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Study on the construction of China nonlinear financial conditions index based on MS-VAR model

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ABSTRACT

Based on Chinese monthly data from January 1996 to November 2013,this paper first discuss the construction methods of nonlinear financial conditions index (NFCI). Then we measure China NFCI using Markov switching impulse response method of Markov switching vector autoregression (MS-VAR) model and do empirical analysis on the ability FCI to predict prospective inflation. The results show in the analysis of the effect that financial variables have on inflation and how they can predict the prospective inflation, it is better to use the NFCI which can reflect many financial variables such as money supply, interest rate, exchange rate and stock prices than linear FCI. NFCI is the leading indicator of inflation in China which contains much information about prospective inflation. We can use NFCI to predict the trend of inflation within the next six months in our country effectively.

KEYWORDS

Nonlinear financial conditions index; China; MS-VAR model.

INTRODUCTION

Financial markets have traditionally been regarded as an economic barometer and observatory. This suggests financial market conditions contain the information reflecting economic growth and inflation. For this reason, men construct financial conditions index using the information of financial markets and apply it to monetary policy operations, economic trends prediction and other fields. Financial conditions index (FCI) originated in the concept of monetary conditions index (MCI) raised by the Bank of Canada in the late 1980s. Canada regarded it as the target of monetary policy. This index aroused widespread interest in all walks of life and some central banks promoted its use in some developed countries. Freedman[1] first systematically studied MCI's monetary policy effect, the method of MCI's construction and the problems when using MCI. Ericsson and Nymoen[2] studied the risk of using MCI. Goodhart and Hofmann[3] introduced the real estate asset prices and stock prices in the MCI which was FCI then. After that, Mayes and Viren[4], Lack[5], English, Tsatsaronis and Zoli[6], Montagnoli and Napolitano[7], Swiston[8], Beaton, Lalonde and Luu[9] used IS curve equation, macroeconomic model, factor analysis, Kalman filtering, VAR impulse response analysis, VECM model, dynamic factor analysis model respectively to determine to weights and constructed the MCI or FCI in different countries and regions.

Chinese scholars' study on the financial conditions index has just started in recent years. They basically referred to the oversea research model combined with China's conditions to conduct empirical analysis. Chen Yulu and Bian Weihong first introduced and commented on MCI. These following men adopted the same methods as foreign scholars did to determine the weight: Piao Yongxiang and Zhou Qing[12],Feng Beilin and Wang Guimin[13], Chen Jianbin and Long Cuihong[14], Lu Jun and Liang Jingyu[15], Li Jianjun[16], Jiang Shuxia and Jiang Richu[17], Dian Zhicun[18], Zhao Yongqing and Fan Conglai[19], Wang Xuefeng[20], Dai Guoqiang and Zhang Jianhua[21], He Jinqi,Zhang Bing[22],Xu Changsheng,Zhang Shuai and Zhuang Jiaqiang[23]. They construct China's MCI or FCI. Besides, they selected currency rates and asset prices as the index variables, such as interest rates, exchange rates, stock prices and real estate prices. Some scholars also introduced the quantity of money and assets, such as money supply, market value. In addition, Guan Dayu[24] studied the FCI based on monetary policy systematically in his doctoral dissertation. Guo Kun and Cheng Siwei[25] conducted a review study.

Overall, the methods adopted by scholars at home and abroad are almost linear methods, which are perhaps not suitable for developing countries and those in transition, such as China, because the financial and economic structures in these countries are often in the change. Therefore, this paper uses the MS-VAR model to construct China's nonlinear financial conditions index (NFCI).

CHINA FINANCIAL CONDITIONS AND INFLATION

FCI includes the operational target variables and intermediary target variables of monetary policy, such as interest rate, exchange rate, money supply, stock prices. It measures and reflects the monetary and financial market conditions of a country. Therefore, some countries use FCI as the operational target and indicator of monetary policy and to predict the inflation.

According to the research results of Yu Yongding (2007) and many other papers, we can see the limit of inflation that China's macroeconomic can tolerate is 4%. The inflation rate which is more than 4% is serious inflation. According to this standard, China has experienced five times serious inflation from 1978 to 2012. They happened in 1980,from1985 to 1989,from June,1991 to March 1997,from June 2007 to September 2008,from October,2010 to January,2012 respectively. The inflation happened in 1980 is demand-pull inflation-the government created more money in order to compensate for the deficit caused by additional wages and increased investment. The inflation from 1985 to 1989 and the one from June,1991 to March,1997 are also demand-pull inflation and they are pushed by the price reform happened in the process of transition from plan price system to market price system. The inflation from

June, 2007 to September, 2008 is cost-push inflation and the most important reason is the transmission of inflation from oversea countries to China under the impact of appreciation of exchange rate. The main reason of the inflation from October, 2010 to January, 2012 is the overly loose monetary conditions which are caused by excessive money supply-the government created more money in order to respond to financial crisis. In short, with the continuous deepening of the process of China's market economy reform and the development of economy, the inflation is mainly pushed by cost and excess liquidity instead of demand.

Therefore, with the rapid development of financial markets, the monetary and financial situation becomes one of the most important factors which affect the inflation. It is because the financial situation has become an increasingly important factor influencing the inflation that developed countries and many developing countries has paid much attention to build financial conditions index and China is no exception.

BRIEF INTRODUCTION OF MS-VAR MODEL

Hamilton (1989) first applied Markov regime switching model to the study of periodic transition of economic cycle. On the basis of Hamilton's (1989) study, Krolzig[27] proposed MS-VAR model which combined the Markov switching model and vector autoregression. In this model, the parameters are assumed to change with the regime of economic system, which is consistent with the characteristics of the real economy. Considering K-dimensional time-series variables:

$$y_t = (y_{1t}, y_{2t}, \cdots, y_{kt})^{\mathrm{T}}, \quad t = 1,2,\cdots,T \tag{1}$$

Where y_t is the column vector of k-dimensional time series; $y_{it}(i = 1,2,\cdots,k)$ is the observed value of the i-th time series at time t. They can form the following model:

$$y_t = V + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + \mu_t \tag{2}$$

Where V is the intercept; $A_i(i = 1,2,\cdots,p)$ is the coefficient vector to be estimated; p is the lag order; $\mu_t \sim IID(0,\sum)$ is k-dimensional perturbation column vector; $\sum$ is the covariance matrix of μ_t.

Krolzig (1998) brought Markov chain in the $VAR(p)$ model mentioned above. We assume that there are m kinds of unobserved regimes which can be indicated by $s_t(t = 1,2,\cdots,m)$; we also assume that the intercept V and the error term μ_t both have the characteristic of regime switching. s_t is a group of discrete random variables which follow Markov chain. Its conversion probability can be represented by the following formula:

$$p_{ji} = prob(s_{t+1} = j \,|\, s_t = i), \sum_{j=1}^{M} p_{ji} = 1, \forall i, j \in \{1,2,\cdots,m\} \tag{3}$$

The transition probability matrix of this traversal irreducible m-regime Markov process is as follows:

$$P = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1m} \\ p_{21} & p_{22} & \cdots & p_{2m} \\ \vdots & \vdots & \cdots & p_{mm} \end{bmatrix} \tag{4}$$

After the introduction of Markov chains, the original VAR model can be expressed as a MS-VAR model with p-order and M regime:

$$y_t = v(s_t) + A_1(s_t)y_{t-1} + A_2(s_t)y_{t-2} + \cdots + A_p(s_t)y_{t-p} + \mu_t \quad \textbf{(5)}$$

Where $\mu_t \sim IID(0, \sum(S_t))$.

THE CONSTRUCTION OF CHINA'S NONLINEAR FINANCIAL CONDITIONS INDEX AND EMPIRICAL MEASUREMENT

The construction of China's NFCI

The standard formula used by former scholars to build financial conditions index

FCI is used to measure and reflect the monetary and financial market conditions of a country. On the basis of monetary conditions index raised by Freedman, Goodhart and Hofmann[3] first constructed FCI which contains interest rates, exchange rates and stock prices. It can be used to predict the prospective inflation. Goodhart and Hofmann[3] defined FCI as follows:

$$FCI_t = \sum_i^n w_i(q_{it} - \bar{q}_{it}) \quad \textbf{(6)}$$

Where, q_{it} is the price of asset i in period t; $\bar{q}_{it}$ is the secular trend or equilibrium of asset i in period t; w_i is the weight coefficient of asset i, besides $\sum w_i = 1$. Financial asset prices generally include the effective interest rate, the real effective exchange rate, the actual stock price and the actual real estate prices. The increasing FCI value indicates accommodative financial conditions, otherwise tight.

The China linear FCI built by this paper

The formula (6) which is defined by Goodhart and Hofmann[3] is widely used by scholars. Since China formally regarded the money supply as the intermediate target of monetary policy in 1996,China Central Bank has modulated currency supply to stabilize prices and thus to further promote economy. Taking this actual situation into account, this paper adds money supply to formula (6) to fully reflect the impact monetary factors have on inflation in China. China FCI constructed by this paper is as follows:

$$FCI_t = w_1 \cdot M2G_t + w_2 \cdot IRG_t + w_3 \cdot REERG_t + w_4 \cdot HPG_t + w_5 \cdot SPG_t \quad \textbf{(7)}$$

Where, $M2G$ indicates the actual money supply gap; IRG indicates the real interest rate gap; $REER$ indicates the real effective exchange rate of the RMB; HPG indicates the actual real estate price tag; SPG indicates the actual stock price tag; w_i is the weight coefficient and $\sum w_i = 1$. Each gap in the formula (7) corresponds to $(q_{it} - \bar{q}_{it})$ in the formula (6). $(q_{it} - \bar{q}_{it})$ stands for the actual value minus the secular trend or the equilibrium value.

The NFCI formula of China built by this paper.

On the basis of formula (7), we assume MS-VAR model is a m-regime Markov process. Thus we can calculate each FCI under each regime and the expectation of FCI.

Firstly, we calculate the FCI under regime j:

$$FCI_{tj} = w_{1j} \cdot M2G_t + w_{2j} \cdot IRG_t + w_{3j} \cdot REERG_t + w_{4j} \cdot HPG_t + w_{5j} \cdot SPG_t \quad \textbf{(8)}$$

Where $w_{ij}, i = 1,\cdots,5; j = 1,\cdots,m$ indicates the weight coefficient of the ith variable under the jth regime.

Next, we calculate each FCI under each regime and the expectation of FCI under all regimes---the NFCI.

$$NFCI = \sum_{j=1}^{m} \pi_{tj} \cdot FCI_{tj} \quad \textbf{(9)}$$

Where, π_t indicates the average probability that the jth regime appears.

The method of calculating NFCI in China

The method of using secular trend value (equilibrium value)

Before using this method, we should first make sure whether the financial variables mentioned above have secular trend. ①The money supply. Although the nominal money supply of a country is constantly changing, the fluctuation of the real money supply has the characteristic of periodicity and seasonal variation with the economic cycle. This shows the money supply has secular trend. ②In the long run, the equilibrium level of the exchange rate depends on the purchasing power of two countries. Under the arbitrage trading on the foreign exchange market, the changing exchange rate gradually return to the equilibrium exchange rate. ③The cycle of the real estate industry is long and the supply of houses cannot increase significantly in a short period. Therefore, there is an equilibrium value of the real estate prices. ④According to the asset pricing theory, the stock price is determined by investors' risk appetite and the expected dividend yield. And people's preferences and the expected benefits are usually stable. Therefore, the value of the stock has long-run equilibrium. Variables in formula (7) are all time series and the equilibrium values of each variable have time-varying characteristics. Therefore, this paper adopted proposal from Goodhart and Hofmann[3] and we use the HP filter to eliminate the time-varying trend and get the equilibrium value. HP filtering method lets the time series be analyzed in the state space, which is equal to minimize the fluctuation variance. When selecting the smoothing factor of HP, men often set the annual data, quarterly data, monthly data as100, 1600 and14400 respectively. In this paper, we choose monthly data and the smoothing factor is 14400.

The method to determine the weight coefficients w_i

From the existing literature, there are mainly three methods to determine the weight coefficients: reduced aggregate demand model method, large macro econometric model method and VAR model impulse response method. The reduced aggregate demand model method depends on the theory of IS curve and Philips curve. But the assumption that each variable must be exogenous is untenable in the real economy. Besides, the estimated results have large deviations with the realistic one (Gauthier et al.,2004). The large macro econometric model method has solved the problem of variables' endogenous but it is based on a lot of data. Besides, its processing is complex (Beaton). Therefore, the VAR model impulse response method has become the one most scholars adopt in China. However, this method is a linear method which cannot better reflect the changes of financial structure in China that is in developing and transition. Therefore, this paper adopts MS-VAR model impulse response method to measure the weight of each variable. We assume MS-VAR model is an m-regime Markov process. Thus we can calculate each variable's weight under each regime. Specific information as follows:

$$w_{ij} = \left(\left| \sum_{t=1}^{n} \phi_{ijt} \right| \right) \Big/ \left(\sum \left| \sum_{t=1}^{n} \phi_{ijt} \right| \right) i = 1,2,3,4,5; j = 1,2,\cdots,m \quad \textbf{(10)}$$

Where, ϕ_{ijt} indicates the inflation rate's response to the impact of a standard deviation from ith variable under jth regime in period t. w_{ij} indicates the weight of ith variable under jth regime.

The process of calculating China's NFCI

Data selection and processing.

The sample interval is from January, 1999 to November, 2013. We choose monthly data and there are 179 sample points. All the data are from China National Bureau of Statistics, People's Bank of China, Economic Information Network and other sites. The reason why we choose 1999 as the starting time is China began to carry out the reform of the housing market (the welfare housing system was abolished by the end of 1998)and the Securities Law was carried out at the same year. These factors promoted the housing prices and stock prices be reasonable. For inflation, we choose China's consumer price index as the proxy variable (CPI); For the money supply, we choose M2 as a proxy indicator (M2);For short-term interest rates, we choose Chilibor as the proxy variable (IR);For the exchange rate, we choose the real effective exchange rate of RMB from the Bank for International Settlements as the proxy variable (REER); For real estate prices, we choose real estate climate index as a proxy indicator (HP); For the stock price, we choose the closing prices at the end of each month of shanghai composite index as the proxy indicator (SP). Real money supply (M2) is got by the nominal money supply divided by fixed base consumer price index. And the actual stock price (SP) is got by nominal stock price divided by fixed base consumer price index. The real interest rate is got by the nominal interest rate minus the inflation rate. The actual real estate price is got by the real estate climate index minus the inflation rate. In addition, the real effective exchange rate of RMB is showed by indirect quotation (1999.01=100). The increasing index stands for appreciation of the RMB. January, 1999 is the base period for the data of fixed base CPI. We use HP filter method to get the gap values of the consumer price index (CPI),the real money supply (M2),the effective interest rate (IR),the real effective exchange rate (REER),the actual real estate prices (HP),the actual stock prices (SP). We record gap values as CPIG,M2G,IRG,REERG,HPG,SPG.

The stationary test

The MS-VAR model requires the variables have the characteristic of stationarity in order to avoid spurious regression. This paper uses the unit root test method to test the stability of the sequence. The test results show that CPIG, M2G, IRG, REERG, HPG and SPG all reject the null hypothesis at the 1% significance level in the ADF test and PP test, which means they are stationary time series and can be used to build MS-VAR model (TABLE 1).

TABLE 1 : The test of unit root

Var.	ADF Test				PP Test			
	(C,t,n)	T-stat.	Prob.	stationary	(C,t)	T-stat.	Prob.	stationary
CPIG	(0,0,1)	-2.8695	0.0043	stable	(0,0)	-3.1631	0.0017	stable
M2G	(0,0,1)	-4.0124	0.0001	stable	(0,0)	-4.0124	0.0001	stable
IRG	(0,0,1)	-4.0108	0.0001	stable	(0,0)	-3.9110	0.0001	stable
REERG	(0,0,1)	-4.7005	0.0000	stable	(0,0)	-4.0456	0.0001	stable
HPG	(0,0,1)	-4.0132	0.0001	stable	(0,0)	-3.4397	0.0007	stable
SPG	(0,0,1)	-3.3507	0.0009	stable	(0,0)	-3.2392	0.0013	stable

Selecting the optimal number of regimes and lag order of MS-VAR model

According to the intercept (I), the mean (M), the coefficient of lagged variables (A) and the variance (H), the MS-VAR model can be divided into 11 kinds: MSI-VAR, MSM-VAR, MSA-VAR, MSH-VAR, MSIA-VAR, MSIH-VAR, MSMA-VAR, MSMH-VAR, MSAH-VAR, MSIAH-VAR, MSMAH-VAR. In order to determine the optimal number of regimes and the lag order of the MS model, we use Lag Order Selection Criteria in the VAR model to do preliminary test. The results show the optimal lag order of VAR model is 2 according to AIC standard. And the optimal lag order is 1 according to SC standard. On this basis, we do further test combing MS model. The results are shown in TABLE 2. As is shown in TABLE 2, the optimal form of MS-VAR model is MSH (3)-VAR (2) according to the standard of AIC. While according to the standard of HQ and SC, the optimal form is MSM (3)-VAR (1). After further analysis using inflation equation, we find MSH (3)-VAR (2) is better. Therefore, we use MSH (3)-VAR (2) model to do empirical analysis.

TABLE 2 : The selection of the optimal regime and order of MS-VAR

MS	VAR	LOG	AIC	HQ	SC	MS	VAR	LOG	AIC	HQ	SC
线性	VAR(1)	3297.40	-36.34	-35.88	-35.22	线性	VAR(2)	3331.14	-36.52	-35.80	-34.74
MSI(2)	VAR(1)	3303.59	-36.32	-35.81	-35.05	MSI(2)	VAR(2)	3341.47	-36.55	-35.77	-34.63
MSM(2)	VAR(1)	3315.04	-36.45	-35.94	-35.18	MSM(2)	VAR(2)	3332.26	-36.44	-35.66	-34.52
MSA(2)	VAR(1)	3334.72	-36.33	-35.60	-34.53	MSA(2)	VAR(2)	3400.32	-36.47	-35.21	-33.36
MSH(2)	VAR(1)	3338.96	-36.55	-35.93	-35.01	MSH(2)	VAR(2)	3372.65	-36.73	-35.84	-34.54
MSIA(2)	VAR(1)	3337.20	-36.29	-35.52	-34.38	MSIA(2)	VAR(2)	3379.48	-36.16	-34.86	-32.95
MSIH(2)	VAR(1)	3368.42	-36.81	-36.15	-35.17	MSIH(2)	VAR(2)	3409.95	-37.08	-36.15	-34.79
MSMH(2)	VAR(1)	3359.27	-36.71	-36.04	-35.07	MSMH(2)	VAR(2)	3371.35	-36.65	-35.72	-34.35
MSMA(2)	VAR(1)	2294.29	-24.58	-23.80	-22.66	MSMA(2)	VAR(2)	2280.15	-23.74	-22.44	-20.53
MSAH(2)	VAR(1)	3382.63	-36.64	-35.75	-34.46	MSAH(2)	VAR(2)	3448.71	-36.78	-35.36	-33.30
MSIAH(2)	VAR(1)	3385.23	-36.60	-35.67	-34.31	MSIAH(2)	VAR(2)	3455.76	-36.79	-35.33	-33.20
MSMAH(2)	VAR(1)	2294.29	-24.34	-23.41	-22.05	MSMAH(2)	VAR(2)	2280.15	-23.50	-22.05	-19.92
MSI(3)	VAR(1)	3307.82	-36.26	-35.67	-34.81	MSI(3)	VAR(2)	3347.29	-36.50	-35.65	-34.40
MSM(3)	VAR(1)	3355.23	-36.79	**-36.20***	**-35.34***	MSM(3)	VAR(2)	3340.90	-36.43	-35.58	-34.33
MSA(3)	VAR(1)	3370.10	-36.28	-35.26	-33.76	MSA(3)	VAR(2)	3471.01	-36.41	-34.59	-31.94
MSH(3)	VAR(1)	3376.01	-36.69	-35.88	-34.70	MSH(3)	VAR(2)	3437.51	**-37.18***	-36.11	-34.54
MSIA(3)	VAR(1)	3377.01	-36.22	-35.12	-33.49	MSIA(3)	VAR(2)	3437.73	-35.90	-34.00	-31.21
MSIH(3)	VAR(1)	3393.84	-36.75	-35.86	-34.55	MSIH(3)	VAR(2)	3432.26	-36.99	-35.83	-34.13
MSMH(3)	VAR(1)	3412.75	-36.96	-36.07	-34.76	MSMH(3)	VAR(2)	3390.12	-36.51	-35.35	-33.66
MSMA(3)	VAR(1)	2339.62	-24.57	-23.46	-21.83	MSMA(3)	VAR(2)	2324.72	-23.32	-21.42	-18.64
MSAH(3)	VAR(1)	3442.18	-36.62	-35.29	-33.35	MSAH(3)	VAR(2)	3536.40	-36.67	-34.55	-31.45
MSIAH(3)	VAR(1)	3435.60	-36.41	-35.00	-32.93	MSIAH(3)	VAR(2)	3527.25	-36.43	-34.23	-31.00
MSMAH(3)	VAR(1)	2339.62	-24.10	-22.68	-20.61	MSMAH(3)	VAR(2)	2324.72	-22.84	-20.64	-17.41

The estimated results of MS-VAR model

As is shown in TABLE 3,the factors having significant impact on China's inflation gap include the real interest rate (IPG),the actual real estate prices (HPG) and the stock prices (SPG).

TABLE 3 : The results of MS-VAR

item	Const	CPIG(-1)	CPIG(-2)	M2G(-1)	M2G(-2)	IRG(-1)	IRG(-2)	REERG(-1)
coefficient	-0.000017	0.338358	0.337382	0.001929	0.004082	-0.185402	0.024871	0.006963
standard errors	0.000433	0.103660	0.093361	0.041929	0.040614	0.084055	0.085977	0.041240
T-Values	-0.039300	3.264300	3.613800	0.046000	0.100500	-2.205700	0.289300	0.168800

item	REERG(-2)	HPG(-1)	HPG(-2)	SPG(-1)	SPG(-2)	SE(Reg.1)	SE(Reg.2)	SE(Reg.3)
coefficient	0.052563	-0.170717	0.238723	0.010867	0.005211	0.006216	0.005559	0.005480
standard errors	0.040408	0.066230	0.065943	0.007681	0.007975	\	\	\
T-Values	1.300800	-2.577600	3.620100	1.414800	0.653500	\	\	\

THE MEASUREMENT RESULTS OF CHINA'S NFCI AND THE ANALYSIS OF INFLATION PREDICTION

The measurement results of China's NFCI based on different regime

Based on the regime switching impulse response analysis, we can get the weight of each variable of FCI in each regime. We chooses 30 regime impulse response analysis and get the weight coefficient w_i under each regime using formula (10). Specific information as follows:

The expression of FCI under different regime

Based on the formula (10), we get the expressions of China's FCI under different regime.

The expression of China's FCI under regime 1:

$$FCI_j = -0.31M2G_t - 0.17IRG_t - 0.20REERG_t + 0.26HPG_t - 0.06SPG_t \quad \textbf{(11)}$$

The expression of China's FCI under regime 2:

$$FCI_j = -0.09M2G_t - 0.07IRG_t + 0.08REERG_t - 0.08HPG_t + 0.67SPG_t \quad \textbf{(12)}$$

The expression of China's FCI under regime 3:

$$FCI_j = 0.02M2G_t + 0.09IRG_t + 0.01REERG_t - 0.10HPG_t - 0.78SPG_t \quad \textbf{(13)}$$

The measurement results of China's FCI under different regime.

We take five variables--CPIG, M2G, IRG, REERG, HPG and SPG--into formula (11), formula (12) and formula (13) and get China's FCI under different regime. Specific information is shown in Figure 1.

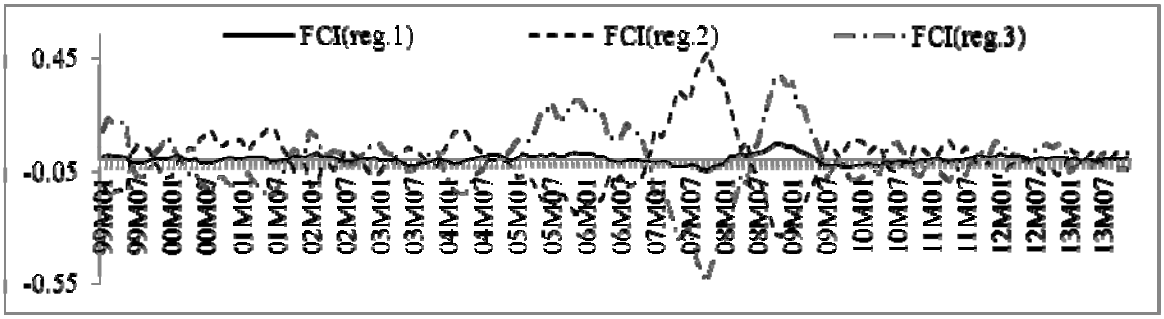

Figure 1 : China FCI in regime 1-3

The measurement results of China's FCI

According to formula (9), the value of NFCI in China is got by the FCI under different regimes multiplied by the average probability of each regime. The results are shown in Figure 2. In order to compare with the inflation gap; we add a negative sign to the original NFCI. From Figure 2, we can see the trend of NFCI is same with that of inflation. From a few peaks and valleys in the Figure, NFCI is about 5-7 months ahead of inflation. For example, the NFCI reached the peak in October, 2007 and the inflation reached the peak in April, 2008. The NFCI fell to the low point in November, 2008 and the

inflation fell in March, 2009. This show there is a strong correlation between the NFCI and the inflation rate. NFCI can be used to predict the prospective inflation of a country six months in advance.

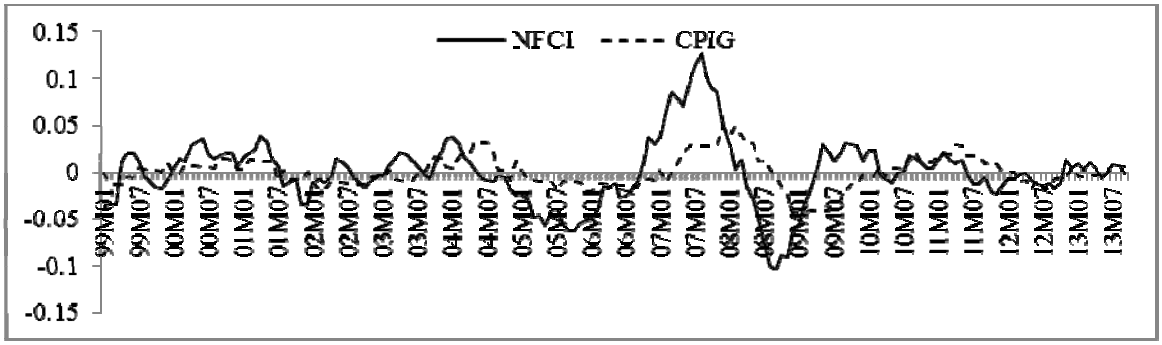

Figure 2 : China NFCI and inflation gap

The predictive ability of China's NFCI

The intertemporal correlation analysis of China's NFCI and inflation gap

The correlation test results show that there is significant intertemporal dynamic correlation between NFCI and inflation rate. The correlation coefficient increases first and then decreases with the lag order. And it reaches the maximum (0.7964) at 7th. The correlation coefficient between NFCI whose lag order is between 3 and 10 and inflation rate are all greater than 0.60, which indicates that China's NFCI can predict the shot-term perspective inflation better. From the contrast NFCI and FCI, we can find that the cross correction between NFCI and CPIG is better than that of linear FCI and CPIG.

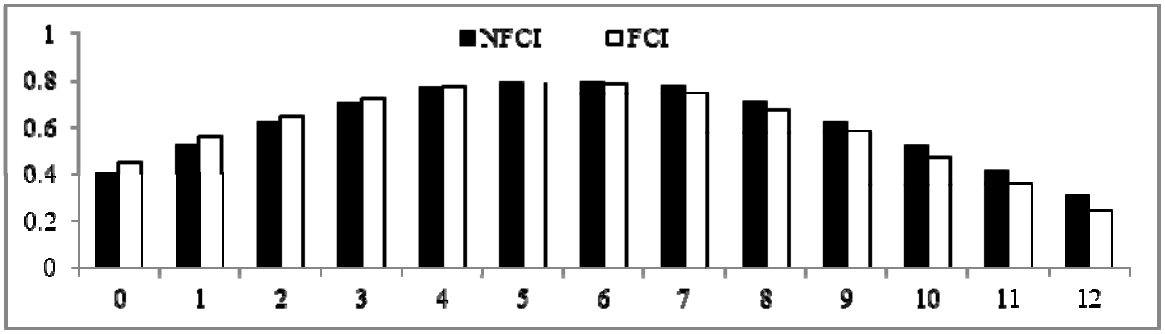

Figure 3 : The cross correction between NFCI and CPIG, FCI and CPIG

The Granger causality analysis

The results (TABLE 4) of Granger causality test show that the significance level P values are all less than 5% in each period where the lag order is less than 18. And the test results are not sensitive to the number of lag orders. These suggest that NFCI is the Granger reason that causes the inflation rate change. The significance level P values are all less than 1% within 6 months, which indicates NFCI will significantly influence the level of inflation rate in short term. Therefore, we can predict the trend of inflation rate in the next six months through the change of NFCI.

TABLE 4 : Granger causality test results of NFCI and inflation rate

The null hypothesis: NFCI is not the Granger cause of inflation rate							
The Lag Order	**F Value**	**P Value**	**Conclusion**	**The Lag Order**	**F Value**	**P Value**	**Conclusion**
1	34.2591	2.00E-08	Reject	10	2.84734	0.0029	Reject

2	21.1229	6.00E-09	Reject	17	1.76508	0.0398	Reject
3	13.7279	5.00E-08	Reject	18	1.60237	0.0695	Reject
4	9.38257	7.00E-07	Reject	19	1.52708	0.0882	Reject
5	7.8594	1.00E-06	Reject	20	1.44715	0.1148	Reject
6	5.90555	1.00E-05	Reject	21	1.36121	0.1533	Reject

BASIC CONCLUSIONS

Based on the monthly data from January, 1999 to November, 2013 and the methods of building China's NFCI, we calculate China's NFCI using regime impulse response method of MS-VAR model and do empirical analysis on the ability NFCI has to predict prospective inflation. The main conclusions are different financial variables have significant different impact on inflation rate. In the analysis of the effect that financial variables have on inflation and how they can predict the prospective inflation, it is better to use the financial conditions index which can reflect many financial variables such as money supply, interest rate, exchange rate and stock prices. NFCI is the leading indicator of inflation in China which contains much information about prospective inflation. NFCI can be used to predict the trend of inflation within the next six months in our country effectively.

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REFERENCES

[1] Charles Freedman; The use of indicators and the monetary conditions index in Canada [A], In Frameworks for Monetary Stability: Policy Issues and Country Experiences, IMF working paper, **(1994)**.

[2] K.H.Eika, N.R.Ericsson, R.Nymoen; Hazards in Implementing a Monetary Conditions Index[J], Oxford Bulletin of Economics and Statistics, **58(4),** 765-790 **(1996)**.

[3] C.Goodhart, B.Hofmann; Asset Prices, Financial Conditions, and the Transmission of Monetary Policy[A], The conference on Asset Prices, Exchange Rates, and Monetary Policy, Stanford University, 2001.3, **(2001)**.

[4] Viren Mayes; Financial Conditions Indexes[A], Bank of Finland Working Paper No. 17/2001, **(2001)**.

[5] Lack P.Caesar; A financial conditions index for Switzerland [A], BIS Papers No. 19, **(2003)**.

[6] William English, Kostas Tsatsaronis, Edda Zoli; Assessing the predictive power of measures of financial conditions for macroeconomic variables [A], BIS Papers No. 22, 2005.4, **(2005)**.

[7] Alberto Montagnoli, Oreste Napolitano; Financial Condition Index and Interest rate Settings: a Comparative Analysis[A], Working Paper n 8, December **(2005)**.

[8] Swiston A.U.S.Andrew; Financial Conditions Index: Putting Credit Where Credit is Due[A], IMF Working Papers from International Monetary Fund No. 08/161, 2008.7 **(2008)**.

[9] Kimberly Beaton, René Lalonde, Corinne Luu; A Financial Conditions Index for the United States [A], Bank of Canada Discussion Paper, 2009.11, **(2009)**.

[10] Chen Yulu, Bian Weihong; The theory of monetary policy target in open economy-taking the monetary conditions index with exchange rate into account MCI[J], Studies of International Finance, **10**, 18~25 **(2003)**.

[11] BuYongxiang, Zhou Qing; China monetary conditions index and its role in monetary policy operation[J], Journal of Financial Research, **1**, 30~42 **(2004)**.

[12] Feng Beilin,Wang Guimin; The study on the function between financial conditions index FCI and monetary policy responses[J], Journal of Finance and Economics, **12**, 53~64 **(2006)**.

[13] Chen Jianbin, Long Cuihong; The construction of China's monetary conditions index and the verification of the effect of monetary policy[J], Contemporary Finance&Economics, **5,** 31~37 **(2006)**.

[14] Lu Jun, Liang Jingyu; The construction of China financial conditions index[J], World Economy, **4**, 13~24 **(2007)**.
[15] Li Jianjun; China monetary conditions index and the unobserved monetary and financial conditions index-theoretical design, empirical methods and the monetary policy implications[J], Journal of Financial Research, **11**, 56~75 **(2008)**.
[16] Jiang Shuxia, Jiang Richu; The empirical test of China monetary conditions[J], Journal of Xiamen University (philosophy and social science edition), **2**, 85~92 **(2008)**.
[17] Dian Zhicun; The optimal monetary policy under open economy, MCI and its test in China[J], The Journal of Quantitative and Technical Economics, **4,** 17~28 **(2008)**.
[18] Zhao Yongqing, Fan Conglai; The construction of China nominal monetary conditions index[J], Journal of Finance and Economics, **12,** 107~117 **(2009)**.
[19] Wang Xuefeng; The financial conditions index and the intermediate target of monetary policy[J], Journal of Shanxi Finance and Economics University, **11**, 95~101 **(2009)**.
[20] Dai Guoqiang, Zhang Jianhua; The study on the transmission effect of China financial conditions index has on monetary policy[J], Journal of Finance and Economics, **7,** 52~62 **(2009)**.
[21] He Jinqi, Zhang Bing; The analysis of China monetary conditions index based on state space model[J], Reform of Economic System, **5**, 108~114 **(2009)**.
[22] Xu Changsheng, Zhang Shuai, Zhuang Jiaqiang; The empirical study on the construction of China monetary conditions index and its applications[J], Statistical Research, **4**, 35~41 **(2010)**.
[23] Guan Dayu; The study on the construction of monetary conditions index and its applications based on monetary policy transmission[D], The Doctoral Dissertation fromNortheast Finance and Economics University, **(2010)**.
[24] Guo Kun, Cheng Siwei; The research review of financial conditions index[J], International Finance Research, **5**, 67~73 **(2011)**.
[25] Yu Yongding; The inflation threats stability seriously [J], Theoretical Reference, **3,** 1-3 **(2008)**.
[26] H.M.Krolzig; Markov-Switching Vector Autoregressions, Modelling, Statistical Inference and Application to Business Cycle Analysis[C], Lecture Notes in Economics and Mathematical Systems 454, Berlin: Springer, **(1997)**.