Index Construction and Features of China's Fiscal Policy Uncertainty and Its Causes

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At present, most of the research discussing the uncertainty of fiscal policy is based on the total fiscal policy and foreign data. There is no literature on the index construction of China's total and specific fiscal policy. By means of the standard data collecting methods of policy uncertainty with China's contextual characteristics of fiscal policy, this paper constructs China's fiscal policy uncertainty index. This paper also analyzes the statistical features of China's fiscal policy uncertainty index and the main factors affecting the uncertainty. Firstly, the index constructed in this paper is robust while the volatility of fiscal expenditure uncertainty is higher than that of the policy. Secondly, the fiscal policy uncertainty index is characterized by regime-switching between "low mean, low volatility" and "high mean, high volatility". Thirdly, the uncertainty of fiscal policy is closely related to the volatility of economic growth and monetary policy uncertainty. It means that studying the uncertainty of China's fiscal policy is of practical significance. Finally, domestic factors are the main causes affecting fiscal policy uncertainty.

Keywords: fiscal policy, uncertainty, index system, tax policy

1. Introduction

Uncertainty brings people both curiosity for their future life and imagination that everything is possible, but it also brings the aversion to risks and has an effect on people's participation into economic and social activities. At present, to provide nations and individuals with a future full of certainty in this world full of uncertainty is a topic widely discussed, and to study uncertainty with the aim of reducing it and realizing a controllable world is a hot topic. In recent years economist are also highly concerned with this issue.

The summary of the existing literature shows that the current research on policy uncertainty either evaluates policy effect in DSGE model or conducts empirical analysis by means of VAR or SVAR using China's economic policy uncertainty index constructed by Baker *et al*. (2016) on the basis of *South China Morning Post.* China's fiscal policy uncertainty index has not been constructed. In other DSGE models the

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forms of fluctuation in fiscal policy impacts are changed, and a process of AR (1) is placed in the fluctuation to indicate uncertainty, yet index construction and statistical analysis is not involved. Next, Baker *et al*. (2016) only constructed uncertainty index of US fiscal policy and monetary policy, and that of China's was not constructed. China's fiscal policy uncertainty index and specific fiscal policy uncertainty index have not been constructed, hence there is no analysis of the features of China's fiscal policy uncertainty, and the volatility of fiscal policy uncertainty, the regime-switching features and its differences from monetary policy are not revealed. Lastly, there is no literature on the connotation of fiscal policy uncertainty or the causes for its fluctuations.

In light of the shortcomings of the current research this paper tries to realize innovation in the following three aspects. Firstly, in order to reflect the reports of domestic media in the regard of index, this paper systematically constructs for the first time China's fiscal policy uncertainty index and specific fiscal and tax policy index, and conducts robustness analysis through different data source. According to the literature available to the author, there is no other literature that has constructed China's fiscal policy uncertainty index. Secondly, this paper systematically analyzes the statistical features of China's fiscal policy uncertainty index. On the basis of the analysis of historic fluctuations and regime-switching, this paper conducts comparative research in contrast to monetary policy index. Lastly, this paper analyzes the source of fiscal policy uncertainty, conducts empirical analysis by dividing them into domestic factors and external factors, and discusses the main causes for China's fiscal policy uncertainty.

2. Theoretical Basis and Index Construction

2.1. Theoretical Basis

Economic uncertainty index is now dealt with mainly from the following three perspectives. The first is to summarize the different predications made by experts in regard to the nation's economy and anticipated inflation. The second is to collect data about domestic economic clauses which are anticipated to lose efficacy. The third is based on frequency of news reports. To overcome the subjectivity of the respondents (the first perspective), to avoid the subjectivity of the subjects constructing the index (the second perspective), and to achieve long-term and consecutive time sequence (both the first and the second perspective), the third perspective becomes the feasible choice. Baker *et al*. (2016) were the first to construct total economic policy uncertainty index in their working paper of 2013 to reflect the economic policy uncertainty of major economies in the world; to measure China's economic policy uncertainty, based on *South China Morning Post*, an English daily issued in Hong Kong, Baker *et al*. (2016) constructed total economic policy uncertainty index of China, but they did not

construct the specific fiscal policy and monetary policy uncertainty index. Based on news report, Baker's method follows the way that index is constructed in US and other countries, specifically speaking, reports concerning economic policy uncertainty in *South China Morning Post* during a certain period are selected. The words first filtered are "China, economy, uncertainty", then keywords of reports which belong to different subgroups are established. Programs can automatically filter relevant reports with the help of these words, and get monthly frequency of reports about China's economic policy uncertainty from January 1995 to October 2016. On this basis total economic policy uncertainty index of China can be constructed.[1]

Baker *et al*. (2016) pointed out that news index is closely related to comprehensive index and can represent economic policy uncertainty by and large. So after the working paper by Baker *et al*. was published in 2013 and specific website was set up to share the index data, their index was widely quoted; also their method was recognized by empirical research (see particularly the representative data application announced on their website, for example Jones and Olson (2013); Dimitrios *et al*. (2016)), and is applicable to the construction of China's fiscal policy and specific policy uncertainty index.

2.2. Construction of Fiscal Policy Uncertainty Index

2.2.1. Policy Background

The nature of fiscal policy is to affect economy through adjusting fiscal scale and structure after the feedback of aggregate change, structural change and efficiency evaluation of fiscal expenditure, to affect aggregate demand or aggregate supply through the change of taxation and then to regulate GDP and labor employment. So the direct instruments for fiscal policy to transmit uncertainty are fiscal expenditure policy and tax policy. The implementation of fiscal policy contains the repositioning of roles of the government and market and the coordination and combination of the government and market. But due to the looming global economic crisis and the complication of domestic economic problems, people have placed their hope for economic regulation on fiscal policy more and more. There will not be fiscal policy uncertainty if all the countries introduce and enforce fiscal laws and rules such as *Basic Financial Law* and *Long-Term Expenditure Framework,* greatly strengthen principle of fiscal legitimacy and fiscal planning with anticipated outcome. But fiscal policy and monetary policy have become important means for nations to intervene in economy because of the reality of government intervening in economy and strong needs of the public, and the

[1] See particularly the discussion about how to deal with China's "economic policy uncertainty" (http://www.policyuncetainty.com/china_monthly.html).

uncertainty of long-term expected outcomes of market economy's ability to recover by itself. The extensive argument, seeking advice from both experts and the public, anticipated outcome before policy implementation and the compromising introduction of the policy, and the timing of the introduction all signify the uncertainty of fiscal policy. Take the economic situation in China after the year 2000 as an example, we can see macro-control began in 2004 to regulate land finance; to cope with global financial crisis and sovereign debt crisis in 2008, the stimulus package of 4 trillion was introduced in 2009; business tax had been gradually replaced by VAT since 2012, and this process was basically completed in May 2016; in 2015 debt replacement was introduced and proactive fiscal policy was continued; leverage was further reduced from 2016, and in November 2016 the State Council issued *Emergency Response Plan for Local Government Debt Risks*. All this indicates that China's fiscal policy uncertainty has become a "new normal" in its economic development.[1]

2.2.2. Uncertainty Index Construction

Before specific index construction, a definition is given as follows: "fiscal policy uncertainty" means that market responses display features of uncertainty caused by inconsistent promises and changeable policies resulting from factors both outside and within the system in policy implementation, and uncertain economic outcomes follow.[2] In order to establish consecutive and time-efficient quantitative index to measure fiscal policy uncertainty, this paper adopts methods of Baker *et al*. (2016), and obtains fiscal policy uncertainty index using news report data. Here, one key factor in constructing fiscal policy uncertainty is whether the choice of core index can reflect economic connotation and uncertainty. If "prophecies far ahead are certain to be fulfilled", then uncertainty index of this kind is invalid, as it is merely a matter of certainty; only partial fulfillment or failure to fulfill can reflect the features of uncertainty. Hence this factor is a key factor in choosing fiscal policy uncertainty index. In summary: (1) In this aspect, China's housing property tax and local government debt index are relatively good choices—constantly receiving policy attention and expostulation yet not finalized, these indexes contain uncertainty in themselves. (2) In the context

[1] Regarding this, Lou Jiwei quoted and affirmed *China's Reform Achievements Are Equivalent to the Sum of Those of Other Countries* by IMF at the conference of Structural Reform from the Perspective of G20, quoted from a secondary source Caixin report *Comprehensively Strengthening Party Discipline Aims to Chop Hands Extending Too Long* (November 27, 2016). This indicates that China's fiscal and tax policies are in the process of adjustment and the future is still full of uncertainty.

[2] Factors within the system refer to factors closely related to domestic economic system and fiscal system, and affected by the system; factors outside the system are practically independent of the country's economic system and fiscal system, not affected by the country's system or institutional reform; for example impact of tax reduction of a foreign country, discussions about levying tax on robots and wechat businessmen in this information age.

of Chinese language there is no fixed expression for "uncertainty",[1]there are only expressions such as "likely, perhaps, maybe, estimate, predict". Therefore, using the first-level word frequency of "economy + uncertainty" combined with the second-level word frequency of "fiscal policy" will lead to the failure to construct China's fiscal policy uncertainty index. The word uncertainty is a derivative word that enters Chinese with translation as there are no words with long-term and consistent connotation of "uncertainty" in Chinese media. To solve this problem, this paper simply chooses "China + economy + relevant indexes" as indicators for uncertainty index. This is because, under the influence of traditional Chinese "discourse on politics", to discuss relevant issues in itself implies the connotation of urging reform and making recommendations. (3) In order to obtain relatively precise filter words, we need to take into account subjects giving rise to uncertainty, what fiscal policy will be implemented, and the effects of the policy. Hence this paper chooses important word frequency which can have an effect. (4) In order to avoid the problem of certainty, this paper designs such indicators as "fiscal and tax reform" and "policy trial" in constructing the indexes to cover the problem of uncertainty, as in Chinese, word frequency of these words cover the element of uncertainty. (5) The word frequency in Chinese is changing, especially with the deepening of the reform, many fiscal concepts including local debts, housing property tax and individual income tax which can be widely understood and sustained in reading appear, so there is little point in selecting data before 1978. (6) It should be noted that, some word frequency related to fiscal policy has been canceled because of institutional reform. So this paper does not use items which changed after fiscal revenue and expenditure classification reform in 2007, including basic construction expenditure, general public service, extra-budgetary expenditure, fixed-asset investment regulation tax, butchery tax. To sum up, key word frequency of this paper is: fiscal expenditure, transfer payment, local debts, fiscal system, pension, fiscal and tax reform, policy trial, VAT, consumption tax, corporate income tax, individual income tax, housing property tax, and tax policy.

Another key factor in constructing policy uncertainty index is how to find the best source of newspapers and magazines. This paper tries to make best choice through subjective qualitative analysis on the basis of press index of domestic newspapers to construct fiscal policy uncertainty index. In this way shortcomings of Baker *et al*. (2016) in constructing China's economic uncertainty index—lack of voice from mainland Chinese media are avoided. As fiscal policies are time-efficient, introduction of new fiscal policies, adjustment of previous policies, or change in the policy implementation strength will all draw attention from the media and cause wide discussion among all sectors of society. So the core principle in index construction is to filter news report related to

[1] Searching *Ci Hai* online (http://cihai.supfree.net/), the author finds there are no Chinese words for "uncertainty", "uncertain", "certainty", but there is "certain".

fiscal policy uncertainty. Considering the professional level, continuity degree, authority, distribution range, and data availability of the domestic newspapers, this paper selected *Economic Daily, People's Daily,* and *Guangming Daily* as sources of the construction of China's fiscal policy uncertainty index. The advantages of choosing three newspapers are: (1) Using different sources to check the reliability of indexes, of course *Economic Daily* being the principal source of subsequent empirical analysis. (2) Avoiding the problem of certainty brought by political seriousness. The political nature of newspapers is an unavoidable topic, but it is of no significance. For example, using *People's Daily* database Mei *et al*. (2015) compiled China's policy trial index to study the central-local institutional relationship peculiar to China. (3) Even if political nature is significant, in order to reduce the increase in certainty caused by reports—choosing and content-editing which may be influenced by possible political inclination, this paper chooses *Economic Daily,* the paper least political, as the principal source of index analysis.

In selecting time range this paper believes that it is more reasonable to use data after 2000 to construct the index system of fiscal policy uncertainty. The reason is that in 1998 China proposed to set up "public finance", the fiscal administrative being more planned; under the background of "national distribution" shifting to "public finance", even the same fiscal terms represented different contexts and meanings, and their economic settings and economic effects are also different. This paper obtains news data of *Economic Daily* from January 1 2000 to September 30 2016 via CNKI newspaper database, conducts monthly filtering to get the relevant news frequency and calculates its proportion in average frequency, and standardizes it to get uncertainty index with a mean of 100. Specifically, this paper modifies the method of Baker *et al*. (2016) and designs the following formula:

$$\overline{X_1} = \frac{\sum_{i=1}^{N} F_i}{N}, \quad X_2 = \frac{100}{\overline{X_1}}, \quad Index_i = F_i \times X_2 \tag{1}$$

Here, F_i stands for the frequency of policy uncertainty (the times that news reports concerning the uncertainty features of certain policy), N is the month series of the sample period (from January 2000 to September 2016, N=201, i=1~201). $\overline{X_1}$ is the monthly mean of policy uncertainty frequency; X_2 is the monthly mean of policy uncertainty frequency after standardization, on the basis of which this paper obtains the policy uncertainty index of a certain period i, $Index_i$.

2.2.3. Results

Based on the above index design and calculating method, this paper gets the monthly fiscal policy uncertainty index. It is found that both the mean absolute deviation (81.67) and volatility (103.61) of fiscal expenditure policy uncertainty index

are higher than the mean absolute deviation (69.35) and volatility (87.10) of tax policy uncertainty index, indicating that the dispersion degree of fiscal policy uncertainty index is higher. Line graphs of the two types of expenditure are shown in Figure 1.

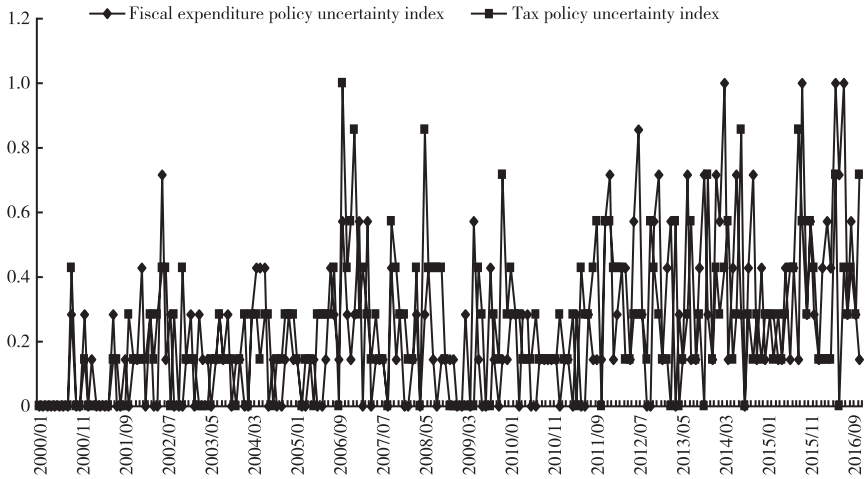

Figure 1. Monthly Change of Total Fiscal Policy Uncertainty Index

This paper also obtains quarterly fiscal policy uncertainty index. It is found that both the mean absolute deviation (58.83) and volatility (76.51) of fiscal expenditure policy uncertainty index is higher than the mean absolute deviation (47.04) and volatility (60.33) of tax policy uncertainty index, indicating that the dispersion degree of fiscal policy uncertainty index is higher. Line graphs of the two types of expenditure are shown in Figure 2.

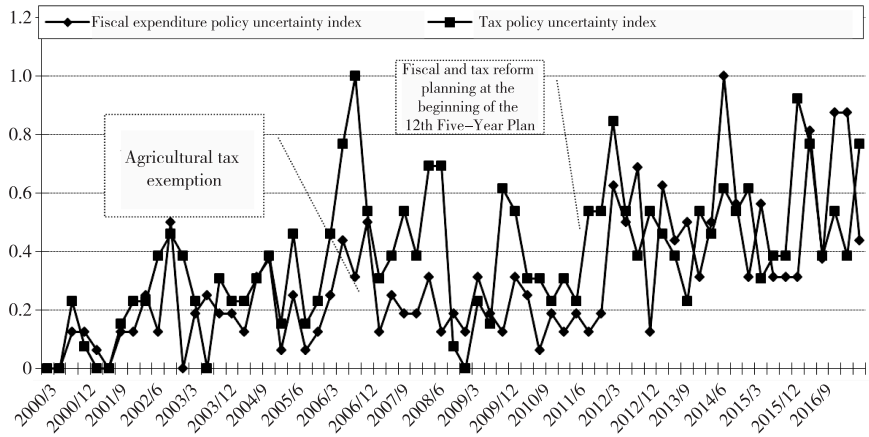

Figure 2. Quarterly Change of Total Fiscal Policy Uncertainty Index

A study of the correlation between China's quarterly fiscal policy uncertainty index and GDP growth rate shows that the result is not zero, indicating that there is moderate negative correlation between the two (the result being −0.33). Therefore, to study China's fiscal policy uncertainty and economic growth is of practical significance. The line graphs are shown in Figure 3.

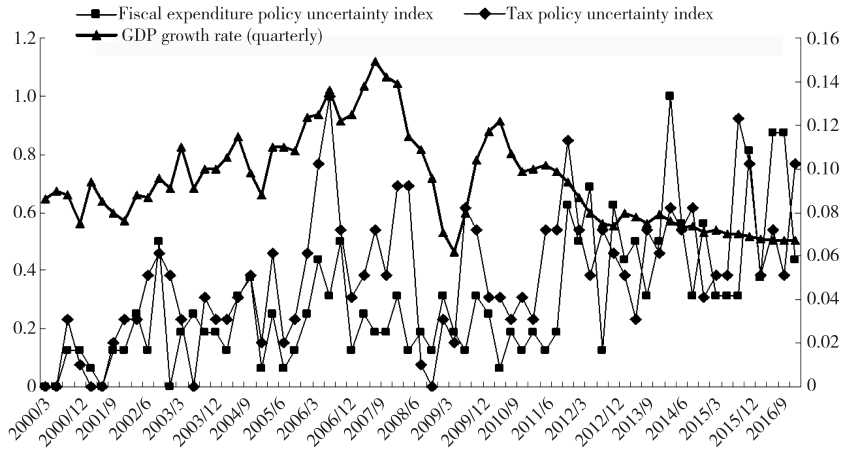

Figure 3. Quarterly Fiscal Policy Uncertainty Index and China's Economic Fluctuations

In order to observe the features and results of fiscal policy uncertainty index in detail, this paper lists annual data and transforms them into normalized results between 0 and 1 (transformed index = (index before being transformed−minimum)/(maximum−minimum)), the results are shown in Table 1.

Table 1. Statistical Results of China's Fiscal Policy Uncertainty Index (Annual Data)

Year	Statistical results of index		Normalized results	
	Fiscal expenditure	Tax	Fiscal expenditure	Tax
2000	21.5873	20.3593	0.1081	0.1176
2001	26.9841	25.4491	0.1351	0.1471
2002	75.5556	96.7066	0.3784	0.5588
2003	70.1587	50.8982	0.3514	0.2941
2004	75.5556	71.2575	0.3784	0.4118
2005	59.3651	86.5269	0.2973	0.5000
2006	118.7302	173.0539	0.5946	1.0000
2007	80.9524	132.3353	0.4054	0.7647
2008	64.7619	66.1677	0.3243	0.3824
2009	75.5556	106.8862	0.3784	0.6176

Year	Statistical results of index		Normalized results	
	Fiscal expenditure	Tax	Fiscal expenditure	Tax
2010	48.5714	71.2575	0.2432	0.4118
2011	124.1270	162.8743	0.6216	0.9412
2012	161.9048	117.0659	0.8108	0.6765
2013	199.6825	122.1557	1.0000	0.7059
2014	151.1111	122.1557	0.7568	0.7059
2015	156.5079	162.8743	0.7838	0.9412
2016.9	188.8889	111.9760	0.9459	0.6471

2.2.4. Robustness Analysis

To test the robustness of index construction, this paper also uses relevant testing method by Baker *et al*. (2016). Drawing on database of *People's Daily* and *Guangming Daily*, same method is used to process the data and monthly, quarterly and annual data are collected (see Table 2).[1] Based on the classical Pearson correlation coefficient calculating method (1895), two observable variables X_i and Y_i (mean value being $\overline{X}$ and $\overline{Y}$ respectively) are defined, and the correlation between the two is:

$$Corr = \frac{\sum_{i=1}^{N}(X_i - \overline{X}) \cdot (Y_i - \overline{Y})}{\sqrt{\sum_{i=1}^{N}(X_i - \overline{X})^2} \cdot \sqrt{\sum_{i=1}^{N}(Y_i - \overline{Y})^2}} \tag{2}$$

The bigger the absolute value of the correlation coefficient |*Corr*|, the closer it is to 1, the stronger the correlation; the closer |*Corr*| is to 0, the weaker the correlation.

As far as *Corr* is concerned, the result being 0.8~1.0 represents "extremely strong positive correlation", 0.6~0.8 represents "strong positive correlation", 0.4~0.6 represents "moderate positive correlation", 0.2~0.4 represents "weak positive correlation", 0.0~0.2 represents "extremely weak positive correlation or no correlation".

Results of Table 2 show that all the correlation coefficients of annual variables *Corr* in this paper range from 0.59 to 0.68, almost all being strong positive correlation. The correlation of quarterly variables changes greatly. Take fiscal expenditure uncertainty index as an example, there is moderate positive correlation (0.54) between benchmark index and the index of *People's Daily,* and there is weak positive correlation between benchmark index and the index of *Guangming Daily.* As for monthly data, the

[1] Limited by the length of the paper, only annual results are listed.

lengthening series reduce the correlation, but still bigger than 0.2, which indicates that there is at least weak positive correlation between benchmark index and mutually confirmed indexes. Moreover, research on the robustness of specific items shows that there is at least moderate positive correlation among most annual indexes and quarterly indexes, and there is at least weak positive correlation among most monthly indexes. This indicates that the indexes of specific items constructed in this paper are also robust. To sum up, this paper holds that, China's fiscal policy uncertainty index constructed in this paper is robust, and index system similar to *Economic Daily* can also be formed even using other data source; and using fiscal expenditure policy uncertainty index to represent total "fiscal policy uncertainty" is better than tax policy, so this indicator is adopted in the subsequent quantitative analysis.

Table 2. Robustness Analysis of Reference Model Index (Annual Data)

Year	Statistical results of index						Normalized results					
	Fiscal expenditure			Tax			Fiscal expenditure			Tax		
	Benchmark	R1	R2	Benchmark	R1	R2	Benchmark	R1	R2	Benchmark	R1	R2
2000	21.59	4.87	23.94	20.36	30.82	44.16	0.11	0.02	0.13	0.12	0.17	0.27
2001	26.98	9.74	5.99	25.45	15.41	36.80	0.14	0.04	0.03	0.15	0.09	0.23
2002	75.56	4.87	53.87	96.71	20.54	80.95	0.38	0.02	0.30	0.56	0.11	0.50
2003	70.16	9.74	41.90	50.90	20.54	73.59	0.35	0.04	0.23	0.29	0.11	0.45
2004	75.56	4.87	47.89	71.26	35.95	44.16	0.38	0.02	0.27	0.41	0.20	0.27
2005	59.37	14.61	71.83	86.53	51.36	51.52	0.30	0.06	0.40	0.50	0.29	0.32
2006	118.73	102.29	101.76	173.05	128.40	125.11	0.59	0.41	0.57	1.00	0.71	0.77
2007	80.95	112.03	89.79	132.34	128.40	95.67	0.41	0.45	0.50	0.76	0.71	0.59
2008	64.76	165.62	125.70	66.17	138.67	110.39	0.32	0.67	0.70	0.38	0.77	0.68
2009	75.56	175.36	107.75	106.89	97.58	125.11	0.38	0.71	0.60	0.62	0.54	0.77
2010	48.57	58.45	173.59	71.26	174.62	125.11	0.24	0.24	0.97	0.41	0.97	0.77
2011	124.13	219.20	149.65	162.87	154.08	88.31	0.62	0.88	0.83	0.94	0.86	0.55
2012	161.90	233.81	173.59	117.07	179.76	147.19	0.81	0.94	0.97	0.68	1.00	0.91
2013	199.68	248.42	155.63	122.16	138.67	161.90	1.00	1.00	0.87	0.71	0.77	1.00
2014	151.11	58.45	113.73	122.16	123.26	132.47	0.76	0.24	0.63	0.71	0.69	0.82
2015	156.51	131.52	179.58	162.87	123.26	154.55	0.78	0.53	1.00	0.94	0.69	0.95
2016.9	188.89	146.13	83.80	111.98	138.67	103.03	0.95	0.59	0.47	0.65	0.77	0.64
Corr(annual)	–	0.68	0.59	–	0.62	0.66	–	0.68	0.59	–	0.62	0.66
Corr(quarterly)	–	0.54	0.34	–	0.38	0.42	–	0.54	0.34	–	0.38	0.42
Corr(monthly)	–	0.49	0.24	–	0.27	0.24	–	0.49	0.24	–	0.27	0.24

Note: The benchmark is *Economic Daily*, R1 is *People's Daily*, R2 is *Guangming Daily*.

3. Features of Fiscal Policy Uncertainty

3.1. Basic Features

Based on standard index construction method and research design of this paper, statistical features of China's fiscal policy uncertainty index are shown in Table 3.

Table 3. Statistical Description of Uncertainty Index (Monthly Data)

Uncertainty index	Standard deviation	Maximum	Mean	Median
Fiscal and tax reform	259.72	2297.14	159.20	0.00
Policy trial	246.92	1256.25	170.15	0.00
Local debts	242.52	1370.45	159.20	0.00
Housing property tax	235.81	1276.19	159.20	0.00
Fiscal system	174.71	873.91	138.31	0.00
Transfer payment	148.85	538.39	125.37	0.00
Consumption tax	144.81	913.64	98.51	101.52
Individual income tax	126.23	567.80	96.52	113.56
Pension	111.31	424.65	89.04	70.77
Fiscal expenditure	103.61	446.67	81.67	63.81
Corporate income tax	102.68	427.66	78.03	85.53
VAT	101.34	735.93	72.30	91.99
Tax policy	87.10	421.26	69.35	60.18

Table 3 shows that the volatility of tax policy uncertainty index is relatively small compared with that of fiscal policy uncertainty index; the volatility of indicators such as local debts, housing property tax, fiscal and tax reform and fiscal system is relatively great. This is in line with reality, as taxation enjoys high degree of legitimacy, the volatility of its policy uncertainty index is relatively small. Fiscal and tax reform, one key indicator of fiscal policy uncertainty, has the greatest standard deviation. In terms of the mean of the indicators, mean values of the indexes which have great volatility are also relatively great.

One key standard to measure fiscal policy uncertainty is that the prophecies far ahead are partially fulfilled or not fulfilled when policies are actually issued, otherwise these policies are certain. Hence, if fiscal policy uncertainty index is featured by intertemporal volatility, then the uncertainty index meets the above standard. Analysis of time-varying features of various uncertainty index standard deviations is shown in Table 4.

Table 4. Time-Varying Features of Uncertainty Index Standard Deviation (Monthly Data)

Fiscal expenditure	2000–2007	49.7	42.7	101.2	50.6	80.9	57.5	93.6	72.6
	2008–2015	72.0	65.7	39.7	99.8	134.7	131.8	99.4	113.7
Transfer payment	2000–2007	0.0	51.8	120.0	139.7	162.3	116.9	171.1	178.8
	2008–2015	187.4	142.3	69.9	142.3	179.5	149.8	189.4	179.5
Local debts	2000–2007	0.0	0.0	65.9	0.0	0.0	0.0	0.0	0.0
	2008–2015	0.0	0.0	65.9	205.6	88.9	481.7	348.9	305.4
Fiscal system	2000–2007	0.0	63.1	196.7	189.2	85.0	215.1	268.9	174.3
	2008–2015	265.5	63.1	63.1	173.2	112.5	217.6	217.6	170.1
Pension	2000–2007	32.0	0.0	59.1	56.1	76.7	56.1	82.4	146.2
	2008–2015	118.2	69.7	82.4	69.7	133.3	160.0	84.5	106.5
Fiscal and tax reform	2000–2007	0.0	0.0	0.0	0.0	0.0	82.9	0.0	0.0
	2008–2015	129.9	0.0	82.9	129.9	141.4	403.0	277.2	664.5
Policy trial	2000–2007	0.0	0.0	0.0	0.0	181.3	0.0	0.0	419.9
	2008–2015	409.1	181.3	181.3	328.0	244.5	181.3	284.1	323.4
VAT	2000–2007	20.8	31.0	43.1	44.4	58.8	52.4	76.8	34.0
	2008–2015	68.9	79.6	67.9	196.5	94.3	155.5	33.0	79.6
Consumption tax	2000–2007	29.3	29.3	68.4	68.4	80.5	67.9	263.3	84.7
	2008–2015	114.5	104.5	80.5	81.0	143.6	118.2	166.7	227.0
Corporate income tax	2000–2007	24.7	57.2	88.1	77.0	61.4	61.4	128.7	98.8
	2008–2015	92.7	57.2	61.4	98.8	96.5	99.9	117.2	105.3
Individual income tax	2000–2007	32.8	44.2	102.2	140.8	75.9	58.5	173.5	81.5
	2008–2015	102.7	55.9	74.0	113.1	146.3	177.9	108.3	175.4
Housing property tax	2000–2007	0.0	0.0	0.0	144.3	0.0	92.1	207.8	0.0
	2008–2015	0.0	92.1	92.1	215.1	287.3	487.4	207.8	213.3
Tax policy	2000–2007	53.4	40.2	65.2	34.7	50.2	47.7	122.6	105.3
	2008–2015	86.9	81.7	34.7	74.1	74.6	92.5	96.0	90.1

The historical trend of volatility in Table 4 shows that, the average volatility of fiscal expenditure uncertainty index turned greater after 2010; transfer payment uncertainty index dropped by a large margin in 2010, remaining relatively steady in other years; local debts uncertainty index suddenly became greater after 2010, while it was mostly 0 before 2010, displaying obvious "periodical" features; the average level of fiscal system uncertainty index dropped after 2010, showing that the system got more stable than that before 2010; pension policy uncertainty index reached two peaks around 2007 (the issue of basic pension of enterprise retirees was discussed in this year) and 2013 (after 2012 pension system unification was proposed) , showing that policy discussions during these two periods drew greatest attention from the society. After 2011, the volatility of fiscal and tax reform uncertainty index grew obviously greater, especially after the overall goal of fiscal and tax reform was proposed at the Third Plenary Session of the 18th Central Committee of the Communist Party of China in 2013; after 2006 policy trial uncertainty index increased obviously, and its volatility got relatively steady after 2010; after 2010

the volatility of VAT uncertainty index increased obviously, and it went steady after 2014; consumption uncertainty index reached two peaks around 2006 and 2015, indicating that policy discussions and anticipated changes received most attention during these two periods; corporate income tax uncertainty index remained relatively steady, which is determined by the legal presence of *Corporate Income Tax Law*; the volatility of individual income tax uncertainty index reached four peaks; after 2009, housing property uncertainty index increased obviously, presenting distinct periodical features; the total tax policy uncertainty index displayed periodical features, including the three periods characterized by low mean volatility, high mean volatility and medium mean volatility respectively.

3.2. Regime-Switching Feature

Based on static statistics of historical volatility, this paper holds that the mean and variance of fiscal policy uncertainty index possesses the feature of Markov Switching, and finds that there are two regimes through imitative effect comparison. Here the econometric equations with regime-switching features are defined as follows:

$$FUIP_t = C(S_t) + \varepsilon_t, \quad \text{here } \varepsilon_t \sim N[0, \sigma^2(S_t)] \tag{3}$$

$$C(S_t) = C_1 \cdot s_{1t} + C_2 \cdot s_{2t}, \ \sigma^2(S_t) = \sigma_1^2 \cdot s_{1t} + \sigma_2^2 \cdot s_{2t} \tag{4}$$

$P\ [S_t = j/S_{t-1} = i\ ] = P_{tj}$, $i,j = 1,2$; and $\sum_{j=1}^{2} P[S_t = j / S_{t-1} = i] = 1$. When $S_t = 1$, $s_{1t} = 1$; otherwise $s_{1t} = 0$. Empirical results based on monthly data are shown in Table 5.

Table 5. Empirical Results of Regime-Switching Model

	FUIP		
C_1	50.46 (0.00)***		
C_2			172.87 (0.00)***
	53.12 (0.00)***		
			115.43 (0.00)***
Switching probability	$P(S_1/S_1)$=0.91		$P(S_2/S_2)$=0.94
Standing time	17.13		11.44
Akaike info criterion		11.75	
Schwarz criterion		11.85	
Observed value-adjusted		201	

Note: *** represents statistical significance at the 1% level.

Empirical results of the regime-switching model show that, there are two regimes regarding China's fiscal policy uncertainty index, one being "low mean (50.46), low volatility (53.12)" and the other being "high mean (172.87), high volatility (115.43)", and both are statistically significant. And fiscal policy uncertainty stays longer in the regime of "low mean, low volatility" than in that of "high mean, high volatility", which indicates that the certainty and legality of China's fiscal policy is improving.

The switching probability and process of specific fiscal policy uncertainty index in historical regimes are shown in Figure 4. It can be seen that China's policy uncertainty mostly remained in the regime of "low mean, low volatility" from 2011 to 2016, which indicates that China's fiscal policy uncertainty reduced more or less after 2011.

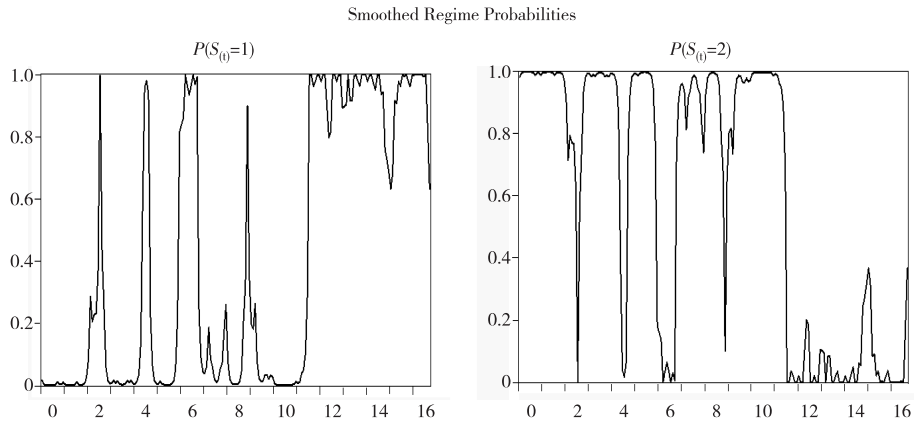

Figure 4. Uncertainty Index Switching Between Different Regimes

4. Causes for Policy Uncertainty

There has been no intensive quantitative research on the causes of fiscal policy uncertainty, and more research was focused on policy effect. Considering the operating characteristics of China's finance and economy, the causes for China's fiscal policy uncertainty mainly include: (1) Policy effect of fiscal system and policy reform, and the adaptability problem of enterprises and individuals, which also involve ambiguous fiscal and tax law provisions and their inconsistent interpretations. Current literature discussing fiscal policy planning reflects this problem in nature. (2) Variability resulting from discretionary choices made by fiscal subjects under external economic pressures. Research by Jia (2012), Wen and Wu (2014) involved this aspect indirectly. (3) The change of administrative leaders at

national and local levels leads to change in the force of policy implementation or the policy itself. Research by Fan and Li (2014), Xiao *et al.* (2015) on fiscal problems affected by administrative factors is an example. (4) Dependence on and balance between Central Bank and fiscal sector. This is reflected by research by Bianchi and Ilut (2017) on inflation from the perspective of power balance between monetary authorities and fiscal authorities. (5) Divergence in understanding "steady growth or risk prevention" between fiscal authorities and other government regulatory departments, and even completely opposing stands on certain fiscal policies. For example, regarding local debts, from 2014 to 2016 macro-control fiscal policy once appeared "confused and ineffective". Based on qualitative cause analysis, this paper transforms it into quantitative research to focus on the following: What are main factors affecting fiscal policy uncertainty? Do these factors increase or decrease fiscal policy uncertainty? This section answers there with empirical analysis.

4.1. Empirical Model

This paper uses quarterly fiscal policy uncertainty index, monetary policy uncertainty index, Five-Year Plan (as the proposal of Five-Year Plan is published in December and the Plan is formally announced in next March, the last quarter of the years which end with 5 and 0 is denoted by 1, the first quarter of the next year is denoted by 1 and others are denoted by 0), People's Congress (the quarters when the first sessions of the 10th, 11th and 12th were held are denoted by 1 and the others are denoted by 0), the change of Finance Minister (Q1 of 2003, Q3 of 2007 and Q1 of 2013 are denoted by 1, and the others are denoted by 0), and export volume data from January 2000 to September 2016. As regards export volume data, this paper uses China's quarterly macro-economic data that were constructed and quarterly adjusted by Chang *et al.* (2015). Using the macro-econometric method commonly adopted by Bloom (2009) and Blanchard *et al.* (2013), this paper conducts empirical analysis by means of VAR (Vector Autoregressive). One important reason for this is that the endogenous variables are relatively independent, especially the fiscal policy uncertainty will not affect the administrative personal change and economic development planning. The model is designed as follows:

$$X_t = C_0 + C_1 \cdot X_{t-1} + \varepsilon_t \tag{5}$$

Here, X_t is endogenous variable, C_0 is constant term of 6×1, C_1 is regression coefficient of 6×6. ε_t is the residual, $\varepsilon_t \sim N(0, \Sigma_6)$. Endogenous variable

$X_t = [FUIP, MUIP, PLAN, PRMM, EXPORT, MFT(-1)]'$, $FUIP$ is fiscal policy uncertainty index, $MUIP$ is monetary policy uncertainty index, $PLAN$ stands for Five-Year Plan, $PRMM$ stands for the people's congresses, $EXPORT$ stands for logarithmized export volume, MFT stands for the change of Finance Minister. ADF stationary test shows that all the vectors are stationary. LR test results show that the lag phase of the basic model is 2, i.e. VAR (2). AR roots test of lag structure show that all the roots are within the unit circle. this indicates VAR (2) in this paper is stationary. The results are shown in the last subgraph in the figure of impulse response (see Figure 5).

4.2. Empirical Results

Empirical research shows that monetary policy uncertainty has positive effects on fiscal policy uncertainty index, and the effects are statistically significant; the government's Five-Year Plan has positive effects on fiscal policy uncertainty; the holding of people's congresses decreases fiscal policy uncertainty; export volume has an ambiguous effect on fiscal policy uncertainty index and it is statistically insignificant; the change of administrative leader of financial department has a positive effect on fiscal policy uncertainty, but its statistical significance is relatively small. Impulse responses of specific fiscal policy uncertainty index to corresponding variables are shown in Figure 5.

Figure 5 shows that when monetary policy uncertainty impacts, there is an immediate hump-shaped positive response of fiscal policy uncertainty, and it will last for relatively long; there is a positive response from policy uncertainty index to Five-Year Plan, indicating that the government's macro-economic planning every 5 years will increase fiscal policy uncertainty; there is a negative response from fiscal policy uncertainty index to people's congresses, indicating the holding of people's congresses contributes to the reduction of fiscal policy uncertainty; when there is the impact of export volume, the response from fiscal policy uncertainty index is not obvious, and the directions of the response are complex, indicating that factors causing China's fiscal policy uncertainty are mainly domestic, rather than external economic pressures; regarding the change of Finance Minister, the change of administrative leaders obviously increases fiscal policy uncertainty as there is the effect of "A new official applies strict measures", that is, more policies may be introduced or previous policies may be less strictly implemented or even reformed.

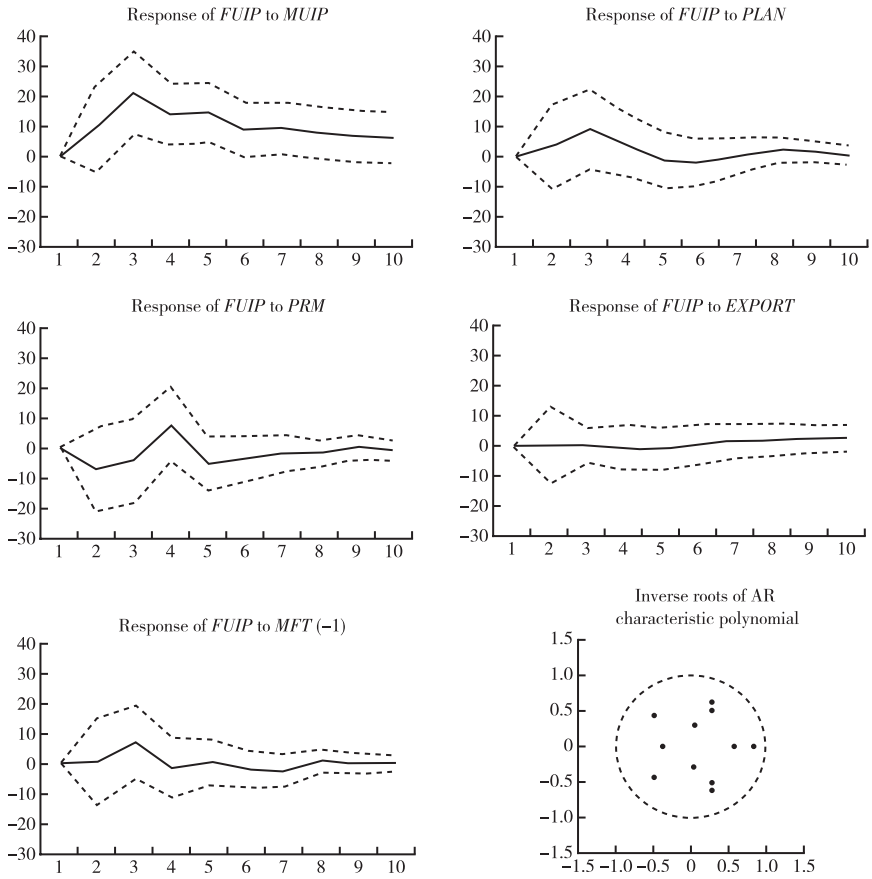

Figure 5. Responses of Fiscal Policy Uncertainty Index

5. Conclusions and Recommendations

As regards China's fiscal policy uncertainty, there has been no literature on index construction and systematic analysis. Based on *Economic Daily, People's Daily* and *Guangming Daily* which are edited and issued in China, this paper conducts for the first time index of China's fiscal policy uncertainty, and analyzes the fluctuation and trend features of the index. Hence, this paper is the first in China to measure fiscal policy uncertainty index and to analyze its features. It is found that, firstly, the index constructed in this paper is robust while the volatility of fiscal expenditure uncertainty is higher than that of tax policy; secondly, the fiscal policy uncertainty index is characterized by regime-switching between "low mean, low volatility" and "high mean, high volatility", and it is closely related to monetary policy uncertainty; lastly, domestic factors are the main causes affecting the uncertainty of fiscal policy,

while external factors have relatively small effects; the change of administrative leaders, the government's Five-Year Plan, and monetary policy uncertainty increase fiscal policy uncertainty, the holding of people's congresses decreases fiscal policy uncertainty. So the following policy recommendations are made. Firstly, in regard to fiscal expenditure policy more attention should be given to the stability of fiscal policies, lay emphasis on expectation management, macro-financial regulation design and long-term fiscal balance plan, which is an important aspect to reduce fiscal policy uncertainty in the short term. Secondly, more attention should be given to domestic factors causing fiscal policy uncertainty, for example, the continuity, implementation, time-varying features of fiscal policy and the correlation between fiscal policy and monetary policy. Lastly, to further clarify the coordination between fiscal policy and monetary policy is an essential part of designing future fiscal-monetary policy framework, and the fluctuation correlation and features of these two types of policies need to be taken into account to optimize macro-control framework design.

Of course, given the economic reality in China, the fiscal policy uncertainty index constructed in this paper cannot reflect the implementation of policies. So in order to avoid the shortcoming of policy uncertainty index being restricted by the changes in policies themselves, the future research will direct at the construction of fiscal policy implementation index or implementation uncertainty index.

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