Policy Analysis of Network Car Based on PMC Policy Evaluation Model

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Abstract: In order to quantitatively analyze the text content of network car policy, the author intends to establish an economic policy evaluation model to quantitatively and qualitatively analyze the network car policy of eight representative cities. Specific steps include establishing evaluation index, selecting city samples, calculating PMC index and establishing PMC surface. Finally, according to the specific PMC index values, the author comprehensively analyzes the strengths and weaknesses of the local network car policy.

I. Introduction

PMC (Policy Modeling Consistency) index model is a government public policy evaluation model based on Omnia Mobilis' hypothesis, which was first proposed by Mario Arturo Ruiz Estrada and could contact all associated variables. The biggest difference between PMC model and previous exponential model is that PMC model tends to take all relevant and possible variables into consideration when selecting variables. The results of the model reflect the evaluation results of relevant items in the policy text to be tested, which is called the regulatory effect. The advantage of this evaluation method is that it can reflect the universality level of policy samples comprehensively through many correlative variables, and quantify the individual policy variables horizontally and intuitively. Based on this feature, the author takes network car as the research object, which was a hot topic in recent years. Finally, through using of this model, the author evaluates the policy of network car and makes a comprehensive analysis.

2. Establishment of PMC model for evaluation of network car policy

2.1 Establishment of evaluation index

In this paper, the author uses ROSTCM6 software to extract word and count word's frequency. By visiting the official website of government departments and related policy yearbooks, 248 relevant policy samples on network car policy issued by China as of January 1, 2019 were selected. The author imports the collected policy texts into the text mining database of ROSTCM6 software to form a document set for text segmentation. Finally, variable indicators are determined according to word frequency statistics and policy attributes.

In the part of parameter identification, PMC index model adopts binary system to ensure that every secondary variable is equally important. And the specific expression of its value is: if the policy to be tested satisfies the secondary variable, the secondary variable is set to 1; if the policy to be evaluated does not satisfy the secondary variable, the secondary variable is set to 0 (see Table1).

Table 1 variable classification and parameter identification

number	First variable	number	secondary variable	number	secondary variable
X1	Policy nature	X1:1	describe	X1:2	proposal
		X1:3	distinguish	X1:4	guide
X2	Policy function	X2:1	define power and responsibility	X2:2	Normative guidance
		X2:3	classification management	X2:4	cooperative innovation
		X2:5	linkage management		
X3	Policy deadline	X3:1	interim	X3:2	test period
		X3:3	short-term	X3:4	metaphase
X4	Market regulation	X4:1	price mechanism	X4:2	quantitative mechanism
		X4:3	scrap management	X4:4	tax standard
		X4:5	participant insurance	X4:6	platform support
X5	Social benefit	X5:1	household registration management	X5:2	information safety
		X5:3	credit mechanism	X5:4	sustainability
X6	Safeguard measures	X6:1	industry self-discipline	X6:2	fixed place
		X6:3	administrative sanction	X6:4	quality testing
X7	Supervision process	X7:1	prior supervision	X7:2	supervision in progress
		X7:3	ex post supervision		
X8	Scope of supervision	X8:1	driver household registration	X8:2	driver age
		X8:3	driver education	X8:4	driver's driving age
		X8:5	vehicle registration plate	X8:6	wheelbase of vehicle
		X8:7	vehicle displacement	X8:8	Safety device
X9	Policy level	X9:1	national level	X9:2	local level
		X9:3	other		
X10	File reference				

On the selection of evaluation objects, the author selected Shenzhen, Shanghai, Chengdu, Hangzhou, Qingdao, Shenyang, Kunming, Dongying (corresponding markers are P1, P2, P3, P4, P5, P6, P7 and P8) in the scale of mega-cities, mega-cities, mega-cities and larger cities, considering the factors of geographical location, economic development, legislative influence and regulations. Eight places are representative cities.

2.2 Calculation of PMC Index

According to Predecessors' research, the calculation of PMC index can be divided into the following four steps: the first step is to determine the first and second variables; the second step is to calculate the second variables according to formula (1) and formula (2); the third step is to calculate the first variables according to formula (3); and the fourth step is to calculate the PMC index of the policy to be evaluated according to formula (4).

$$X \sim N[0,1] \text{ - - - (1)}$$

$$X = \{XR : [0 \sim 1]\} \text{ - - - (2)}$$

$$X_t\left(\sum_{j=1}^{n} \frac{X_{tj}}{T(X_{tj})}\right)_{t=1,2,3,4,5\ldots} \text{ - - - (3)}$$

In formula (3), "t" is a first-level variable and "j" is a second-level variable.

$$PMC = [X_1\left(\sum_{j=1}^{4}\frac{X_{1j}}{4}\right) + X_2\left(\sum_{j=1}^{5}\frac{X_{2j}}{5}\right) + X_3\left(\sum_{j=1}^{4}\frac{X_{3j}}{4}\right) +$$
$$X_4\left(\sum_{j=1}^{6}\frac{X_{4j}}{6}\right) + X_5\left(\sum_{j=1}^{4}\frac{X_{5j}}{4}\right) + X_6\left(\sum_{j=1}^{4}\frac{X_{6j}}{4}\right) +$$
$$X_7\left(\sum_{j=1}^{3}\frac{X_{7j}}{3}\right) + X_8\left(\sum_{j=1}^{8}\frac{X_{8j}}{8}\right) + X_9\left(\sum_{j=1}^{3}\frac{X_{9j}}{3}\right) + X_{10}] \text{ - - - (4)}$$

According to the PMC index, this paper evaluates the policy of the network car. Its score reflects the policy rules and regulations. The evaluation criteria are shown in Table 2:

Table 2 criteria for evaluating policies and regulations

Score	10~7	6.99~6	5.99~4	3.99~0
Regulation degree	strong	Stronger	in	Weaker

By importing policy sample information into the model, the multi-input-output tables of local policies are obtained (see Table 3).As an example, the PMC values of the eight places are finally calculated (see Table 4).

Table3 part of multi-input-output table)

policy number	X_1			
	$X_{1\cdot1}$	$X_{1\cdot2}$	$X_{1\cdot3}$	$X_{1\cdot4}$
P_1	1	1	1	1
P_2	1	1	1	1
P_3	1	1	1	1
P_4	1	1	1	1
P_5	1	1	1	1
P_6	1	1	1	0
P_7	0	1	1	0
P_8	0	1	1	0

Table 4 comparisons of PMC values of network car in eight cities

Contrastive terms	Shenzhen	Shanghai	Chengdu	Qingdao	Hangzhou	Shenyang	Kunming	doy	mean value
(X1) Policy nature	1	1	1	1	1	0.75	0.5	0.5	0.84
(X2) Policy functions	0.8	0.8	1	0.8	0.8	0.6	0.6	0.6	0.75
(X3) Policy prescription	0.75	0.5	0.5	0.5	0.75	0.25	0.5	0.25	0.5
(X4) Market regulation	0.83	0.83	1	0.33	0.83	0.67	0.33	0.33	0.64
(X5) Social benefits	0.5	0.75	0.5	0.5	0.75	0.5	0.25	0.25	0.5
(X6) Safeguards	0.5	0.5	0.75	0.5	0.75	0.5	0.5	0.25	0.53
(X7) Regulatory process	0.67	0.67	0.67	0.67	0.33	0.33	0.33	0.33	0.5
(X8) Scope of supervision	0.5	0.25	0.63	0.13	0.63	0.38	0.13	0.13	0.35
(X9) Policy level	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
(X10) File reference	1	1	1	1	1	1	1	1	1
PMC index	6.88	6.63	7.38	5.76	7.17	5.31	4.47	3.97	5.94
Regulation degree	stronger	stronger	strong	secondary	strong	secondary	secondary	weaker	secondary

2.3 Constructing PMC Surface

The visual processing of PMC exponent by PMC surface form shows the result of parallelism intuitively through matrix transformation of 10 first-order variables designed in this paper. Considering the symmetry of the matrix and the balance of the PMC surface, the variable X10 is eliminated to form a matrix of order 3 x 3. The area of the PMC area is calculated by using the formula (5).

$$PMC = \begin{bmatrix} X_1 & X_2 & X_3 \\ X_4 & X_5 & X_6 \\ X_7 & X_8 & X_9 \end{bmatrix}$$

According to the above PMC surface construction, the PMC surface of eight cities is drawn by using matlab. Fig. 1 shows the PMC surface of four cities with larger PMC index in eight cities.
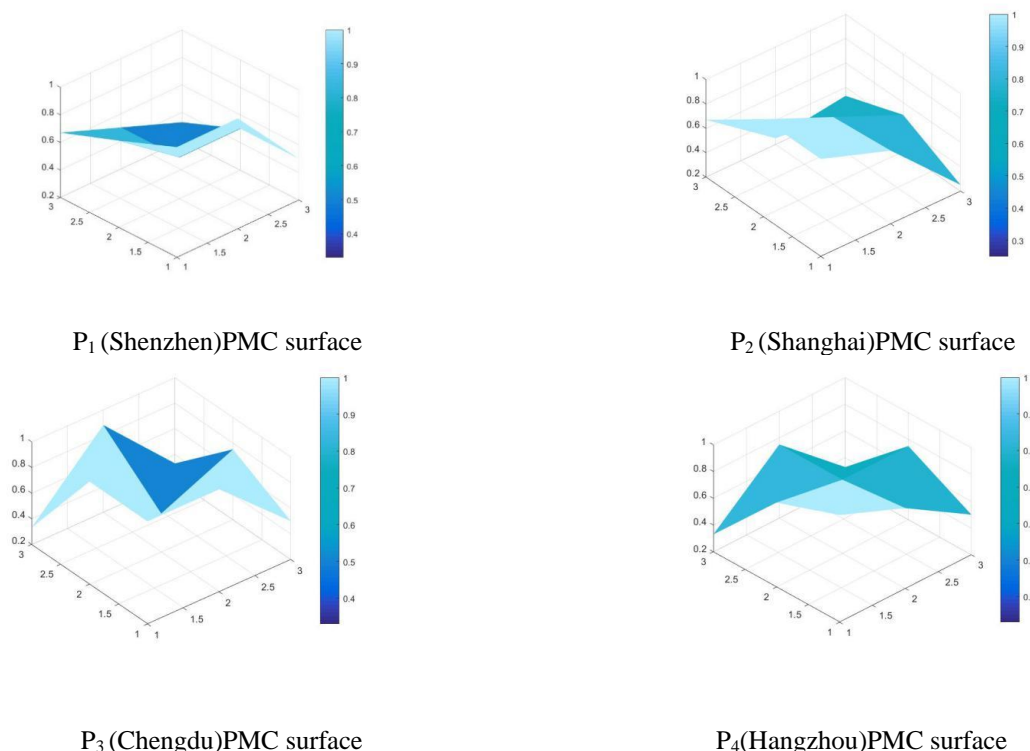

P_1 (Shenzhen)PMC surface

P_2 (Shanghai)PMC surface

P_3 (Chengdu)PMC surface

P_4(Hangzhou)PMC surface

Figure1 PMC surface

3. Analysis of the characteristics of the network car policy

The index of X_1 policy is higher, which shows that the basic coverage is complete in supervision, guidance, standardization and trial implementation. The value of the variable X_2 "policy function" is generally higher, but the overall value of $X_{2:1}$ is lower, and only the value of the policy of Shenzhen is 1 about this Secondary variable. This is because that the "legal liability" chapter in the policy of Shenzhen stipulates civil, administrative and criminal liability for driving in black cars and revealing privacy. The overall low variable X_3 "policy prescription" indicates that the policy has a short history of development and its content of regulation is a new thing. The highest and lowest value of X_4 "market regulation" differ by 0.67, which reflects the difference between the level of urban development and the strategic positioning of the city. It is worth noting that the value of Chengdu policy is the highest, because the government has fully liberalized the quantity and price control. The policy of Chengdu also specifies the supervision content of compensation liability, tax collection and management; the secondary variable "household registration management" of X_5 "social benefits" is low, and information security is not regulated in Dongguan and other places; in the variable X_6 "safeguard measures", there are many regulations on $X_{6:3}$ "administrative penalties" in various places, while the overall values of variable $X_{6:4}$ "quality testing" are generally low. Among that variable , the value of Chengdu policy is the highest, which stipulates the responsibility of the regulator to audit the quality assurance text of the platform service and the duty of periodic inspection of the platform; The variable X_7 "supervisory process" is generally low, because many governments place more emphasis on stipulating the industry access standards in advance, but ignore the information review, information update and periodic spot check after that. The overall low level of X_8 is due to the restrictions imposed by many places on the driver's education, age, criminal background, and their car's number plate, wheelbase and so on. In the X_9 "policy level" item, all places belong to the local level policy, so the index is the same, so as the variable $X_{10.}$

From the results of comprehensive data, the author put forward the following suggestions to improve the policy of network car: firstly, clarify the responsibility of black car driving, leaking

privacy, platform not fulfilling management obligations, and strengthen the protection of passengers' rights and interests; secondly, improve the legal regulation of downwind vehicles; thirdly, to improve the content of insurance liability and tort liability sharing mechanism; fourthly, strengthen the supervisory responsibility of government in advance, in the process and afterwards.

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