Empirical Analysis on the Influence of Social Security and Public Service on Residents' Quality of Life Under the Background of Intelligentization

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Abstract. Since the 20th century, modern intelligent technologies, such as big data, Internet of Things, block chain and artificial intelligence, have developed vigorously. With the help of intelligent technologies, various platforms have spread all over the industry, and the multilateral platform model and its revolution have shown extensive coverage, far-reaching impact and new governance paradigm with the trend of sweeping the world, which has brought about great changes in residents' lives. As far as the government is concerned, it should not only conform to the trend of the times, but also ensure the stable and sustainable development of society. Therefore, in order to reduce the residents' uncertainty about the future life caused by the social intelligent change and increase the residents' confidence in improving the quality of life, this paper selects the relevant data of social security and general public services in China from 2000 to 2019, makes an empirical analysis of their influence on the quality of life of residents, that is, residents' consumption, analyzes their influence effects, and provides data basis for the subsequent reform of government governance mode and related platform construction. The results show that both social security and public services have positive and positive effects on residents' quality of life, and good social security has a more significant positive effect on residents' quality of life. Therefore, based on the existing social security public service platform, combined with the above empirical analysis, in order to improve people's quality of life and achieve sustainable economic development, some suggestions are put forward: optimizing the platform design; Simplify the platform operation framework and realize service equalization; Promote the construction of a platform-based government governance model and strengthen the intelligent supervision of the platform.

Keywords: Intelligent · Quality of life of residents · Social security · Public service · Platform-based government

1 Introduction

China's economy is in the critical stage of transition from high-speed growth to high-quality growth, and technological innovation is the core driving force of high-quality

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economic growth. Intelligent technology is the main representative of current technological innovation. It is an attribute that things can meet various needs of social subjects with the support of information technologies such as computer network, big data, internet of things and artificial intelligence. It is a higher-level application of information technology in real economy, which mainly realizes the optimization and innovation of production technology, production decision-making and production mode by supplementing and replacing traditional production factors to improve production efficiency [6]. With the help of intelligent information technology such as the Internet, the multilateral platform model and its revolution have shown extensive coverage, far-reaching impact and new governance paradigm with the trend of sweeping the world. With the advancement of the platform revolution and the arrival of the platform era, multilateral platforms are increasingly infiltrating into the field of social governance. Platform-based society has arrived [11], and platform-based governance has become a new paradigm of social governance [8]. More and more government departments and social organizations provide public services by creating or connecting multilateral platforms to promote cooperation and co-governance, which makes the diversified supply of public services and collaborative innovation come into reality, and residents' work and life become more convenient and efficient.

At the turning point of the gradual transformation of China's economic structure and increasingly frequent social conflicts, the government must also conform to the trend of the times, and on the basis of realizing the integration of various platforms and platform-based governance, escort the economic development, improve people's quality of life and better serve the people. Residents' consumption, as an important indicator of national economic development, not only represents the development level of the whole society's economy, but also reflects the residents' quality of life and benefits. Promoting residents' consumption, improving residents' quality of life and promoting high-quality economic growth are the main goals of the future government platform construction, transformation and upgrading.

In the intelligent era with the rapid development of computer information technology, platforms have spread all over the industry, and people's working and living styles have also undergone tremendous changes, resulting in increasingly complex and inevitable problems. In order to make up for the adverse effects of technological innovation and social transformation and upgrading on residents' lives and reduce residents' uncertainty about their future lives, the government, on the basis of doing its own job, that is, public service, and perfecting the relevant social security system, realizes the intelligent upgrading of social security methods, and provides social security that is more diversified, adapted to local conditions and meets people's needs.

2 Literature Review and Index Selection

At present, the domestic literature related to this paper mostly focuses on intelligent technology [10], industrial intelligence [17], the influence on domestic industrial economy [16] and regional economy (Hou 2021), or the specific application of computer information technology in government work [18], etc., mostly for promoting the high-quality development of industrial economy [15] and promoting the transformation and

upgrading of government work (Chen 2022). The quantitative research is less, and the industrial intelligence measurement index constructed by Sun Zao and Hou Yulin is mostly used [14]. There is little research on how to improve residents' quality of life with the help of the development of intelligent platform in the process of promoting the reform of governance.

Therefore, from the government's point of view, this paper selects the social security expenditure and general public service expenditure (which was replaced by administrative expenses before 2007) in the national government financial expenditure from 2000 to 2019 as the measurement indicators of the level of national living security and the level of government public service in the process of China's intelligent development since the 20th century, and then establishes an econometric model to analyze and test their influence on residents' living quality (that is, residents' consumption level) and further grasp their influence effects.

In this paper, household consumption (Y) is selected as the explanatory variable, and social security expenditure (X_1) and public service supply (X_2) are introduced into the econometric model together as explanatory variables.

3 Economic Model Setting and Empirical Test

3.1 Data Source

Considering the collectibility and systematicness of samples and the accuracy of model results, the time series data from 2000 to 2019 are selected from China Statistical Yearbook, China Financial Yearbook and China Labor Yearbook for empirical analysis (as shown in Fig. 1).

3.2 Inspection and Analysis

3.2.1 Unit Root Inspection

In this paper, the unit root ADF test method is used to test the unitary order of each variable. Taking the variable Y as an example, it can be seen the test results that the Mackinnon critical values of the unit root test are −4.616, −3.710 and −3.298, respectively, and the statistical value of the T test is −4.724 less than the corresponding critical values.

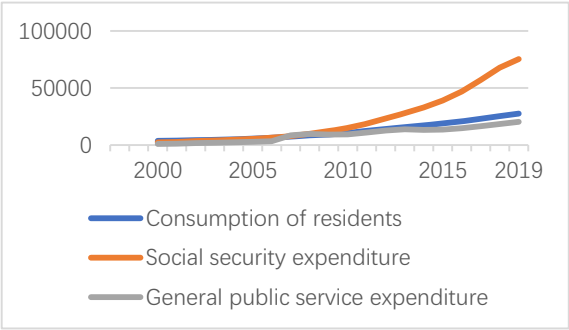

Fig. 1. Household Consumption and Related Data from 2000 to 2019.

Similarly, social security expenditure (X_1) and general public service expenditure (X_2) pass the stationarity test after the second-order difference, namely X_1~I(2) and X_2~I(2).

3.2.2 Model Construction and Parameter Determination

As can be seen from Fig. 1, each variable is increasing year by year, with fluctuations in individual years and changes in growth rate, indicating that there is a linear relationship between variables, so the model can be determined as a linear form, namely:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \mu_i \tag{1}$$

μ_i in formula (1) is a random interference term.

In this paper, the data of social security expenditure, household consumption and general public service expenditure in China from 2000 to 2019 are taken as samples. Assuming that the random term accords with the classical assumption, the general least square method OLS is used to regress the above formula to obtain:

$$\hat{Y} = 2887.723 + 0.217X_1 - 0.464\,X_2 \tag{2}$$

$$\text{t} = (8.526) \quad (11.993) \quad (6.907)$$

$$\overline{R}^2 = 0.991 \qquad \text{F} = 1028.83$$

The mode $\overline{R}^2 = 0.991$, the determinable coefficient is very high, and the F test value is 1028.83, which is obviously significant. However, (X_2) the impact of general public service expenditure on residents' consumption is higher than (X_1) the impact of social security expenditure on residents' consumption, which is inconsistent with expectations, indicating that there may be multiple col-linearity.

3.2.3 Multiple Col-Linearity Test

The correlation coefficient between the two variables is 0.912, which proves that there is a certain degree of multi col-linearity. Therefore, the variables in the model are subjected to the following logarithmic transformation, and then the model is estimated.

$$\ln Y_t = \beta_0 + \beta_1 \ln X_{1t} + \beta_2 \ln X_{2t} + \mu_i \tag{3}$$

The model estimation result obtained by OLS regression is as follows:

$$\widehat{\ln Y} = 3.494 + 0.578\ \ln X_1 + 0.024\ \ln X_2 \tag{4}$$

$$\text{t} = (56.733) \quad (31.848) \quad (1.169)$$

$$\overline{R}^2 = 0.998 \qquad \text{F} = 4817.437$$

Table 1. OLS regression results of the model

Variable	Coefficient	Standard deviation	T statistic
Constant term (c)	2887.723	338.700	8.526
X_1	0.217	0.018	11.993
X_2	0.464	0.067	6.907
Coefficient of determination R^2	0.992		
Modified determinable coefficient $\overline{R}^2$	0.991		
F statistic	1028.830	DW value	16.211
F statistic p value	0.000		

Table 2. Regression results after logarithmic transformation

After logarithmic transformation:			
Variable	Coefficient	Standard deviation	T statistic
Constant term (c)	3.494	0.062	56.733
$\ln X_1$	0.578	0.018	31.848
$\ln X_2$	0.024	0.021	1.169
Coefficient of determination R^2	0.998		
Modified determinable coefficient $\overline{R}^2$	0.998		
F statistic	4817.473	DW value	0.917
F statistic p value	0.000		

According to the estimation results in Table 1 and 2, it can be seen that after logarithmic transformation, although the explanatory variables are highly correlated, the corresponding statistical test indicators are highly significant, and all the coefficients have correct signs, which indicates that all these variables together have a significant impact on household consumption.

Economic meaning: The estimated results of this model show that if the social security expenditure increases by 1%, the average household consumption will increase by 0.578% when other variables remain unchanged. For every 1% increase in general public service expenditure, household consumption will increase by 0.024% on average.

Statistical test: Goodness of fit test: $\overline{R}^2 = 0.998$, which shows that the model fits the sample well.

T Test: For $H_0 : \beta_i = 0$ (i = 1, 2), given the significance level $\alpha = 0.05$, the critical value $t_{\frac{\alpha}{2}}(n-k) = 2.11$ with the degree of freedom of n − k = 17 is obtained by looking up the T distribution table. From the regression results, it is known that $\hat{\beta}_1$ is greater than 2.11 and the absolute value of $\hat{\beta}_2$ is less than 2.11, which indicates that

β_1 should reject $H_0 : \beta_i = 0$ (i = 1, 2) and β_2 should accept H_0 at the significance level of $\alpha = 0.05$. That is to say, when other explanatory variables remain unchanged, the explanatory variable X_1 "social security expenditure" has a significant impact on the explained variable "household consumption" Y, while the explanatory variable X_2 "general public service expenditure" has no significant impact on the explained variable "household consumption" Y.

F test: For $H_0 : \beta_1 = \beta_2 = 0$, we have obtained F = 4817.437, given $\alpha = 0.05$, and the critical values of freedom k − 1 = 2 and n − k = 17 $F_\alpha(2, 17) = 3.59$, because F = 4817.437 > 3.59 indicates that the model is significant on the whole.

3.2.4 Auto-correlation Test

The determinable coefficient of the regression equation is high and the regression coefficients are significant. For the model with sample size of 20 and two explanatory variables, at the significant level of 5%, we can see from DW statistics that $d_L = 1.1$ $d_U = 1.537$. From Table 1, we can see that DW in the model is less than d_L, and there is obvious auto-correlation.

The LM (BG) test is used for auto-correlation test, and the results are as shown in Table 3.

The result shown in Table 3 is the second-order lag test, that is, the lag period length p = 2. According to the result, it can be known that F = 4.476, LM = TR^2 = 7.475, given the known n = 20, k = 2. According to the look-up table, at the significant level of α = 0.05, $F_\alpha(n, k) = F_{0.05}(2, 20) = 3.49$, F = 4.476 > $F_{0.05}(2, 20) = 3.49$; According to the table, at the significant level of α = 0.05, $\chi^2_{0.05}(2) = 5.99$, LM = TR^2 = 7.475 > $\chi^2_{0.05}(2) = 5.99$, which shows that there is auto-correlation in the data. Therefore, Cochrane-orcutt iterative method is used for generalized difference regression, and the results are as shown in Table 4.

Therefore, the final results of the generalized difference model are as follows:

$$\ln \hat{Y}_t = 3.328 + 0.56 \ln X_{1t} + 0.061 \ln X_{2t} \tag{5}$$

$$t = (30.033) \quad (28.716) \quad (2.47)$$

$$\overline{R}^2 = 0.999 \qquad F = 5354.918$$

It can be seen from Table 4 that DW = 1.903 can be judged, $d_U = 1.537$, $d_U <$ DW $< 4\text{-}d_U$, indicating that the model has no auto-correlation after generalized difference at 5% significant level.

Table 3. (LM)BG Test Results

F statistic	4.476	Critical probability P value	0.0299
LM value (sample size * R^2)	7.475		0.0238

Table 4. Cochrane-orcutt method estimation results

Variable	Coefficient	Standard deviation	T statistic
Constant term (c)	3.328	0.111	30.033
LnX_1	0.560	0.020	28.716
LnX_2	0.061	0.025	2.470
Estimated value after iteration of synonyms of auto-correlation function ρ	0.447	0.167	2.684
Coefficient of determination R^2	0.999		
Modified determinable coefficient $\overline{R}^2$	0.999		
F statistic	5354.918	DW value	1.903
F statistic P value	0.000		

According to the generalized difference model of household consumption, with other explanatory variables unchanged, for every 1% increase in social security expenditure, household consumption will increase by 0.56% on average. For every 1% increase in general public service expenditure, household consumption will increase by 0.061% on average.

3.2.5 Heteroscedasticity Test

In order to make the model more accurate and convincing, to prevent errors in model setting, heteroscedasticity test is carried out.

According to the heteroscedasticity test results we can know that Obs*R-squared = 12.551. According to the White test, at the significant level of $\alpha = 0.05$, look up the χ^2 distribution table and get the critical value $\chi^2_{0.05}(5) = 11.0705$. Compare the calculated χ^2 statistic with the critical value, because $nR^2 = 12.551 > \chi^2_{0.05}(5) = 11.0705$, and the p value is small, the original hypothesis is rejected, and the alternative hypothesis is not rejected, which indicates that the model has heteroscedasticity.

Therefore, the weighted least square method (WLS) is used for correction, and the weights $w_{1t} = \ln x1 * \ln x2$, $w_{2t} = (\ln x1 * \ln x2)^2$, $w_{3t} = (\ln x1 * \ln x2)^3$, $w_{4t} = (\ln x1 * \ln x2)^4$, $w_{5t} = (\ln x1 * \ln x2)^5$ are selected respectively. Through the comparative estimation test, it is found that the heteroscedasticity correction effect of the weight w_{4t} is better, and the weighted least square estimation results are as shown in Table 5.

It can be seen from Table 5 that after the heteroscedasticity is eliminated by using the weighted least square method, the T test of the parameters is significant, and the F test is also significant, that is, the estimated results are as follows:

$$\ln \hat{Y}_t = 3.435 + 0.561 \ \ln X_{1t} + 0.05 \ \ln X_{2t} \tag{6}$$

$$t = (43.683) \quad (43.368) \quad (2.606)$$

$$\overline{R}^2 = 0.999 \quad DW = 1.125 \qquad F = 6462.303$$

Table 5. Estimation result of weight w_{4t}

Variable	Coefficient	Standard deviation	T statistic
Constant term (c)	3.435	0.079	43.683
$\ln X_1$	0.561	0.013	43.368
$\ln X_2$	0.050	0.020	2.606
Weighted statistics			
Coefficient of determination R^2	0.999		
Modified determinable coefficient $\overline{R}^2$	0.999		
F statistic	6462.303	DW value	1.125
F statistic P value	0.000		

It shows that with other variables unchanged, for every 1% increase in social security expenditure, the average increase of household consumption is 0.561%. For every 1% increase in general public service expenditure, the average increase of household consumption is 0.05%.

Although this model may have some other problems that need to be further solved, this estimate may be closer to the real situation than the conclusion in the initial model.

4 Conclusion and Discussion

Through the above-mentioned quantitative analysis and statistical test, it can be concluded that both social security and public service have positive and positive effects on residents' quality of life, but there are differences in their effects, and good social security has a stronger positive effect on residents' quality of life.

At present, the government has launched a social security public service platform to meet the requirements of the times, facilitate people's lives and provide security services for residents' lives. Based on the above conclusions and the development of the platform, the following suggestions are put forward:

First, optimize the platform design.

However, due to the particularity of social security and public services, such as wide service scope, involving many departments and closely related to people's lives, there are many problems in platform design, such as the mismatch between functional orientation and actual demand, the multifarious types of platform modules, and the excessive workload of platform design.

Therefore, in the process of designing the platform, first of all, we should do a good job of early market research by using information technologies such as big data, make a basic judgment and analysis of the needs of groups of different regions and ages, and make functional positioning according to the analysis results, and then design functional modules for different groups of people in a targeted manner. On the basis of information equivalence and data sharing, we should use computer information technologies such as cloud computing and big data to grasp the specific service needs of residents in various

provinces, cities and towns. Secondly, intelligently screen the modules to be designed, and reasonably arrange the proportion of various modules in the platform according to the difference of influence effects, combined with the inspection results in the above-mentioned metro logical analysis; Finally, the platform design process advocates multi-participation, extensively absorbs social talents to engage in government public platform design, fully mobilizes their enthusiasm, and provides a basis for diversified supply and open innovation of intelligent platform design, and improves efficiency.

Second, simplify the platform operation framework and realize service equalization.

Social security and public services are of great significance to the improvement of residents' quality of life. At present, due to the dualization of urban and rural economy in China's economic development, the construction and coverage of some intelligent equipment and infrastructure are not in place, so we should use information technology to maximize the efficiency of the platform at the current level. For example, strengthen the construction of software facilities and simplify the operation process of the platform; In areas where there is a shortage of intelligent equipment, set up basic functional service areas: first, public service areas, set up comprehensive open service windows with social security, and undertake employment services, vocational training, social insurance and other work. Second, the information release area, with electronic large-screen display and electronic touch screen, has information release functions such as policy propaganda, recruitment, job hunting and skills training. Realize the five-level networking of connecting provinces, cities, counties (cities, districts) and villages (residences) [13].

Third, promote the construction of a platform-based government governance model and strengthen platform intelligent supervision.

Platform-based government is a multi-agent participation, including the government, the public, enterprises, non-governmental organizations, etc. They use the platform network based on the Internet and various terminals to transmit information and services, forming the operation mode of "platform + client = service [7]". Platform-based government is not only a technical tool, but also provides a cross-departmental, cross-regional and cross-level sharing network for users scattered in different workplaces. At the same time, it also contains a management mechanism characterized by openness and modularity, that is, the platform adopts an open participation mode for users, allowing them to freely join and quit the platform, and modular management of resources such as business, functions, capabilities, systems, modes, codes, etc., using general design rules, so that they can be shared and reused among government departments [12]. In this ever-changing intelligent digital age, the government is faced with increasingly complex governance environment and diverse and changeable governance affairs. By combining with intelligent technology, platform-based government provides a platform for the interaction between a wide range of departments or political organizations with its open and modular characteristics, which is of great significance for simplifying the work process, improving administrative efficiency and providing better safeguard services for residents.

Platform-based governance is a governance model that creates public value by connecting multiple interest groups, integrating supply-side resources, and promoting supply-demand matching and interactive cooperation, based on the opening of public governance, using the space carriers, infrastructure, shared resources and governance

rules of multilateral platforms [9]. Under the platform-based governance mode, the government integrates various platform resources with the help of intelligent computer information technology, builds a multilateral public platform, extensively absorbs multiple governance subjects to form a community of interests, and jointly performs the supervision responsibilities, which is conducive to avoiding problems such as the implementation of platform supervision responsibilities, ensuring the transparency, safety, efficiency and fairness of supervision, and plays a key role in improving residents' quality of life.

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