Coastal meteorological characteristics based on big data and financial tax optimization of urban enterprises

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Received: 1 June 2021 / Accepted: 7 July 2021 / Published online: 26 July 2021
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Abstract
In recent years, many cities in the world have been hit by the high temperature heat wave and suffered heavy losses. And many coastal cities have been affected to a certain extent. Through reasonable urban form and architectural design to cope with the heat wave, improving the city’s ability to cope with high temperature has become an important planning and mitigation strategy to adapt to urban high temperature. In this paper, big data is applied to the study of coastal weather characteristics. From the perspective of urban planning and architecture, the interaction mechanism of coastal weather characteristics is discussed by using quantitative analysis methods such as correlation analysis and spatial regression model, which provides an important basis for the planning and urban design of high temperature heat wave. Then, taking urban morphology parameters, land use parameters and LST as variables, Pearson correlation coefficient was calculated by SPSS and GeoDa tools, and a spatial regression model was established to explore the quantitative relationship between coastal weather characteristics and land surface temperature. In the Pearson correlation coefficient, the correlation between vegetation coverage and LST is the largest, showing a negative correlation, with the coefficient of \(-0.595\). In addition to coastal climate types, the correlation between building density and LST is the largest, the coefficient is 0.360, positive correlation. The correlation is the smallest. With the application of big data technology, the tax collection and management mode will develop in the direction of intelligence, efficiency, fairness, and accuracy. Big data technology will provide a new direction for the research of coastal meteorological characteristics and the optimization of urban enterprise finance and taxation. In this paper, through the study of coastal meteorological characteristics of big data, it is applied in the city enterprise financial tax, to promote the enterprise financial tax more standardized.

Keywords  Big data · Coastal meteorological characteristics · Urban enterprises · Fiscal and taxation optimization

Introduction
With the rapid development of information construction and the explosive growth of social data, big data is born. The advent of the era of big data has a disruptive impact on our society and our lives. People’s thoughts, the production and operation of urban enterprises and the administration of the government are deeply affected by big data (Singh and Singh 2017). Starting from the concept of big data and the mode of tax collection and management, this paper analyzes the evolution and main characteristics of China’s tax collection and management mode (Kamruzzaman et al. 2014). This paper discusses the problems in the current tax collection and management mode from the aspects of management ideas, information collection, data analysis, legal system, personnel technology, etc., and analyzes the challenges and effects of big data technology on the optimization of Finance and taxation, as well as the management of tax sources and the establishment of tax information. Taking the most widely used personal income tax mobile application (personal tax APP) on mobile terminals as an example, this paper studies the changes caused by the application of big data technology in tax collection and management model, and explains that big data technology plays an important role in solving the problem of information asymmetry between tax collectors and payers and
promoting the development of tax collection and management. And put forward from the top-level design, data integration, improve the construction of talent mechanism and legal system, strengthen the construction of talent training platform and other countermeasures to optimize the tax collection and management mode. This paper also applies big data to monitor coastal meteorological characteristics (Loo and Du Verle 2016). Heat wave will affect human health, and have a negative impact on social economy, urban infrastructure and natural environment (Schlossberg and Brown 2004). At the same time, with the development of science and the leading role of Meteorology in all walks of life, people pay more and more attention to the impact of climate change on coastal weather (Singh et al. 2014). From the perspective of urban planning and architectural design, urban public structure will not change for decades or hundreds of years after completion (Malczewski 2006). For example, climate disasters such as heat wave will not be considered during construction, which will cause irreversible coastal weather environment in future damage. When disasters happen in the future, not only a lot of social resources need to be invested in emergency and disaster relief, but also a lot of additional funds must be spent on reconstruction or destructive transformation. Therefore, from the perspective of urban planning and architectural design, it is of far-reaching significance to apply big data to monitor the coastal weather characteristics, study the relationship between climate change and urban development, and formulate reasonable plans to cope with the pressure brought by high temperature, improve the response of coastal cities to disasters, and improve the livability of coastal cities (Motlagh et al. 2020).

Materials and methods

Data source

The hourly precipitation observation data used in this chapter is the hourly precipitation data set provided by the National Meteorological Information Center of China Meteorological Administration. The data set includes 2420 national terrestrial meteorological stations, national benchmark climate station, national basic weather station, and national general weather station in China, which are formed by strict data quality control (such as extreme value check and consistency check with other data). From June to August in the summer of 1981–2020, this chapter selects data from 89 national meteorological stations in southern China for analysis.

The time for analyzing the diurnal variation of precipitation in this chapter is local time. When events are classified according to the duration of precipitation events, events with a duration of less than 5 h are regarded as short-term precipitation events. In order to analyze the circulation characteristics related to different types of precipitation events in the coastal areas of southern China, the reanalysis data of era5 from 2013 to 2020 are also used. Era5 reanalysis data with high spatial and temporal resolution provided by ECMWF is the fifth generation of global climate and atmosphere reanalysis data developed by Copernicus climate change bureau (Singh et al. 2017).

Calculation of coastal meteorological characteristics

Through the analysis of the previous part, it is found that the false weak precipitation in the model may be related to the colder and wetter lower troposphere, while the higher water vapor is related to the abnormal convergence of the lower troposphere in the key area. In this section, sensitivity test is used to analyze the influence of water vapor diffusion on Precipitation Simulation over steep terrain. Referring to the analysis of Zhang and Li, we can redistribute water vapor by changing the divergence of water vapor and accompanying the air flow around the mountains, so as to study the change of precipitation simulation.

The water vapor equation in three-dimensional space field is as follows:

\[ \frac{\partial q}{\partial t} = -\nabla \cdot (q \nabla q) - \frac{Q_2}{L} \]

(1)

where \( q \) is the mixing ratio of water vapor and \( t \) is the time, which can represent the three-dimensional velocity vector. By omitting the source sink term and adding an additional three-dimensional water vapor divergence term at the right end of Eq. (1), Eq. (1) can be changed into:

\[ \frac{\partial q}{\partial t} = -\nabla \cdot (q \nabla q) - \nabla \cdot (\nabla q) = -\nabla \cdot (\nabla q) \]

(2)

That is, the control test solves Eq. (1), and the sensitive risk test in this section solves Eq. (2). The continuity equation in the model is as follows:

\[ \frac{\partial p}{\partial t} - \nabla \cdot (\nabla p) + \frac{\partial q}{\partial t} - \frac{\partial p}{\partial t} = 0 \]

(3)

Multiply \( q \) at both ends of Eq. (3) to obtain:

\[ q \frac{\partial p}{\partial t} - q \nabla \cdot (\nabla p) + q \frac{\partial q}{\partial t} - q \frac{\partial p}{\partial t} = 0 \]

(4)

By expanding both sides of the equation at the same time, we can get the following results:
\[
\frac{\partial p}{\partial \eta} \frac{\partial q}{\partial t} + \frac{\partial p}{\partial \eta} \nabla^2 q + \frac{\partial p}{\partial \eta} \frac{\partial q}{\partial \eta} = 0
\]

(5)

**Optimization analysis of financial and tax policies of urban enterprises**

China has a large number of small and medium-sized enterprises, but few have a sound financial system. This paper selects data from companies listed in the new three sessions of the Council from 2010 to 2020. The relevant index values in this paper are from the company’s annual financial statements, tonghuashun database, and wind database. The basic information of the company, such as company name, date of establishment, nature of business operation, and province of the company, comes from the new third board research section of guotai’an database. The annual total number of patent applications and annual total number of patent authorizations of the new third board company are from the company’s annual financial report and the patent research data website of the State Intellectual Property Office (Zhao et al. 2018). According to a study in the annual report of the company, the manually collected patent data will be verified and compared on the manually retrieved patent page according to the full Chinese name of the company, so as to ensure the authenticity and authority of the data source. The sample includes closed, restructured, bankrupt and withdrawn companies, which avoids selection errors in subsequent search. For company statements, please select consolidated statements, not just the financial statement data of the parent company. Specific variable definitions and indicators are shown in Table 1.

**Results**

**Difference analysis of precipitation events in different coastal areas**

Table 1: Description of main variables of the model

| Types                      | Specific indicators | English name of the processing method |
|----------------------------|--------------------|--------------------------------------|
| Explained variable         | Total R&D expenditure | Totalrdi                              |
|                           | Natural logarithm of total R&D expenditure | Lnrdrd                                |
|                           | Annual total number of patent applications | Apply                                  |
|                           | Annual total number of patents granted | Applygrant                            |
| Core explanatory variables | Government subsidy | Intax                                  |
|                           | Tax incentives      | The natural logarithm of the tax refund received by the business |
| Life cycle division indicators | Net cash flow from business operations | cashinv                                |
|                           | Corporate investment | cashinv                                |
|                           | Cash flow           | cashfin                                |
|                           | Net cash flow from corporate financing | Retainratio                            |
|                           | Retained earnings ratio | Retainratio                            |

Figure 1a shows the spatial distribution of the frequency of deep convection in summer 2013–2020, which is similar to the results of Zheng hechen et al. The frequency of deep convection in the southern Beibu Gulf and its surrounding waters is relatively high. The deep convection frequency in area a is 9.1%, which is very close to the center of the maximum convection frequency (9.5%) in the high seas. The frequency of deep convection decreases eastward along the coast, at about 111 °E. Then the frequency of deep convection began to increase eastward, reaching 7.2% near Yangjiang. In addition, there is a high frequency center of deep convection in the northwest of the island. It can be seen from Fig. 1b that the diurnal variation of Dongxing deep convection frequency presents a bimodal pattern. The main peak appears at 07:00 in the morning LST (13.7%), which is consistent with the diurnal variation peak of rainfall frequency in area A. the secondary peak appears in the evening. In the morning (Fig. 1c), the high frequency center of Beibu Gulf is similar to Fig. 1a. In Fig. 1c, the convective Center (about 113 °E) It is consistent with Fig. 1a, but there is no convective center near Yangjiang River and on land in Fig. 1c. ZJ is located between the two centers, and the frequency of deep convection is only 6.7%. On the contrary, the deep convection in the afternoon (Fig. 1d) mainly occurs in the inland area and HN Island, and the frequency of deep convection in area a is lower than that in the other two stations.

Figure 2 provides the comprehensive results of the first two cycle models that affect the long-term persistent morning precipitation events in Dongxing City. For the 15 events affected by the internal weather system, the negative terrain height anomaly of 850hPa controlled the inland area 6 h before the beginning of rainfall (Fig. 2a). Therefore, the whole water vapor of the whole layer in the inner region is relatively positive anomaly. These systems move southeast with enough water vapor to affect Dongxing, where precipitation occurs (Fig. 2b). On the contrary, for the 12 events affected by the marine weather system, the negative elevation anomaly of
Fig. 1 Spatial distribution of deep convective activity frequency obtained by geostationary satellite in summer

Fig. 2 Combined circulation of 15 inland (oceanic) weather systems affecting long lasting early morning precipitation in Dongxing area
850hPa before the beginning of rainfall controlled the Beibu Gulf (Fig. 2c). The enhanced abnormal low pressure system extends northward with enough water vapor, and the high value abnormal water vapor center in Dongxing area has been pushed forward at the beginning of the precipitation event (Fig. 2d).

The third type is local triggered precipitation under the influence of southwest wind and internal topography. There were 44 such precipitation events, accounting for two-thirds of the long precipitation events in the early morning. The average duration of these events was relatively short (10.4 h). The precipitation events affected by this mechanism are comprehensively analyzed. Figure 3 shows the cumulative precipitation frequency distribution of 2 h before, 1 h before, 1 h after the beginning of local precipitation events in 44 regions a. The vector represents the 925 HPA wind field mediated by 44 events. The results show that there is southwest wind in the coastal area, and the wind speed is about 8 MS-1. When the strong southwest airflow meets the terrain in the northwest of area a, it usually triggers local rainfall. As shown in Fig. 3a-d, this type of precipitation usually occurs near the foot of the mountain and affects area A 1–2 h later.

In addition to the long-term rainfall in the early morning, there are also a considerable number of short-term afternoon rainfall in Yangjiang. There were 31 short-term precipitation events in the afternoon, which lasted less than 5 h. The maximum hourly precipitation (≥ 3 mmh⁻¹) occurred between 1300 and 1700 lst. This kind of precipitation event was analyzed in Yangjiang. Figure 3a-d shows the composite precipitation frequency of 31 precipitation events in Yangjiang at 2 h before the beginning, 1 h after the beginning and 1 h after the beginning. The afternoon rainfall event in Yangjiang was mainly caused by the mountains on the northwest side of the station. After encountering mountains, southerly winds from the ocean converge, which can easily cause precipitation. Precipitation usually occurs first on the southeast slope (Fig. 3a) and then moves southeast to Yangjiang (Fig. 3b).

**Bias analysis of weather and climate models on Precipitation Simulation in coastal areas.**

From the analysis of the first two parts, it can be seen that the most important feature of precipitation in southern China is the difference in coastal areas. Then, the simulation capability of the regional differences will be analyzed around the model. Figure 5 shows the summer precipitation simulation of cams-csm-a and ECMWF and their deviations. It can be seen from Fig. 5A that cams-csm-a can simulate the precipitation difference between the East and west sides of Leizhou Peninsula, but in the model, the precipitation between the East and west sides of Leizhou Peninsula is more concentrated on the surface. There is little rainfall in the sea and land area where Yangjiang is located. The rainfall in this area is slightly less than that in Zhanjiang City. The precipitation in the coastal

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**Fig. 3** The combined frequency of 44 locally triggered precipitation events with long persistence in the early morning and the corresponding 925 HPA wind field in area A
area of ECMWF is relatively small. 21°–22°N The deviation between latitude and most areas of Hainan Island is between 1 and 0.5mm–1. The precipitation in Leizhou Peninsula shows a positive deviation of about 2mm–1 (Fig. 5d).

Fig. 4 Is the same as Fig. 3a-d, but the results of 31 short-term precipitation events in Yangjiang area

Fig. 5 Summer precipitation (a-b) simulated by CAMS-CSM-A and ECMWF and its deviation from CMPA (c-d)
Although ECMWF can more reasonably reproduce the “large small large” rainfall distribution pattern along the South China coast, it cannot well simulate the low value rainfall area near Leizhou Peninsula (Fig. 5b).

The model focuses on the daily variation of precipitation in coastal areas. It is found that the peak moment of precipitation daily change simulated by cams-csm-a and ECMWF is similar: the precipitation on land is mainly in the afternoon, while the peak of ocean rainfall mainly occurs in the early morning (Fig. 6a-b). For coastal areas (Fig. 6c), CAMS-CSM-A can basically reproduce the distribution pattern of “morning afternoon morning” distribution in the peak stage of each day. However, in the east of Leizhou Peninsula (station 4), the peak morning precipitation in cams-csm-a is more east than observed (site 7). The sixth station is still mainly rainfall in the afternoon, and it rains heavily in the early morning. Meanwhile, the regional differences between the precipitation in Leizhou Peninsula and its east cannot be reproduced reasonably during the observation of CAMS-CSM-A. ECMWF has no obvious advantage in simulating the daily variation of coastal precipitation. In the west of Leizhou Peninsula, ECMWF precipitation is characterized by double peaks, which is different from the observation and the single early peak of CAMS-CSM-A.

In the model, the grid points closest to Dongxing, Zhanjiang and Yangjiang are selected to represent the three typical stations. Figure 7 shows the diurnal variation of precipitation at CAMS-CSM-A and ECMWF (Fig. 7a-b) and the diurnal variation of the start time of precipitation events (Fig. 7c-d). In CAMS-CSM-A (Fig. 7a), the daily variation of precipitation in Dongxing City has a single peak distribution, and the daily amplitude is large. Two hours after the observation, the peak appeared at 0800 LST in the morning and 2000 LST at night in the valley. The precipitation in Zhanjiang peaked in the afternoon 1 h before the observation. There is a great difference between simulation and observation of precipitation in Yangjiang. Although the diurnal variation is bimodal, the midday rainfall is dominant. The rainfall in the morning is lower than that in Zhanjiang, and the peak value is obviously weaker. There are main problems in simulating the diurnal variation of precipitation in these three areas. By analyzing the diurnal variation of the frequency of the event start time, it is found that the precipitation in the three regions of ECMWF basically starts from 2300-0100 LST in the night and 0900-1400 LST in the day.

As shown in Fig. 8a, in the early morning, the 925 HPA low-level wind field in the southern coast of China converges abnormally, and the coastal area to the west of Leizhou Peninsula converges to the south of city a, which is larger than the coastal area to the east of Leizhou Peninsula. The weak anomalous convergence in Yangjiang leads to the low simulation of morning rainfall. The distribution model of abnormal wind emission field in the afternoon (Fig. 8b) is almost opposite to that in Fig. 8a, and the spatial correlation is −0.93.

![Fig. 6 Peak time of daily variation of summer precipitation over South China coast simulated by CAMS-CSM-A and ECMWF](image-url)
The results of empirical analysis on the optimization of financial and tax policies of urban enterprises

The following is to test the impact of government subsidies and tax incentives on enterprises’ technological innovation input and innovation output (see Table 2).

In Table 2, all regression uses mixed OLS regression and checks the sector fixed effect and annual fixed effect. The regression in column (1) includes only government subsidy variables. The results show that the state subsidy increases the R & D expenditure by 1%. The results in this column are for reference only, in column (2), except for tax preference variables, regression also includes all control variables. The results show that the government subsidy can significantly promote the R & D expenditure of enterprises at the level of 10%. Similar regression with column (1) and column (3) of the table only includes variables of corporate tax preference. The results show that 1% tax preference can significantly promote R & D expenditure of enterprises. Similar to column (2), regression in column (4) does not include variable state subsidies, and all control variables, the promotion effect of tax preference is still significant. The main conclusion of Table 2 is that the government subsidy and tax preferential policies greatly promote the R & D expenditure of enterprises, and the promotion effect of tax preference is greater than that of government subsidy.

Column (1) of the basic model in Table 3 only includes government subsidies and tax preferences, and does not include control variables. Column (2) adds control variables based on column (W), while columns (1) and (2) are OLS regression. If the control variables are not added, the government subsidies and tax incentives will actively promote the patent application. If the control variable is added, the state subsidy will still actively promote the development of patent applications, and the tax incentive coefficient will become negligible. Considering that the variable is the number of patent applications, the value is a positive integer containing zero, and columns (3) and (4) are Poisson regression of columns (1) and (2) respectively. The results of the above table show that:

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Fig. 7 CAMS-CSM-A -a and ECMWF results

Fig. 8 The average 925 HPA anomalous wind divergence field of ECMWF in the morning and afternoon
government subsidies promote the patent application of companies, but tax incentives do not play an important role in promoting the patent application of enterprises.

The explanatory variables in Table 4 are the number of patents granted by the company, including: column (1) is OLS regression without control variables, while column (2)

| Table 2 | The effect of government subsidy and tax preference on innovation investment policy |
|------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                  | (1) R & D expenses               | (2) R & D expenses               | (3) R & D expenses               | (4) R & D expenses               | (5) R & D expenses               | (6) R & D expenses               |
| Government grants | 0.0645                           | 0.0086                           | 0.1242                           | 0.0063                           | 0.0116                           | 0.0048                           |
|                  | 0.0037                           | 0.0045                           | 0.0063                           | 0.0036                           | 0.0063                           | 0.0045                           |
| Tax preference   | 0.1463                           | 0.1406                           | 0.0371                           | 0.0360                           | 0.0351                           | 0.0351                           |
|                  | 0.0366                           | 0.0063                           | 0.88813                          | 0.8398                           | 0.8580                           |
| Enterprise age   | 0.1246                           | 0.1406                           | 0.0063                           | 0.0063                           | 0.0063                           | 0.0063                           |
| Enterprise scale | 0.0124                           | 0.0083                           | 0.0088                           | 0.0088                           | 0.0088                           | 0.0088                           |
| Total profit     | 0.0282                           | 0.021                             | 0.0044                           | 0.0038                           | 0.0042                           | 0.0017                           |
| The nature of enterprise property rights | 0.0744                           | 0.0032                           | 0.0017                           | 0.0016                           |
| Return on net assets | 0.0444                           | 0.0038                           | 0.0042                           | 0.0017                           |

| Table 3 | The influence of government subsidy and tax preference on enterprise patent application |
|------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                  | (1) Patent application               | (2) Patent application               | (3) Patent application               | (4) Patent application               |
| Government grants | 0.6444                           | 0.3398                           | 0.1165                           | 0.0532                           |
|                  | 0.0973                           | 0.1319                           | 0.0037                           | 0.0043                           |
| Tax preference   | 0.3774                           | 0.0385                           | 0.0056                           | 0.0049                           |
| Enterprise age   | 0.1221                           | 0.1477                           | 0.0026                           | 0.0033                           |
| Enterprise scale | 2.2240                           | 0.8756                           | 0.0114                           | 0.0011                           |
| Corporate income tax burden | -0.8040                        | -0.0840                      | -0.201                           | -0.0201                           |
| Proportion of technical personnel | 0.0385                            | 0.0038                           | 0.0038                           | 0.0005                           |
| Total profit of enterprise | -0.4107                        | -0.4107                      | -0.0298                           | -0.0298                           |
| Business nature | -0.8761                           | 1.5489                           | -0.850                          | 0.0140                           |
| Return on net assets | 0.0283                           | 0.0432                           | -0.0009                          | 0.0010                           |
| Asset liability ratio | 2.3941                           | 2.9536                           | 0.1986                           | 0.0676                           |
is OLS regression with control variables. Two columns of data show that tax incentives and state subsidies are positive, which can promote the number of patents granted by companies, but after adding control variables, the positive role of tax incentives becomes negligible. The data in columns (3) and (4) show that the government subsidies and tax incentives received by enterprises greatly promote the number of business patents, while the promotion effect of tax incentives on business patents becomes significant due to the insignificant return of ordinary OLS. The results of the first two tables show that tax incentives and government subsidies are actively promoting enterprise innovation. In any case, state subsidies have greatly increased the number of patent applications and patents granted to companies. However, only tax incentives can promote the role of enterprise patent granting, but not the role of enterprise patent application.

Discussion

Problems in the fiscal and tax policies of urban small and medium-sized enterprises

However, there are two problems in the actual implementation of the above support policies. First, fiscal policy, (1) The investment intensity of tax funds. Although the intensity of financial investment supporting technological innovation of SMEs has increased year by year, compared with emerging market countries, the intensity of financial capital expenditure (fiscal investment/GDP) has increased. But compared with developed countries such as the United States and Japan, there is a big gap, which shows to some extent that although tax investment is increasing (Aminu et al. 2017). In the new international situation of increasingly fierce competition, China’s tax investment has improved. In the current global innovation situation in China, with China’s economy entering a new normal, the expenditure on social science research will shift from slow growth to steady growth. The R & D intensity of the whole society is 2%, which is the threshold for a country to become an “innovative country”. The government must strive to keep the R & D intensity of the whole society at more than 2%, instead of blindly narrowing the R & D intensity gap with the United States and other countries. (2) The distribution of tax funds is reasonable. Similarly, only about 5% of state funding goes to basic research. As we all know, the basic research ability is an important measure of the basic innovation ability of enterprises and even a country. Obviously, the reasonable allocation of tax funds for basic research, applied research and experimental development in China must be appropriate and optimized (Banerjee et al. 2018). The current situation is that the proportion of tax funds for R & D expenditure is too low.

Table 4 The influence of government subsidy and tax preference on enterprise patent granting

|                  | (1) Patent grant | (2) Patent grant | (3) Patent grant | (4) Patent grant |
|------------------|------------------|------------------|------------------|------------------|
| Government grants| 0.6659           | 0.3515           | 0.1493           | 0.0676           |
|                  | 0.1093           | 0.1448           | 0.0050           | 0.0053           |
| Tax preference   | 0.3674           | 0.0622           | 0.0372           | 0.0077           |
|                  | 0.1231           | 0.1575           | 0.0031           | 0.0036           |
| Enterprise age   | 0.4825           |                  | 0.0466           |                  |
|                  | 0.9589           |                  | 0.0233           |                  |
| Enterprise scale | 2.3204           |                  | 0.2175           |                  |
|                  | 0.9645           |                  | 0.0230           |                  |
| Corporate income tax burden | –2.1917      |                  | –0.1908          |                  |
|                  | 2.8479           |                  | 0.0639           |                  |
| Proportion of technical personnel | 0.0323   |                  | 0.0038           |                  |
|                  | 0.0231           |                  | 0.0006           |                  |
| Total profit of enterprise    | –0.4801          | –0.0365          |                  |                  |
|                  | 0.6996           |                  | 0.0153           |                  |
| Business nature | 0.1901           |                  | –0.0225          |                  |
|                  | 1.5916           |                  | 0.0337           |                  |
| Return on net assets | –0.0282          | –0.0038          |                  |                  |
|                  | 0.0437           |                  | 0.0012           |                  |
| Asset liability ratio | 1.5258            | 0.1334           |                  |                  |
|                  | 3.5123           |                  | 0.0274           |                  |
Analysis of the impact of big data on tax collection and management mode

Adjustment of tax collection and management mode in the era of big data

With the continuous development of big data technology, the continuous improvement of information technology, the continuous expansion of globalization, the increasing importance of online transactions, the changing phenomenon of tax concealment, the asymmetric information of tax collection and management in China, and the obvious problems of quality and effectiveness, the management will be greatly affected. For example, the prevalence of online shopping makes the main body of operators unclear, many parts of the transaction are anonymous on the Internet, even if the use of virtual code and network address cannot execute transaction activities, and the authenticity of transaction information cannot be verified; Without the permission of the parties, some companies use personal identity information to forge wages and false statement expenses; The company pays employees in cash to avoid tax declaration, etc (Bibri 2018). If tax collection and management continue to use the original method, it will inevitably lead to more serious tax losses. Therefore, in the era of big data, tax collection and management mode must adapt to the needs of the times. It also provides technologies for adjusting tax collection and management, studying the collection and management methods of numerical system and solving the problem of information asymmetry, which can reduce tax losses and promote tax equity.

New challenges of big data technology to tax collection and management mode

Driven by big data technology, China’s current tax collection and management models are relatively backward in information collection and analysis. Big data technology challenges the functions of tax data processing and analysis. The main function of big data technology is the ability to process data. The processing method of batch data is different from the previous target analysis data processing methods. In the past, due to the application of big data technology, the ability of filtering target data for analysis is very limited. Lack of effective data analysis and processing capacity, even if the database collects all the data, the value of massive data will be buried, which will also have a negative impact on the subsequent data analysis (Canepa 2007). Therefore, how to analyze the massive data processing related to tax is a challenge to the current tax collection and management mode.

Impact of big data technology on tax source management

Big data puts forward new requirements for the management of tax sources. Under the influence of big data technology, financial resources management has shown a trend of accuracy, higher efficiency, and scientific development (Celik et al. 2014). Big data technology improves the accuracy of tax source management. With the acceleration of social computerization, the structure of tax sources has become more complex and diversified. The original analysis method of tax source management is relatively simple, and the management of tax source is relatively limited (Ewing and Cervero 2010). In addition, the management of tax sources is not fully emphasized, which leads to the incomplete management of tax sources; Under the application of big data technology, through professional analysis, collection, sorting, classification, screening and comparison of tax data, the basic information of taxpayers, declaration, and other data are processed to strengthen the strength of the tax department. Data comparison and analysis of complete and accurate understanding of taxpayer information, and effective implementation of accurate management of tax sources. Big data technology improves the management efficiency of tax sources. Due to the problems of the original tax source management method, we need to improve the efficiency of the original tax source management.

Countermeasures for optimizing tax collection and management mode by using big data technology

Establish big data tax management thinking

It can be seen that big data technology has played a key role in the development of tax collection and management model in a more effective, scientific and accurate direction. In recent years, the Party Central Committee and the State Council have issued a series of documents to support the development of big data, and established a number of big data centers nationwide. Big data has become a national strategy. In the international big data industry expo, it was emphasized that China should attach great importance to the development of big data. National big data strategy plays an important role in China’s economic and social development. It is necessary to fully implement the national big data strategy to help China’s...
economy transform from high-speed growth to high-quality development (Jones 2003).

**Highly integrated tax related big data**

At present, the collection of tax data is particularly important. Tax data is no longer the past sample and incomplete sample, but a complete sample. The correlation between tax data is no longer causal analysis, but correlation analysis (Hollevoet et al. 2011). The tax department should start with the “high integration of information”, break through the bottleneck of tax governance system and governance ability, and establish the joint governance mode of tax. If all sample taxpayer information can be collected and used, the previous data can be modified. The required accuracy has a certain degree of fault tolerance in order to fully understand the situation of taxpayers and improve the tax collection and management chain.

**Conclusion**

With the support of big data technology, using mathematical statistics, geographic information, and other methods to study the factors affecting urban climate is the focus of current research. For coastal cities, it is urgent to establish a more targeted high temperature heat wave risk prevention system. In general, this study provides a method for people to study the environment of coastal cities under the conditions of high temperature and heat wave, and puts forward countermeasures according to the current situation of cities. This research is still in progress, and many professional and technical information, such as urban planning, geography, and climate, will need to be integrated in the future. In order to cope with the high temperature and heat wave, in addition to the cooperation of designers and architects, the support of government, public, and economy is also necessary to obtain satisfactory results. In addition to studying the climate characteristics of coastal cities, this paper also explains the role of big data in the tax optimization of urban enterprises. With the rapid development of information construction, the structure of tax sources is more and more complex, and the number of tax records is more and more. Big data has produced all aspects of tax collection and management. Therefore, if the tax collection and management department does not change the original tax collection and management method, it will become more and more passive, resulting in greater tax losses. Under the influence of big data technology, the tax management department has improved the software and hardware, data storage capacity, mining capacity, and analytical computing capacity. Through the software based on big data application, under the information sharing of public security, housing management, banking and other departments, the problem of information asymmetry is effectively alleviated, the taxpayer’s independent and honest declaration awareness is improved, the taxpayer’s understanding of tax declaration is promoted, and a harmonious and efficient collection environment is built. Application software and programs based on big data technology are also the trend of future development of tax collection and management mode, which can effectively improve the quality and efficiency of tax collection and management. Therefore, tax authorities should keep pace with the times, pay attention to the application of big data technology, start with high-level design, highly integrate tax-related big data, innovate application thinking, improve team building, and legal protection and optimization. Adapting to the new situation and new demand of tax collection and management mode will promote the specialization, intelligence, and efficiency of tax collection and management mode.

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**Competing interests** The authors declare no competing interests.

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