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Calculating Index of Local Financial Autonomy: Evidence from Mongolia

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Abstract

The provision of local financial independence increases access to public services, improves the distribution of reserves and the efficiency of utilities, and boosts local economic capacity. This article presents the methodology for calculating the index of local financial independence, which comprises six main indicators: local revenue independence, non-tax revenue independence, tax independence, financial capacity, the ratio of capital costs, and local expenditure independence. The result of the local financial autonomy index is calculated based on a total of 210 samples from 21 provinces of Mongolia, covering the period from 2013 to 2022.

Keywords

Financial Autonomy, Local Financial Indicators, Index Methodology, Optimal Weights, Financial Independence Capacity

1. Introduction

Local financial autonomy in Mongolia was governed not only by the Budget Law but also by the Law of Public Institution Finance and Management. Following the approval of these laws in 2002, the budgets of sectors such as health, education, and social welfare were consolidated into the state budget through their respective localities. Consequently, addressing minimal matters related to public services independently became challenging for the localities. Subsequently, on January 1, 2013, the law was nullified, seeking ways to decentralize the state budget, aiming to enhance greater local financial autonomy. The new concern requires the approval of revision to the budget law, facilitating not only grants-in-aid to finance local budget deficit but also transfers from the general fund to bolster local development by implementing investments, programs, and projects.

The initial proposition was to transform from a system of collecting revenue from localities for the state budget to one fostering enhanced local financial autonomy. Despite efforts to pursue this shift, the core concept of local financial autonomy remained fundamentally unchanged.

In provinces and localities, there is a prevailing interest and tendency to seek financial support from the state budget, which results in the neglect of creative initiatives and a lack of motivation to increase income while reducing expenses. The absence of a proper legal framework for implementing budget relations at the local level and the fact that the local budget is inclusive of the centralized state budget, continues to undermine local financial independence. Numerous research studies have demonstrated that transferring and decentralizing budgetary and financial authorities within sub-government can enhance the efficiency of resource allocation and utilization and ultimately foster increased economic growth. (Meloche, Vaillancourt, & Yilmaz, 2004; Beer-Toth, 2009; Kotarba & Kolomycew, 2014; Psycharis, Zoi, & Iliopoulou, 2015; Ratang, 2016; Mahmud & Normalita, 2017; Sawitri, Perdanawati, Sudiyani, & Setini, 2020; Paranata, 2022). These studies covered various topics, ranging from theoretical and methodological issues of evaluating and defining local financial independence to the efficient distribution and spending of social resources. They also addressed matters such as decentralization of budget revenues and expenditures, inter-budget transfers, and economic direction.

This research work is structured as follows: The introduction is followed by the second part, which discusses the topic of local financial independence. The third part outlines the methodology used to calculate the local independence index. In the fourth section, descriptive statistics and data correlations are presented. The fifth part calculates the financial independence index, and finally, the last part offers a conclusion.

2. Literature Review

Meloche, Vaillancourt, & Yilmaz evaluated local financial independence by using three indicators: local financial dependence, fiscal decentralization, and tax revenue autonomy (Meloche, Vaillancourt, & Yilmaz, 2004). Focusing on these indicators, they compared the financial independence of ten transition countries, which include Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia. Beer-Toth's assessment of local financial autonomy considered the general dimensions of the fiscal decentralization process, including local expenditure autonomy, revenue autonomy, and local financial autonomy (Beer-Toth, 2009). In their research on the financial autonomy of local government units in Poland, which underwent a socio-economic transition in the 1990s, Kotarba and Kolomycew suggested that financial autonomy could be improved through local fiscal decentralization and independent decision-making (Kotarba & Kolomycew, 2014).

Greece heavily relies on a central budget and has limited resources for tax

revenues. In Psycharis, Zoi, and Iliopoulou's research on local government independence, they identified four indicators: revenue independence, reserve revenue independence, tax revenue independence, and expenditure independence. These indicators were found to significantly affect local financial autonomy (Psycharis, Zoi, & Iliopoulou, 2015). According to their findings, when expenditure independence is low, there is a higher reliance on self-generated revenues by local governments rather than grants-in-aid from the central budget.

Ratang's research on Keerom District, Indonesia, analyzed the results of local financial management and financial efficiency using financial data from 2009 to 2013. The evaluation encompassed various indicators, including independence, autonomy, and fiscal decentralization, as well as efficiency and effectiveness ratios (Ratang, 2016). The research findings led to the calculation of local financing efficiency via ratios. A ratio exceeding 100 percent indicated highly efficient financial management, while those between 90 - 100 percent indicated efficient financial management, 80 - 90 percent suggested reasonably efficient financial management, 60 - 80 percent indicated relatively lower efficiency, and less than 60 percent indicated inefficient financial management.

Regarding the local financial status, Pratiwi and Fafurida examined 35 provinces and cities on the island of Java in Indonesia (Fafurida & Pratiwi, 2017). Their researchincorporated assorted indicators, including local short-term solvency, long-term liquidity ratio, solvency for providing public services, fiscal solvency, and financial flexibility. Additionally, they computed ratios for financial autonomy and independence to determine citizen involvement in local development and reliance on external financing sources as measures of local financial independence.

Digdowseiso and Zainul examined the impact of fiscal decentralization on local revenues in Karawang District, Indonesia, from 2009 to 2018. They have used financial autonomy, decentralization, and efficiency ratios as measuring indicators (Digdowseiso & Zainul, 2020).

Sawitri, Perdanawati, Sudiyani, and Setini investigated the impact of financial independence and income on economic growth through capital expenditure in Denpasar, Indonesia from 2017 to 2019. Their study utilized indicators such as local revenue efficiency, financial independence, capital expenditure, and economic growth (Sawitri, Perdanawati, Sudiyani, & Setini, 2020). Regarding the efficiency ratio of local revenues, the ability to meet the target and achieve the planned income was determined based on the actual potential of the locality. However, the calculation of this ratio differed from the one defined by Ratang (2016), Digdowseiso and Zainul (2020), and Mahardika and Artini (2014). On the other hand, the same ratio as used by other researchers was employed to determine the independence of local revenues. A higher ratio indicates greater financial independence. Local financial independence, representing the ability to finance local activities, development, and services, was determined using the same ratio as utilized by other researchers.

3. Methodology

Let AI_i be a formulation:

$$AI_i = \sum_{j=1}^{m} w_j I_{ij},\ i = \overline{1,n},\ j = \overline{1,m}, \tag{1}$$

where I_i is the component index, w_j is the component weights for local financial autonomy, and AI_i is the index of local financial autonomy.

The component index comes in the following two forms:

$$I_{ij} = \begin{cases} \dfrac{V_{ij} - V_j^{\min}}{V_j^{\max} - V_j^{\min}} \text{ if } I_{ij} \to 1 \\ \dfrac{V_j^{\max} - V_{ij}}{V_j^{\max} - V_j^{\min}} \text{ if } I_{ij} \to 0, \end{cases} \tag{2}$$

where near one, the component index displays an increasing index. In contrast, it shows a falling index. On the other hand, if some variables are increasing well, we will use an increasing index formula. In contrast, we will employ a falling index formula.

From (1), we can get the following expectation:

$$E(AI) = \sum_{j=1}^{m} w_j E(I_{ij}), \tag{3}$$

and variance:

$$\begin{aligned} Var(AI) &= E\left[\left(AI_i - E(AI)\right)^2\right] = E\left[\left(\sum_{i=1}^{n} I_{ij} w_j - \sum_{i=1}^{n} E(I_{ij}) w_j\right)^2\right] \\ &= E\left[\left(\sum_{i=1}^{n} w_j \left(I_{ij} - E(I_{ij})\right)\right)\left(\sum_{v=1}^{n} w_v \left(I_{vj} - E(I_{vj})\right)\right)\right] \\ &= E\left[\sum_{i,v=1}^{n} w_j w_v \left(I_{ij} - E(I_{ij})\right)\left(I_{vj} - E(I_{vj})\right)\right] = \sum_{i,v=1}^{n} w_j \sigma_{iv} w_v. \end{aligned} \tag{4}$$

To rearrange(3) and(4), we employ matrix notation as follows:

$$\mu = \begin{pmatrix} E(I_{i1}) \\ E(I_{i2}) \\ \vdots \\ E(I_{im}) \end{pmatrix},\ w = \begin{pmatrix} w_1 \\ w_2 \\ \vdots \\ w_m \end{pmatrix},\ I_m = \begin{pmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{pmatrix},\ A = \begin{pmatrix} \sigma_{11} & \sigma_{12} & \cdots & \sigma_{1n} \\ \sigma_{21} & \sigma_{22} & \cdots & \sigma_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{n1} & \sigma_{n2} & \cdots & \sigma_{nn} \end{pmatrix},$$

where μ is a vector of expected values of the component index, w is a vector of the component weights, I_m is the unit matrix, and A is the covariance matrix for each component index.

Using matrix notations, we calculate the component weights for local financial autonomy in the following model:

$$\begin{aligned} &\min f(w) = \frac{1}{2} w^T A w \\ &\text{subject to } w^T \mu = E(AI) \\ &w^T I_m = 1. \end{aligned} \tag{5}$$

The lagrangian function for the above model would be:

$$L(w,\lambda_1,\lambda_2)=\frac{1}{2}w^T Aw-\lambda_1\left(w^T\mu-E(AI)\right)-\lambda_2\left(w^T I_m-1\right).$$

The first-order conditions with respect to w, λ_1, λ_2 give us the system below:

$$\begin{cases}\dfrac{\partial L(w_1,\lambda_1,\lambda_2)}{\partial w}=Aw-\lambda_1\mu-\lambda_2 I_m=0\\ \dfrac{\partial L(w_1,\lambda_1,\lambda_2)}{\partial \lambda_1}=w^T\mu-E(AI)=0\\ \dfrac{\partial L(w_1,\lambda_1,\lambda_2)}{\partial \lambda_2}=w^T I_m-1=0.\end{cases}$$

From the first equation of the above system:

$$w=\lambda_1 A^{-1}\mu+\lambda_2 A^{-1}I_m,$$

and substituting it into the system's second and third equations, we have:

$$E(AI)=\left(\lambda_1 A^{-1}\mu+\lambda_2 A^{-1}I_m\right)^T\mu=\lambda_1 a+\lambda_2 b$$

$$1=\left(\lambda_1 A^{-1}\mu+\lambda_2 A^{-1}I_m\right)^T I_m=\lambda_1 b+\lambda_2 c,$$

where $a=\mu^T A^{-1}\mu$, $b=I_m^T A^{-1}\mu$ and $c=I_m^T A^{-1}I_m$. A result of this system's solution is:

$$\begin{pmatrix}\lambda_1^*\\ \lambda_2^*\end{pmatrix}=\begin{pmatrix}a & b\\ b & c\end{pmatrix}^{-1}\begin{pmatrix}E(AI)\\ 1\end{pmatrix}.$$

The optimal solution of the optimization model is as follows:

$$w^*=\lambda_1^* A^{-1}\mu+\lambda_2^* A^{-1}I_m.$$

4. Data

The calculation of the local financial independence indices includessix factors: local autonomy of revenue (LAR), local dependence ratio (LDR), tax autonomy (TRA), local financial capacity (LFC), capital expenditure ratio (CER), and local expendituredependence (LED). These variables are computed as follows:

$$\text{LAR}=\frac{\text{Local inter revenue}}{\text{Local gross revenue}},$$

$$\text{LDR}=\frac{\text{Local grant in aid income}}{\text{Local gross revenue}},$$

$$\text{TRA}=\frac{\text{Local tax revenue}}{\text{Local gross revenue}},$$

$$\text{LFC}=\frac{\text{Local gross revenue}}{\text{Local gross expenditure}},$$

$$\text{CER}=\frac{\text{Local capital expenditure}}{\text{Local gross expenditure}},$$

$$\text{LED} = \frac{\text{Local grant in aid income}}{\text{Local gross expenditure}}.$$

These indicators cover the period of 2013-2022 and apply to 21 provinces in Mongolia. The relevant statistics were obtained from the National Statistics Office of Mongolia. Table 1 displays the annual average values of these indicators for each province from 2013 to 2022.

Table 1 shows that provinces like Umnugovi and Orkhon are dominant in terms of capital expenditure, financial capacity, revenue, and tax independence, while Umnugovi and Sukhbaatar lead in terms of local dependence ratio. Conversely, Bayan-Ulgii and Khuvsgul have the lowest local dependence ratios,

Table 1. Annual average indicators of local financial autonomy for each province for 2013-2022.

№	Provinces	LAR	LDR	TRA	LFC	CER	LED
1	Arkhangai	18.72%	3.74%	14.92%	101.40%	10.03%	82.45%
2	Bayan-Ulgii	16.04%	2.37%	13.64%	100.32%	7.41%	84.26%
3	Bayankhongor	19.54%	4.55%	14.85%	101.75%	7.50%	81.80%
4	Bulgan	43.99%	4.69%	39.16%	102.62%	11.33%	57.28%
5	Darkhan-Uul	41.58%	3.80%	37.79%	99.21%	16.31%	58.16%
6	Dornod	35.94%	5.10%	30.57%	99.83%	18.68%	64.09%
7	Dornogovi	44.38%	4.66%	39.52%	101.62%	22.36%	56.10%
8	Dundgovi	18.37%	5.58%	12.49%	101.98%	15.13%	83.30%
9	Govi-Altai	16.43%	3.36%	12.93%	99.64%	14.96%	83.53%
10	Govisumber	38.45%	4.80%	33.65%	101.36%	20.18%	62.66%
11	Khentii	24.54%	3.75%	20.51%	101.40%	14.40%	76.59%
12	Khovd	22.29%	4.75%	17.41%	101.88%	13.92%	78.97%
13	Khuvsgul	17.60%	2.33%	14.98%	100.82%	8.26%	82.99%
14	Orkhon	62.80%	4.16%	58.47%	106.24%	25.21%	39.69%
15	Selenge	33.37%	3.81%	29.47%	102.95%	12.74%	67.76%
16	Sukhbaatar	26.88%	8.53%	18.06%	100.84%	17.47%	73.93%
17	Tuv	31.16%	5.65%	25.30%	102.84%	13.11%	70.26%
18	Umnugovi	75.22%	14.76%	60.43%	108.10%	42.45%	26.82%
19	Uvs	17.29%	3.07%	14.04%	100.45%	12.78%	83.06%
20	Uvurkhangai	21.68%	5.79%	15.83%	102.26%	10.55%	79.90%
21	Zavkhan	18.39%	3.39%	14.99%	101.99%	10.53%	83.26%

Source: National Statistics Office of Mongolia (2013-2022).

Dundgovi has the lowest tax independence, and Darkhan-Uul has the lowest financial capacity. Moreover, Umnugovi has the lowest expenditure dependency, while Bayan-Ulgii province has the highest dependence.

Table 2 displays the descriptive statistics. Based on the table, the average value of local revenue independenceis 30%, dependence ratio is 4.89%, tax independence is 25.67%, financial capacity is 101.88%, capital expenditure ratio is 15.49%, and expenditure dependence is 70.33%, respectively. The standard deviation of these parameters is less than 1 compared to their respective means.

Table 3 displays the correlation coefficients between the parameters under consideration. The table indicates positive correlations among the LAR, LDR, TRA, LFC, and CER indicators, while the LED indicator exhibits negative correlations with the other indicators.

Table 2. Descriptive statistics.

Variable	Observation	Mean	Std.Dev	Minimum	Maximum	Jarque-Bera
LAR	210	30.02%	19.68%	9.20%	95.00%	56.85
LDR	210	4.89%	4.14%	0.80%	36.50%	2887.32
TRA	210	25.67%	17.57%	8.10%	90.90%	70.69
LFC	210	101.88%	7.13%	84.90%	152.9%	3641.26
CER	210	15.49%	10.97%	0.60%	69.2%	186.34
LED	210	70.33%	19.75%	5.20%	99.10%	57.64

Table 3. Correlation coefficient.

	LAR	LDR	TRA	LFC	CER	LED
LAR	1.0000					

LDR	0.5869	1.0000				
	0.0000	-----				
TRA	0.9814	0.4211	1.0000			
	0.0000	0.0000	-----			
LFC	0.1993	0.1814	0.1778	1.0000		
	0.0037	0.0084	0.0098	-----		
CER	0.6986	0.4659	0.6717	0.0419	1.0000	
	0.0000	0.0000	0.0000	0.5458	-----	
LED	−0.9863	−0.5690	−0.9707	−0.0496	−0.7088	1.0000
	0.0000	0.0000	0.0000	0.4741	0.0000	-----

5. Outcome of Evaluation

Local financial independence is calculated according to the following eight steps:

- Step 1. The first set of selected key indicators includes local autonomy of revenue (LAR), dependence ratio (LDR), tax autonomy (TRA), local financial capacity (LFC), capital expenditure ratio (CER), and local expenditure dependency (LED).
- Step 2. Find the maximum and minimum values for each component of financial independence.
- Step3. The index of each component of financial independence is calculated according to the formula (2), and the related averages are found.
- Step 4. Find the overall average.
- Step5. A covariance matrix is calculated based on the index of each component of financial independence.
- Step 6. Find the values of the matrix.
- Step 7. Find lambda.
- Step 8. Calculate the optimal respective weights.

Below are the calculations performed in this eight-step sequence.

Step 1.

Number of observations	LAR	LDR	TRA	LFC	CER	LED
1	0.107	0.016	0.090	1.033	0.121	0.922
2	0.104	0.015	0.088	0.992	0.124	0.889
3	0.133	0.012	0.121	1.000	0.078	0.866
4	0.163	0.036	0.126	1.021	0.060	0.855
5	0.188	0.043	0.143	0.988	0.066	0.803
...	...	...	...	...	...	...
209	0.191	0.055	0.136	1.086	0.065	0.878
210	0.507	0.084	0.423	1.003	0.229	0.495

Step 2.

Number of observations	LAR	LDR	TRA	LFC	CER	LED
Max	0.950	0.365	0.909	1.523	0.692	0.991
Min	0.092	0.080	0.081	0.849	0.006	0.052

Step 3.

Number of observations	LAR	LDR	TRA	LFC	CER	LED
1	0.017	0.021	0.011	0.271	0.167	0.073
2	0.014	0.020	0.008	0.210	0.171	0.109
3	0.048	0.010	0.048	0.221	0.104	0.133
4	0.082	0.077	0.054	0.253	0.079	0.145
5	0.111	0.098	0.075	0.205	0.087	0.201
...	...	...	...	...	...	...
209	0.115	0.132	0.066	0.348	0.086	0.121
210	0.483	0.211	0.413	0.227	0.325	0.528
Average	0.250	0.114	0.212	0.250	0.216	0.307

Step 4.

$$E(AI)=\frac{0.250+0.114+0.212+0.250+0.216+0.307}{5}=0.225$$

Step 5.

	LAR	LDR	TRA	LFC	CER	LED
LAR	0.053	0.016	0.048	0.005	0.026	0.048
LDR	0.016	0.014	0.010	0.002	0.009	0.014
TRA	0.048	0.010	0.045	0.004	0.023	0.043
LFC	0.005	0.002	0.004	0.011	0.001	0.001
CER	0.026	0.009	0.023	0.023	0.026	0.024
LED	0.048	0.014	0.043	0.001	0.024	0.044

Step 6.

							0.053	0.016	0.048	0.005	0.026	0.048	0.250	
							0.016	0.014	0.010	0.002	0.009	0.014	0.114	
							0.048	0.010	0.045	0.004	0.023	0.043	0.212	
a =	0.250	0.114	0.212	0.250	0.216	0.307	0.005	0.002	0.004	0.011	0.001	0.001	0.250	0.040
							0.026	0.009	0.023	0.023	0.026	0.024	0.216	
							0.048	0.014	0.043	0.001	0.024	0.044	0.307	

							0.053	0.016	0.048	0.005	0.026	0.048	0.250	
							0.016	0.014	0.010	0.002	0.009	0.014	0.114	
							0.048	0.010	0.045	0.004	0.023	0.043	0.212	
b =	1.000	1.000	1.000	1.000	1.000	1.000	0.005	0.002	0.004	0.011	0.001	0.001	0.250	0.175
							0.026	0.009	0.023	0.023	0.026	0.024	0.216	
							0.048	0.014	0.043	0.001	0.024	0.044	0.307	

							0.053	0.016	0.048	0.005	0.026	0.048	1.000	
							0.016	0.014	0.010	0.002	0.009	0.014	1.000	
							0.048	0.010	0.045	0.004	0.023	0.043	1.000	
c =	1.000	1.000	1.000	1.000	1.000	1.000	0.005	0.002	0.004	0.011	0.001	0.001	1.000	0.737
							0.026	0.009	0.023	0.023	0.026	0.024	1.000	
							0.048	0.014	0.043	0.001	0.024	0.044	1.000	

Step 7.

	a	b	0.042	0.175
	b	c	0.175	0.737
Lambda1 =	7866.3	−1870.0	0.225	−101.222
Lambda2 =	−1870.0	445.9	1	25.420

Step 8.

w_1 =	23%	Local autonomy of revenue(LAR)
w_2 =	18%	Local dependence ratio (LDR)
w_3 =	16%	Tax autonomy (TRA)
w_4 =	4%	Local financial capacity (LFC)
w_5 =	17%	Capital expenditure ratio (CER)
w_6 =	20%	Local expenditure dependency (LED)

The results of the analysis indicate calculation of the index of local financial independence, the following percentage weights are optimally assigned to each component: revenue independence (23%), expenditure dependence (20%), dependence ratio (18%), capital expenditure ratio (17%), tax independence (16%), and local financial capacity (4%), respectively.

The percentages assigned to each component of the local financial indepen-

dence index can be used to calculate the overall index using the following formula:

$$AI = 0.23\left(\frac{\text{LAR}-0.092}{0.950-0.092}\right)+0.18\left(\frac{\text{LDR}-0.008}{0.365-0.008}\right)+0.16\left(\frac{\text{TRA}-0.081}{0.909-0.081}\right)$$
$$+0.04\left(\frac{\text{LFC}-0.849}{1.523-0.849}\right)+0.17\left(\frac{\text{CER}-0.006}{0.692-0.006}\right)+\frac{20}{100}\left(\frac{0.991-\text{LED}}{0.991-0.052}\right).$$

Following results can be expected:

$$AI = 0.1136+\frac{23}{86}\text{LAR}+\frac{18}{35}\text{LDR}+\frac{16}{83}\text{TRA}+\frac{4}{68}\text{LFC}+\frac{17}{68}\text{CER}-\frac{20}{94}\text{LED}.$$

The index of local financial independence calculated by this equation is sorted from the smallest to the largest, and the total observation value is divided into 4 equal parts to create 5 intervals. These intervals are shown in Table 4.

The intervals are divided into 5 categories based on their values, and Table 4 shows the following interpretation: the (L) is colored in red, the (M−) value in orange, the (M) value in yellow, the (M+) value in light green, and the (H) value in bright green. Also, the combined value is shown in Table 5.

According to Table 5, during the period of 2013-2022, the provinces that are colored in light and bright green, such as Umnugovi, Orkhon, Dornogovi, Darkhan-Uul, and Bulgan, are financially independent or have the potential to be so. Following these provinces, it is expected that provinces like Dornod and Govisumber will also become financially independent or have the potential to achieve independence.

Table 4. The local financial independence index range.

Interval	Financial independence capacity	Explanation
[0.000, 0.088)	Low (L)	If the local financial independence index is less than 0.088, then the locality is considered to have the lowest level of financial independence or to not be financially independent.
[0.088, 0.124)	Doubtful (M−)	If the local financial independence index is between 0.088 and 0.124, the locality is considered to be somewhat financially independent.
[0.125, 0.176)	Moderate (M)	If the local financial independence index is between 0.125 and 0.176, the locality is considered to be possibly financially independent.
[0.176, 0.269)	Probable (M+)	If the local financial independence index is between 0.176 and 0.269, the locality has the capacity to be financially independent.
[0.269, 0.724]	High (H)	If the local financial independence index is between 0.269 and 0.724, the locality is consideredfinancially independent.

Table 5. Results of the local financial independence index.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Arkhangai	L	L	L	M−	M−	M−	L	M−	M	M−
Bayan-Ulgii	L	L	L	L	L	L	L	L	M−	L
Bayankhongor	L	L	L	L	M	M−	M−	M−	M	L
Bulgan	M+	M+	H	H	H	H	M+	M+	H	M+
Darkhan-Uul	M+	M+	M+	M+	M+	H	H	M+	H	H
Dornod	M	M+	M+	M+	M+	M+	H	H	H	M+
Dornogovi	H	M+	M+	M+	H	H	H	H	H	H
Dundgovi	L	M−	M−	M	M	M	L	M−	M	L
Govi-Altai	L	M	M−	L	L	L	M−	M−	M−	L
Govisumber	M+	M+	M+	M+	M+	M+	M+	M+	H	M
Khentii	M	M−	M−	M−	M−	M	M	M	M+	M
Khovd	M−	M−	M−	M−	M−	M	M−	M	M	M+
Khuvsgul	L	L	L	L	L	L	L	M−	M−	L
Orkhon	H	H	H	H	H	H	H	H	H	H
Selenge	M+	M	M	M	M+	M	M+	M+	M+	H
Sukhbaatar	M	M+	M	M	M+	M	M	M	M+	M
Tuv	M	M	M	M	M	M	M+	M+	M+	M+
Umnugovi	H	H	H	H	H	H	H	H	H	H
Uvs	L	L	L	L	L	L	M−	M−	M−	M−
Uvurkhangai	L	M−	M−	M−	M	M	M−	M	M	M
Zavkhan	L	L	L	L	M−	M−	L	M−	M−	M−

6. Conclusion

This research proposed a methodology for calculating the local financial independence index and tested it using data from 21 provinces in Mongolia. The study showed that the weight of the six component factors of the index can be formulated into an optimal management policy and calculated in eight steps. Based on the calculation of the local financial independence index, the weight of revenue independence is 23 percent, expenditure dependence is 20 percent, dependence ratio is 18 percent, the capital expenditure ratio is 17 percent, tax independence is 18 percent, and local financial capacity is 4 percent. This weight calculation is considered optimal. As a result of the local financial independence index, Mongolia's provinces such as Umnugovi, Orkhon, Dornogovi, Darkhan-Uul, Bulgan, Dornod, and Govsumber are highly likely to be financially in-

dependent. Finally, even though the proposed methodology is based on real data and the situation in Mongolia provinces, it is likely to be deficient due to poor data.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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