



# Exploring the Fiscal Policy Rules of Different Countries under the Epidemic Outbreak

Senwei Liao

Department of Chinese language and literature, Sun Yat-sen University, Guangzhou, 510275, China

[liaosw@mail2.sysu.edu.cn](mailto:liaosw@mail2.sysu.edu.cn)

**Abstract.** The COVID-19 pandemic in 2020 led to changes in fiscal policy around the world. This paper uses the COVID-19 financial responses of governments as samples, investigating the relationship between fiscal policies and income level and authority. The research use three sorts of methods: comparative analysis, multiple logistic regression and clustering analysis. The result indicates that different types of policies have different impact on different regions, while each authority has its own preferred policy type. The study provides a nuanced dig into the fiscal policy used to respond to the pandemic, and reveals the potential regularities between policies and countries and institutions.

**Keywords:** Fiscal policy, Comparative analysis, Multiple logistic regression, Clustering analysis.

## 1 Introduction

Fiscal policy is always critical to a country's development. To explain the growth performance of a particular country, fiscal policy will be an important growth determinant [1]. In different periods, governments will make different fiscal policies to achieve different goals according to the specific background of The Times. Bad times are normally associated with high levels of public debt, but in good times government consumption innovations will begin to play an important role [2]. Overall developments in the world are changing minute by minute, which means there is no one-size-fits-all fiscal policy. In order to better promote the development of the country, it is necessary for the government to keep an eye on the changes and make appropriate adjustments to the fiscal policy accordingly, so as to ensure the financial stability of society.

In December 2019, the first case of COVID-19 was reported in Wuhan, China. Soon after, COVID-19 swept the world, becoming the worst pandemic of the 21st century. Due to the strong infectivity of COVID-19, almost all countries had broken down the medical system, shut down the society and entered the state of financial system paralysis. From supply side to demand side, the circulatory system of world trade was gradually eroded and finally paralyzed by China's illness [3]. Because of the destruction caused by pandemic, a country's credit rating became the most important determinant

of its fiscal spending [4]. Therefore, governments had introduced various fiscal policies to salvage losses and stimulate growth. In this background, the epidemic has become one of the important factors to consider when the government makes policies. It is no exaggeration to say that how to minimize the negative impact of the epidemic on the economy became the most headache for every government at that time.

Due to the difference of process, speed and shape, policies and multilateralism, the economic crisis caused by COVID-19 could not solved by the experience in 2008 [5], which meant government should explore a new direction of fiscal policies. About the fiscal policy in this time period, there have been many related studies. Such as an effective tool to stabilize household income and borrower consumption, a general overview of governments' policy responses to the pandemic in 2020, a cross-country comparison of fiscal policy responses, the early impact and so on [6-10]. The issue of the impact of the pandemic on the world economy and related fiscal policy has become well established in the academic circle. However, there is few research focusing on specific policy types.

Therefore, we want to explore the relationship between policies and authority or income level. This paper aims to study the main characteristics of the fiscal policies of various countries under the influence of COVID-19. In the work, we use comparative analysis, multiple logistic regression and clustering analysis to analyse the correlation among the policy, income level and authority, with SPSS Statistics as the research tool. Through the comparison of the distribution of different kinds of policies and the prediction of multiple logistic regression, we explain the situation which can represent most countries. Moreover, by the clustering analysis, we analyze and explain a few special cases in fiscal policy. As the background factor of the epidemic is included, the results of this study can be used to compare the previous policies and to explore the policy differences before and after the epidemic, and as an analytical supplement to the existing research.

## **2 Data Analysis**

### **2.1 Database description**

The database is extracted from kaggle, compiled using public information collected by the World Bank and COVID-19 financial response trackers maintained by several entities (e.g., Yale Program on Financial Stability, IDB, IIF, IMF, OECD). In the database there are 3723 samples and 3 sorts of variate. The variate is classified into 3 different kinds: Income level, authority, level1. Income level is discrete variable, consisting of High income (1), Upper middle income (2), Lower middle income (3), Low income (4) and aggregates (5). They reveal the status of development of sample countries. Authority is discrete variable, consisting of Central bank (1), Supervisor department (2), Government (3), Ministry of Finance (4), Resolution authority (5) and Other (6). They show which agencies issued the policies in the database. The variate Level1 is discrete variable, which means level 1 policy measures. Policies are classified as five main categories: Banking sector (1), Financial Markets/NBFI (2), Insolvency (3), Liquidity/funding (4), and Payments systems (5). There are level 2 and level 3 policies as a further more

granular classification. Considering the amount of types, however, this paper only put level 1 policy into the analysis. They are used to be analyzed together in order to explain the relationship among the income level, authority and measures.

2.2 Comparative analysis

In the comparative analysis, this paper uses cross tabulations. In the cross table, the variable level1 is set as a column, and authority and income level are set as rows in 2 different tables, in order to study the relationship between policies and income level or authority respectively. The analysis will take policies as the dependent variable to explore the rules shown by five kinds of policies, authority and income level. The income level 5 (aggregates) has not been included in the analysis because of its small amount. In addition, the authority 6 (Other) is also disused. The result is shown as tables below.

Table 1. Income level \* level1 Chi-square test

| Chi-Square Tests                                                                       |                      |    |                                   |
|----------------------------------------------------------------------------------------|----------------------|----|-----------------------------------|
|                                                                                        | Value                | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square                                                                     | 309.635 <sup>a</sup> | 16 | .000                              |
| Likelihood Ratio                                                                       | 268.031              | 16 | .000                              |
| Linear-by-Linear Association                                                           | 138.098              | 1  | .000                              |
| N of Valid Cases                                                                       | 3723                 |    |                                   |
| a. 5 cells (20.0%) have expected count less than 5. The minimum expected count is .19. |                      |    |                                   |

Table 2. Income level \* level1 cross tabulation

| Incomelevel * level1 Crosstabulation |   |        |     |    |     |     |       |
|--------------------------------------|---|--------|-----|----|-----|-----|-------|
| Count                                |   |        |     |    |     |     |       |
|                                      |   | level1 |     |    |     |     | Total |
|                                      |   | 1      | 2   | 3  | 4   | 5   |       |
| Incomelevel                          | 1 | 958    | 204 | 29 | 335 | 34  | 1560  |
|                                      | 2 | 628    | 165 | 15 | 318 | 82  | 1208  |
|                                      | 3 | 337    | 79  | 9  | 186 | 88  | 699   |
|                                      | 4 | 95     | 13  | 0  | 64  | 71  | 243   |
|                                      | 5 | 8      | 4   | 1  | 0   | 0   | 13    |
| Total                                |   | 2026   | 465 | 54 | 903 | 275 | 3723  |

Table 3. Authority \* level1 Chi-square test

| Chi-Square Tests                                                                       |                       |    |                                   |
|----------------------------------------------------------------------------------------|-----------------------|----|-----------------------------------|
|                                                                                        | Value                 | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square                                                                     | 1269.297 <sup>a</sup> | 20 | .000                              |
| Likelihood Ratio                                                                       | 1400.156              | 20 | .000                              |
| Linear-by-Linear Association                                                           | 362.953               | 1  | .000                              |
| N of Valid Cases                                                                       | 3716                  |    |                                   |
| a. 6 cells (20.0%) have expected count less than 5. The minimum expected count is .47. |                       |    |                                   |

**Table 4.** Authority \* level1 cross tabulation

| authority * level1 Crosstabulation |   |        |     |    |     |     |       |
|------------------------------------|---|--------|-----|----|-----|-----|-------|
| Count                              |   |        |     |    |     |     |       |
|                                    |   | level1 |     |    |     |     | Total |
|                                    |   | 1      | 2   | 3  | 4   | 5   |       |
| authority                          | 1 | 860    | 146 | 7  | 878 | 224 | 2115  |
|                                    | 2 | 563    | 214 | 1  | 5   | 15  | 798   |
|                                    | 3 | 231    | 31  | 33 | 14  | 10  | 319   |
|                                    | 4 | 91     | 29  | 1  | 2   | 2   | 125   |
|                                    | 5 | 30     | 2   | 0  | 0   | 0   | 32    |
|                                    | 6 | 247    | 42  | 12 | 2   | 24  | 327   |
| Total                              |   | 2022   | 464 | 54 | 901 | 275 | 3716  |

Shown as Table 1 and Table 3, both of asymptotic significance in the Chi-square test are less than 0.05, which means the analysis is valid. Next, we will analyze the relationship between different kinds of policies and authority and income level one by one.

### Banking sector

Shown as Table 2, the proportion of banking policies gradually descends, which is respectively 61.41%, 51.99%, 48.21%, 39.09% from High income to Low income. Meanwhile, according to Table 4, banking policies is very popular in Supervisor department (70.55%), Government (72.41%), Ministry of Finance (72.80%) and Resolution authority (93.75%), especially in the Resolution authority. On the contrary, the percentage of central bank is relatively lower (40.66%).

Banking sector has always played an important role in the financial industry, providing loans for enterprises and individuals in need of funds. It is also a safe and reliable deposit platform, so it occupies a very high proportion in from supervisor department to resolution authority. The relatively low proportion among central banks may be due to the fact that central banks themselves also perform part of banking functions. Therefore, when policies need to be implemented jointly by central banks, the policies are usually issued by other departments.

From the perspective of national income, the proportion of banking policies gradually decreases from high-income countries to low-income countries. This may be because as the income level of the country decreases, the credit of the bank correspondingly decreases. When the bank fails or even goes bankrupt, depositors will withdraw their deposits out of panic, thus aggravating the bank crisis. At this time, the government will step in to provide assistance, such as financial allocation. Countries with higher income levels have more reserves to support their banks. With the endorsement of the state, bank credit will be correspondingly improved. However, the overall development level of low-income countries is low, and even in a state of war and turmoil, the government's financial control is relatively weak, and the support for banks is not as good as that of high-income countries. Therefore, the effect of banking policy is relatively small, and its proportion gradually decreases. In addition, since the definition

of resolution authority is mainly the resolution authority related to the banking industry, it is normal that almost all resolution authority is related to banking policies.

### **Financial Markets/NBFI**

Shown as Table 2, the proportion of policies related to financial markets or NBFI is close among High income (13.08%), Upper middle income (13.66%) and Lower middle income (11.30%), but relatively lower in Low income (5.35%). Meanwhile, according to Table 4, this sort of policies is more popular in Supervisor department (26.82%) and Ministry of Finance (23.20%) than Central bank (6.90%) and Government (9.71%). In addition, as the resolution authority almost only issues banking policies as mentioned above, it will not be involved in the following comparative analysis.

As a trading market for financial instruments, the financial market plays an important role in the efficient allocation of capital. Enterprises are listed and issued here to raise funds, and investors achieve hedging and arbitrage purposes through the trading of financial instruments, jointly building a perfect system. In 2020, in the era of COVID-19, most enterprises would face the dilemma of insufficient labor force, lack of market vitality and poor capital turnover. At the same time, investors also generated a higher propensity to retreat under negative general trends. Under the joint action of the two, if there is no effective macro policy intervention, the original order of the financial market is likely to be broken, which will have a worse impact and form a vicious circle. As a result, policies related to financial markets still carry a significant weight, although they are less important than those related to banking. However, through the data, we can find that the proportion is significantly lower in low-income countries, which may be due to the incomplete financial market system in low-income countries. In this case, the role of financial market in resource allocation will be weakened accordingly, so the proportion of policies related to financial market is relatively low.

In addition, they are more popular in Supervisor department and Ministry of Finance than Central bank and Government. This phenomenon may be related to the configuration of power institutions in different countries. The central bank and the government are higher-level departments than the supervisor department and the Ministry of finance. In countries with more segmented authorities, financial markets are a specific trading market rather than an overall macroeconomic phenomenon, and policies related to them are usually promulgated by subordinate departments, such as China and Singapore. In countries with underdeveloped institutional structures, fiscal policy may be handled by the government, as in the case of Nepal, where all fiscal policy is directly issued by the government in this database. Obviously, the latter is a minority case, so the proportion of policy related to financial markets or NBFI in different authority shows the distribution in the Table 4.

### **Insolvency**

Shown as Table 4, almost all the insolvency policies are related to Government. Insolvency refers to the financial distress of an insolvent enterprise or individual. When faced with insolvency, the first option for seeking assistance is the government. When

the corporate capital chain breaks and banks refuse to lend because of solvency concerns, only the government can come to the rescue. So, of course, bankruptcy policy is almost entirely the province of the government.

### **Liquidity/funding**

Shown as Table 4, almost all the liquidity or funding policies are related to Central bank. During the pandemic, most industries fell into depression. Due to the epidemic, a large number of projects have not been completed, resulting in difficult delivery of orders, blocked transaction process and poor capital turnover. Depositors and investors out of risk aversion psychology, will withdraw a large number of deposits and invest in value-preserving products. On the other hand, the reduced consumption desire of the market as a whole, combined with the weakened consumption power caused by the quarantine of the epidemic, have led to a significant reduction in the financial liquidity of the whole society. In order to attract investment and enhance economic vitality, national authorities often choose to inject liquidity. Liquidity supply is mostly carried out by the central bank: printing a large number of money into the market to enhance the vitality of the market; Bailing out deposit-starved banks or cash-strapped businesses; Mobilize liquidity in the financial market through measures such as cutting reserve requirement ratio and interest rate or reverse repos. The above means are the functions of the central bank, so almost all policies related to liquidity and funding are corresponding to the central bank.

### **Payment systems**

Shown as Table 2, the proportion of banking policies gradually increases, which is respectively 2.18%, 6.79%, 12.59%, 29.22% from High income to Low income. Meanwhile, they are almost all related to Central bank according to Table 4.

Although the time frame of this database is the period when the epidemic was widespread, due to the different ways and attitudes of different countries to deal with COVID-19, the policy content in this database is not all targeted measures to the impact of the epidemic, and payment system just belongs to this part. After checking the policy content, it is found that the purpose of this sort of policies is to promote the development and improvement of domestic payment means, except for a few which are to maintain the stability of the payment system. From this perspective, the reason for the gradual increase in the proportion is obvious. Payment systems in high-income countries have long been well developed, so the number of policies issued on payment systems is naturally low, and most of them are announcements on payment platforms to maintain stability during the pandemic or minor adjustments to electronic payment limits. From upper middle income countries to low income countries, their payment platforms have different problems to be solved, so there are still many corresponding policy outputs. In upper middle income and lower middle income countries, the policies mainly focus on the popularization of electronic payment and the improvement of laws and regulations, while low income countries is relatively backward in terms of payment means, and most of them are in the current situation where cash payment accounts for a large

proportion. Therefore, not only electronic payment, but also the popularization and development support for bank cards and other credit means frequently appear in the policy content. As a result, the proportion of related policies has gradually increased from high-income to low-income countries.

In addition, on the one hand, banks are the trading platforms for most payment means, and their highest coordinating institutions are the central bank, so relevant policies are generally issued by the central bank. On the other hand, as a means of payment, bank card itself appears in a large number of policies in all countries. Thus, the policies related to payment systems contribute a maximal distribution in Central bank.

**2.3 Multiple logistic regression analysis**

From the rules and relevant analysis shown in the comparative analysis, we can figure out some typical conclusions between policies and income level/authority. On this basis, we find that the above conclusions can be further corroborated and strengthened by the prediction results of multiple logistic regression. In the regression analysis, level 1 is set as dependent variable, while authority and income level are set as factor. The result is shown as tables below.

**Table 5.** Model fitting information

| Model Fitting Information |                        |                        |    |      |
|---------------------------|------------------------|------------------------|----|------|
| Model                     | Model Fitting Criteria | Likelihood Ratio Tests |    |      |
|                           | -2 Log Likelihood      | Chi-Square             | df | Sig. |
| Intercept Only            | 1970.631               |                        |    |      |
| Final                     | 353.752                | 1616.879               | 36 | .000 |

**Table 6.** Goodness of fit

| Goodness-of-Fit |            |    |      |
|-----------------|------------|----|------|
|                 | Chi-Square | df | Sig. |
| Pearson         | 156.159    | 52 | .000 |
| Deviance        | 137.850    | 52 | .000 |

**Table 7.** Pseudo  $r^2$

| Pseudo R-Square |      |
|-----------------|------|
| Cox and Snell   | .353 |
| Nagelkerke      | .389 |
| McFadden        | .183 |

Table 8. Likelihood ratio tests

| Likelihood Ratio Tests                                                                                                                                                                                                                                 |                                    |                        |    |      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------|----|------|
| Effect                                                                                                                                                                                                                                                 | Model Fitting Criteria             | Likelihood Ratio Tests |    |      |
|                                                                                                                                                                                                                                                        | -2 Log Likelihood of Reduced Model | Chi-Square             | df | Sig. |
| Intercept                                                                                                                                                                                                                                              | 353.752 <sup>a</sup>               | .000                   | 0  | .    |
| Incomelevel                                                                                                                                                                                                                                            | 570.475                            | 216.723                | 16 | .000 |
| authority                                                                                                                                                                                                                                              | 1703.574                           | 1349.823               | 20 | .000 |
| The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0. |                                    |                        |    |      |
| a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.                                                                                                                           |                                    |                        |    |      |

Table 9. Estimation of parameters

| Parameter Estimates |                 |                |            |        |    |      |            |                                    |
|---------------------|-----------------|----------------|------------|--------|----|------|------------|------------------------------------|
| level1 <sup>a</sup> |                 | B              | Std. Error | Wald   | df | Sig. | Exp(B)     | 95% Confidence Interval for Exp(B) |
|                     |                 |                |            |        |    |      |            | Lower Bound Upper Bound            |
| 1                   | Intercept       | 16.852         | 817.233    | .000   | 1  | .984 |            |                                    |
|                     | [Incomelevel=1] | -13.938        | 817.233    | .000   | 1  | .986 | 8.846E-7   | .000 b                             |
|                     | [Incomelevel=2] | -14.835        | 817.233    | .000   | 1  | .986 | 3.609E-7   | .000 b                             |
|                     | [Incomelevel=3] | -15.512        | 817.233    | .000   | 1  | .985 | 1.833E-7   | .000 b                             |
|                     | [Incomelevel=4] | -16.329        | 817.233    | .000   | 1  | .984 | 8.096E-8   | .000 b                             |
|                     | [Incomelevel=5] | 0 <sup>a</sup> | .          | .      | 0  | .    | .          | .                                  |
|                     | [authority=1]   | -.331          | .242       | 1.880  | 1  | .170 | .718       | .447 1.153                         |
|                     | [authority=2]   | 1.171          | .343       | 11.633 | 1  | .001 | 3.226      | 1.646 6.323                        |
|                     | [authority=3]   | 1.168          | .396       | 8.702  | 1  | .003 | 3.215      | 1.480 6.985                        |
|                     | [authority=4]   | 1.857          | .753       | 6.082  | 1  | .014 | 6.407      | 1.464 28.038                       |
|                     | [authority=5]   | 13.207         | 577.871    | .001   | 1  | .982 | 543899.446 | .000 b                             |
|                     | [authority=6]   | 0 <sup>a</sup> | .          | .      | 0  | .    | .          | .                                  |
| 2                   | Intercept       | 15.995         | 817.233    | .000   | 1  | .984 |            |                                    |
|                     | [Incomelevel=1] | -15.103        | 817.233    | .000   | 1  | .985 | 2.759E-7   | .000 b                             |
|                     | [Incomelevel=2] | -15.453        | 817.233    | .000   | 1  | .985 | 1.944E-7   | .000 b                             |
|                     | [Incomelevel=3] | -16.228        | 817.233    | .000   | 1  | .984 | 8.957E-8   | .000 b                             |
|                     | [Incomelevel=4] | -17.416        | 817.233    | .000   | 1  | .983 | 2.730E-8   | .000 b                             |
|                     | [Incomelevel=5] | 0 <sup>a</sup> | .          | .      | 0  | .    | .          | .                                  |
|                     | [authority=1]   | -.449          | .293       | 2.344  | 1  | .126 | .638       | .359 1.134                         |
|                     | [authority=2]   | 2.070          | .376       | 30.331 | 1  | .000 | 7.925      | 3.794 16.556                       |
|                     | [authority=3]   | .833           | .454       | 3.373  | 1  | .066 | 2.300      | .946 5.595                         |
|                     | [authority=4]   | 2.445          | .782       | 9.782  | 1  | .002 | 11.534     | 2.492 53.395                       |
|                     | [authority=5]   | 12.520         | 577.871    | .000   | 1  | .983 | 273857.064 | .000 b                             |
|                     | [authority=6]   | 0 <sup>a</sup> | .          | .      | 0  | .    | .          | .                                  |

|                                                                                                                   |                 |                |          |         |   |      |           |        |              |
|-------------------------------------------------------------------------------------------------------------------|-----------------|----------------|----------|---------|---|------|-----------|--------|--------------|
| 3                                                                                                                 | Intercept       | 14.897         | 817.234  | .000    | 1 | .985 |           |        |              |
|                                                                                                                   | [Incomelevel=1] | -14.900        | 817.234  | .000    | 1 | .985 | 3.381E-7  | .000   | <sup>b</sup> |
|                                                                                                                   | [Incomelevel=2] | -16.389        | 817.234  | .000    | 1 | .984 | 7.630E-8  | .000   | <sup>b</sup> |
|                                                                                                                   | [Incomelevel=3] | -16.801        | 817.234  | .000    | 1 | .984 | 5.052E-8  | .000   | <sup>b</sup> |
|                                                                                                                   | [Incomelevel=4] | -28.362        | 834.248  | .001    | 1 | .973 | 4.815E-13 | .000   | <sup>b</sup> |
|                                                                                                                   | [Incomelevel=5] | 0 <sup>c</sup> |          |         | 0 |      |           |        |              |
|                                                                                                                   | [authority=1]   | -1.804         | .549     | 10.805  | 1 | .001 | .165      | .056   | 483          |
|                                                                                                                   | [authority=2]   | -2.141         | 1.097    | 3.806   | 1 | .051 | .118      | .014   | 1.010        |
|                                                                                                                   | [authority=3]   | 2.445          | .529     | 21.336  | 1 | .000 | 11.532    | 4.086  | 32.546       |
|                                                                                                                   | [authority=4]   | .477           | 1.286    | .138    | 1 | .711 | 1.611     | .130   | 20.035       |
|                                                                                                                   | [authority=5]   | -1.625         | 1426.368 | .000    | 1 | .999 | .197      | .000   | <sup>b</sup> |
|                                                                                                                   | [authority=6]   | 0 <sup>c</sup> |          |         | 0 |      |           |        |              |
| 4                                                                                                                 | Intercept       | 1.090          | .764     | 2.035   | 1 | .154 |           |        |              |
|                                                                                                                   | [Incomelevel=1] | -2.814         | .266     | 112.178 | 1 | .000 | .060      | .036   | .101         |
|                                                                                                                   | [Incomelevel=2] | -4.222         | .215     | 386.405 | 1 | .000 | .015      | .010   | .022         |
|                                                                                                                   | [Incomelevel=3] | -4.890         | .217     | 507.207 | 1 | .000 | .008      | .005   | .012         |
|                                                                                                                   | [Incomelevel=4] | -5.820         | .000     |         | 1 |      | .003      | .003   | .003         |
|                                                                                                                   | [Incomelevel=5] | 0 <sup>c</sup> |          |         | 0 |      |           |        |              |
|                                                                                                                   | [authority=1]   | 4.687          | .746     | 39.414  | 1 | .000 | 108.477   | 25.114 | 468.549      |
|                                                                                                                   | [authority=2]   | 1.191          | .902     | 1.743   | 1 | .187 | 3.290     | .562   | 19.267       |
|                                                                                                                   | [authority=3]   | 3.295          | .850     | 15.034  | 1 | .000 | 26.981    | 5.101  | 142.709      |
|                                                                                                                   | [authority=4]   | 2.918          | 1.247    | 5.473   | 1 | .019 | 18.511    | 1.606  | 213.421      |
|                                                                                                                   | [authority=5]   | 2.910          | 660.195  | .000    | 1 | .996 | 18.364    | .000   | <sup>b</sup> |
|                                                                                                                   | [authority=6]   | 0 <sup>c</sup> |          |         | 0 |      |           |        |              |
| a. The reference category is: 5.                                                                                  |                 |                |          |         |   |      |           |        |              |
| b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing. |                 |                |          |         |   |      |           |        |              |
| c. This parameter is set to zero because it is redundant.                                                         |                 |                |          |         |   |      |           |        |              |

According to the Table 5-8, the significance level is less than 0.05, and Nagelkerke's pseudo R-square is 0.389, which means this group of data can be used in research. In the estimation of parameters shown as Table 9, we can conclude some groups of data with a significance level less than 0.05, which means they have a significant correlation. The analysis of multiple logistic regression use a same form of comparative analysis.

### Banking sector

According to Table 9, it can be worked out that when the dependent variable is Banking sector, Supervisor department, Government and Ministry of Finance have a positive influence on policies. From the result of Table 4, we can know that the distribution of banking policies in authority 1-4 is respectively 40.66%, 70.55%, 72.41%, 72.80%, which confirm the correlated relationship shown in the comparative analysis.

### Financial Markets/NBFI

When the dependent variable is Financial Markets/NBFI, Supervisor department and Ministry of Finance have a positive influence on policies. Similarly, the percentage of

relevant policies in authority 1-4 is 6.90%, 26.82%, 9.71%, 23.20%, which confirm the correlated relationship shown in the comparative analysis.

### Insolvency

When the dependent variable is Insolvency, Central bank has a negative influence while Government has a positive influence. In the Authority \* level1 cross tabulation, Central bank and Government respectively has a maximal and minimum distribution (0.33%, 10.34%), revealing a same trend to the influence of two factors.

### Liquidity/funding

When the dependent variable is Liquidity/funding, Central bank, Government and Ministry of Finance has a positive influence. Meanwhile, all kinds of income level have a negative influence on policies. Relatively, the liquidity and funding policies have a close proportion in different income levels, and the Supervisor department owns a minimum percentage, corroborating the relationship in the comparative analysis.

## 2.4 Clustering analysis

According to the correlated relationship shown in the regression analysis, all results above perfectly corroborate and strengthen the conclusions in the comparative analysis. Different types of fiscal policies have relationships with different types of income level and authority. However, these conclusions are generalizations of a large range and cannot well explain some special cases. Therefore, we use clustering analysis, setting level 1 policy measures as dependent variable and authority and income level as independent variable. The result is shown as tables below.

**Table 10.** Final cluster centers

| Final Cluster Centers |         |   |   |
|-----------------------|---------|---|---|
|                       | Cluster |   |   |
|                       | 1       | 2 | 3 |
| Incomelevel           | 2       | 2 | 2 |
| authority             | 2       | 5 | 1 |
| level1                | 1       | 1 | 4 |

Shown as Table 10, As the income level in all clusters is the same, this variable is disused. In the first cluster, the authority is Supervisor department, and the policy is banking policy. In this database, there are 563 cases of banking policies issued by regulatory institutions, accounting for 27.84%, second only to the central bank (860,42.53%). The central bank and regulators have been the main issuers of banking policy, jointly issuing more than half of the relevant policies. This cluster shows a trend that is reflected in most cases. The amount and proportion of data in the second cluster are the least, and this special case will be analyzed next.

In the second cluster, the policy is banking policy as well, but the authority is Resolution authority. In this database, there are 30 cases in which banking policies are issued

by the resolution authority, which is the least among all authorities. The 30 policies in the database are all issued by high-income countries. There are lots of policies having the totally same content, which can be classified into 3 groups. Obviously, these policies are issued by a institution consisting of different countries. After investigation, it turns out that these policies all came from the same agency, The Single Resolution Board (SRB). The SRB is the central resolution authority within the Banking Union, which at present is 20 eurozone countries and Bulgaria. Together with the national resolution authorities it forms the Single Resolution Mechanism. The SRB works closely with the European Commission, the European Central Bank, the European Banking Authority and national authorities. Its mission is to ensure an orderly resolution of failing banks, protecting the taxpayer from state bail-outs, which is promoting financial stability. It is a key element of the Banking Union and its Single Resolution Mechanism [11]. All the eurozone countries belong to the European Union, so their banking sectors are regulated in a unified manner, The SRB. As a rare form of coalition in the world, their related policies are uniformly issued by resolution authority. Since such institutions are not available for countries in the other income brackets, all countries in this cluster are high income. In addition, there are also a small number of individually issued policies in this cluster, all of which are issued by the United States, and the corresponding agency of their policies is the Federal Deposit Insurance Corporation (FDIC). The United States, the world's only superpower, has a sophisticated and complex political structure, and the same functions can be handed over to different agencies because of subtle differences, such as the FDIC. The FDIC is an independent agency created by the Congress to maintain stability and public confidence in the nation's financial system [12]. Therefore, the policies issued by the agency are refined from Government classification to Resolution authority, which enters this cluster belonging to minority groups.

In the third cluster, the authority is Central bank, and the policy is related to liquidity and funding. As the comparative analysis shows, central banks are in most cases the issuers of liquidity and funding policies. Therefore, the results shown by this cluster are in line with the general trend of the law. However, there are also a small number of other authority issuing this sort of policies. Contrary to the third clustering, we want to analyse this minority (except for Other). The authority list of liquidity and funding policy is shown as a table below.

**Table 11.** Authority of liquidity and funding policy

| Authority |     |
|-----------|-----|
| CB        | 878 |
| GOV       | 14  |
| MoF       | 2   |
| Other     | 2   |
| SUP       | 5   |

According to the summary of the content in this data set, the reasons why policy 4 corresponds to Government rather than Central bank are as follows: 1) The policy content is funding policy. In addition to the central bank, the government is also one of the authorities with funding functions. In most cases, rates such as the benchmark interest

rate are determined by the central bank, although in both countries the government and the central bank have discretion. 2) The government issues directives to the central bank, which in turn implements or issues secondary policies. 3) Interest rate adjustment and interest rate reduction are directly carried out by the government, representing countries such as Ghana and Malawi.

All policies issued by supervisor department in Table 11 is from South Korea, and the policy content is all reverse repurchase. This may be related to the institutional structure of power in South Korea. Two of the policies in this category, by Hungary and India, focus on directing the central bank. Here, the Ministry of Finance performs the same function as the government, and has the same essence as the second reason in the government classification.

### 3 Conclusion

Through three types of analysis, we can make a conclusion about the fiscal policies in 2020. As mentioned above, with the country's credit becoming the most important fiscal determinant, banking sector still played the most important role in fiscal policies. Meanwhile, policies related to financial market also made a great contribution with ones for insolvency, liquidity and payment systems. This paper makes an analysis about the relationship between five types of fiscal policies and authority or income level, revealing the trend while governments issued fiscal policies against the pandemic. The trend can be used as a reference and give some help when governments' issuance goes against the rules. However, there are still some types of fiscal policies with a small distribution excluded in the analysis. They are still waiting for a further research as a supplement.

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