stable in the range of 7-10 years; it decreases with the increase of lack of safeguard, and decreases the fastest in the range of 0.8%-0.9%; and it decreases with the increase of government support, but stabilizes when government support is greater than 13.5%. 13.5% tends to stabilize.

Based on the above findings, it is recommended that the government should make efforts to strengthen the concept of overall coordination and eliminate departmental nativism; clarify the boundaries of departmental authority and responsibility to achieve reciprocity of authority and responsibility; improve the institutionalized coordination mechanism to reduce the dependence on interpersonal trust; and strengthen the participation of social supervision to optimize the coordination environment. These measures will help build a more efficient and synergistic government administrative management system and enhance the quality of public services and public satisfaction.

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