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An Analysis of the Effects of External Shocks on Macroeconomic Fluctuations in China

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Abstract
The US subprime mortgage crisis and the ensuing European debt crisis caused a severe global recession from the year of 2008. Influenced by external shocks and cyclical adjustments of domestic economy, Chinese economy had a deep set-back and experienced e-scale fluctuation. This paper delivers effect analysis of external shocks' impact on China's macro economy by taking into account the fluctuations in some external factors including international commodity prices, interest rates, exchange rates and foreign demand on Chinese products, and by using an SVAR model and impulse response analysis. Empirical results indicate that external shocks are important causes of macroeconomic fluctuations in China; Chinese economic growth maintains its overall trend despite rises in world oil prices; world commodity prices and interest rates are the main causes of domestic inflation; over time, RMB appreciation has visibly suppressed inflation in China; in addition, the decline of foreign demand will be less detrimental than predicted, and Chinese economic growth can be stimulated by means of increasing domestic consumption and investment.

Key Words: External Shocks; Economic Fluctuation; SVAR Model; Effect Analysis

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1. Introduction

A violent fluctuation of commodity prices has been observed since 2008 after the outbreak of American's subprime mortgage crisis and the ensuing European debt crises, as shown by the CRB index in an overall up trend after 2005 and its rise to 487.86 in June 2008, followed by a sharp drop to 306.96 in February 2009. Crude oil price reached the historical high of $133.88 per barrel in June 2008, and then fell below $40 per barrel in only a half year's period. Metal price index dropped nearly 100% during the period from March 2008 to March 2009. Same thing happened to iron ore prices and food prices. Radical adjustment of monetary policies has been made by major countries, especially the United States. The Fed Fund Rate was sharply lowered to a level approaching 0. China export also fluctuated drastically, from $112.48 billion of monthly total in October 2007 to $87.37 billion in March 2008, and then gradually rising up to $136.68 billion in August 2008 and swiftly falling to $64.89 billion in March 2009. Meanwhile RMB appreciated remarkably. RMB's real exchange rate showed that RMB appreciated by 9.46% within 13 months, from July 2007 to August 2008. Global economy was trapped in severe recession, and Chinese economy also experienced fluctuation as manifested by a fast setback of GDP year-on-year growth rate from 24.26% in April 2007 to 5.33% in January 2009. Under the circumstance of economic globalization and the expanding opening-up scale of China's economy, it is an important issue for macro economy management to decide to what extent the macro economy fluctuation is caused by international economic fluctuation. This paper applies SVAR model to carry on effective recognition and quantitative measurement, and by applying impulse responding function and variance decomposition techniques, it also discusses on the dynamic impact of several important external shock variables.

2. Literature Review

Empirical study shows that external shocks are important factors that trigger macro economy fluctuation. (Mackowiak, 2007; Sosa, 2008) [1-2].Following are several external shock factors that are mostly concerned and studied by scholars.

2.1 Oil price shock. Cunado and Gracia(2003) studied the responsive effect of industrial output and consumer price index in presence of oil price shock in 14 European countries. Cologni and Manera(2008) investigated the reverse relationship between GDP in most developed countries and oil price & currency variables[4]. In China, Liu Qiang (2005) established a mixed economic model of two departments, and used this model to study the impact of oil price fluctuation on China's economy and the transmission mechanism of the impact[5]. Yu Wei and Yi Jingdong(2005) discovered the asymmetric relation of oil price shock and China's economic growth, namely, when oil price rises, China's economic growth will be impeded, but in a hysteric nature; when oil price declines, the positive stimulation to economic growth will also last just for a short period[6].

2.2 Exchange rate shock. Not much research work has been done to study the effect of RMB exchange rate fluctuation on macro economy. Mckinnon, Schnabl (2003) are in the opinion that China's economy would be adversely effected by RMB appreciation[7]. In China, Fu Xuewen (2005) constructed a small-sized simultaneous equation model by integrating variables including GDP, consumption, real effective exchange rate, import and export, and investment, etc., to evaluate the impact of RMB appreciation on macro economy[8]. Wang Xi, Feng Wenguang (2009) established a SVAR model including variables of output, import and export, money supply, price and exchange rate, and analyzed the dynamic effect of RMB appreciation on macro economy[9]. Liu Raocheng (2010) applied SVAR model to probe into the topic of structural shock of RMB exchange rate fluctuation and the transmission mechanism. He thought that currency shock gave a satisfactory explanation to RMB NEER fluctuation[10].

2.3 External demand shock. By analyzing multiplier effect of international trade, Du Ting (2006) brought up the idea that international trade shock played an important role in the economic cycle fluctuation, i.e., 1% fluctuation of export would bring about 0.25% GDP fluctuation, and as the ratio of dependence on foreign trade grew, the impact of international trade shock on China's macro economy would enhance[11]. Che Weihan and Jia Lijun (2008) applied Structural VAR and came to the conclusion that external demand shock had a positive effect on China's economy fluctuation and the short-term effect was evident. Meanwhile, there were oppositions from elsewhere. Zhao Liuyan (2008) conducted empirical research on causes of Chinese macro economy fluctuation by applying SVAR, and proposed that although Chinese economy openness increased over time, macro economy fluctuation was mainly caused by domestic supply, while international shock played very small part.

From above, no matter domestic or abroad, most research work focused on only some fields of external shocks, and very little has been done based on the combination of some major external shock factors. As macro economy is an organic system and endogenous variables interact with each other, it is very probable that external shock factors will influence economic fluctuation as a whole. Focusing on certain external shock factor or some facets of a certain external shock might well result in exaggeration of the factor's impact in question, hence derail the result. Therefore, this paper expands study scope and includes several major external shock factors in a model, attempting to identify their direction and degree of impact on China's macroeconomic fluctuation.

3. Methods and Variable Declaration

Most frequently used tools in empirical research of external shocks' impact on China's macro economy have been VAR and SVAR. VAR gains its popularity and becomes a standard analytical tool in econometrics as statistical test plays a more and more important role in evaluating interactive relationships of variables. However, since there are only lagged values instead of current values of endogenous variables at the right end of the model, the defect of VAR lies in its inability to depict the relativity of variables in current period that are hidden

in error terms, unaccountable and inter-dependent. To differentiate among impacts of different shocks and from the standpoint of economic importance, structural decomposition of VAR model information should be carried out to obtain structural information, In comparison, SVAR model is based on VAR model and it takes current interaction of endogenous variables into account while sets structural restraint conditions in the sense of economic importance. SVAR model is adopted in this paper as it makes up for the flaws of VAR model by analyzing dynamic interrelationships of variables in the model.

The SVAR model is set as follows:

$$A_0 Y_t = D + \sum_{i=1}^{p} \Gamma_i Y_{t-i} + \varepsilon_t \qquad\qquad (\ 1\ )$$

In which Y_t includes 8 endogenous variables, Y_t=(CRB,VAI,CPI,FFR,CNREER, EX,R,M2)^T;

CRB（Commodity Research Bureau）: index compiled by Commodity Research Bureau of the United States as approximate variable to evaluate commodity price change;
VAI: industrial added value;
CPI: consumer price index;
FFR: the federal funds rate, the approximate variable evaluating interest rate change;
CNREER: RMB real effective exchange rate;
The REER is the weighted average of bilateral nominal exchange rates eliminating inflation influence on purchasing power of foreign currencies. The CNNEER is calculated by the following equation:

CNREER =（ER×CPI*）/ CPI

In which ER is the bilateral exchange rate of RMB and US dollar, CPI is the Chinese consumer price index with base year of **, converted from relative ratio CPI according to China Statistical Yearbook and Statistical Bulletin; CPI* is urban consumer price index of the United States with base year of **, converted from fixed base CPI in the year of ** according to the US Department of Labor.
EX: monthly total export, as variable evaluating external demands;
M2: broad money supply
R: interest rate, taking 7-day CHIBOR (China inter-bank offered rate) as proxy variable

t for time variable, p for the maximum lag order number; A_0 for current period coefficient matrix; Γ_i for coefficient matrix in lag period Y_{t-i}; D for column vector in deterministic trends; ε_t for structural residual vector, including information in irreverent structural shock and fulfilling $E(\varepsilon_t \varepsilon_t') = I$.

4. Data Collection and Data Processing

4.1 Data selection. The current Chinese currency policy adjustment method was established after 1996. To minimize deviation from estimation in the model, monthly data of macro economy from January 1996 to March 2012 are selected and sample volume is 195.

4.2 Raw data processing. Firstly, industrial value added (VAI) and monthly nominal value of export volume are converted to actual according to fixed base CPI. Meanwhile, to eliminate influences of US dollar exchange rate change and inflation of main trade partners on commodity price, the actual values are further adjusted by US dollar real effective exchange rate; Secondly, owing to the fact that monthly data show seasonality, all variables are adjusted seasonally by Census X12 method to assure accuracy. Natural logarithms of variables other than interest rate are taken and undergo smooth processing; Finally, HP filter method is applied to filter all variables and to extract recursive elements. All variables are processed step by step according to above mentioned methods with Eviews 6.0. To keep it simple, all fluctuation components of data take their original form.

4.3 Stability test. To avoid spurious regression, time serial data go through ADF unit root test respectively. Result shows that all variables are experiencing I(0) stable process.

4.4 Best lag period determination and stability test. To make reasonable estimation in SVAR model, the best lag period must be determined. When lag period is long, model will be confined and effectiveness of coefficient estimation will be affected. When lag period is short, error terms may be severely interrelated, thus lead to inconsistency of coefficient estimation. Table 1 is the test result of lag order. It is observed that AIC, FPE, HQ standards give the lag order of 2, SC standard,1, and LR standard 1. We choose the lag order of 2. Test result shows that inverse roots of AR characteristic polynomial locate in the unit circle.

Table 1 Lag order determination

Lag	LogL	LR	FPE	AIC	SC	HQ
0	2217.606	NA	9.67E-21	-23.3821	-23.2449	-23.3265
1	3144.835	1766.151	1.04E-24	-32.5168	-	-32.0165
2	3267.822		5.61e-	-	-30.8083	-
3	3311.124	75.14865	7.04E-25	-32.922	-29.4915	-31.5322

Note：*lag order determined by the standard
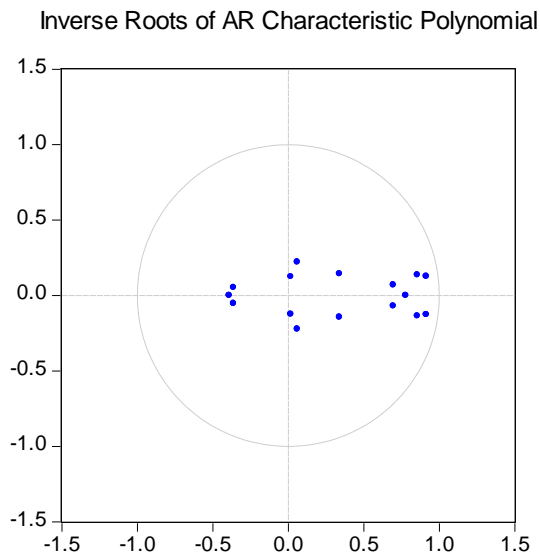
Figure 1 stability test (AR characteristic polynomial inverse root)

5. Empirical Analysis and Conclusion

5.1 Impulse response analysis

Impulse response analysis is made to analyze how external shocks influence China's macro economy. The sequence of variables is very important, and the first variable will not be affected by all other variables, but the shock on the first variable will be relayed to other variables; the second variable will affect all the rest variable (except the first variable), but will not be affect by these variables, so on and so forth. According to economic relationship among variables and the strength of their exogenous nature, the variables of the model are arranged in sequence as follows: commodity price index (CRB), industrial added value (VAI), CPI , the US fed fund interest rate (FFR), RMB real effective exchange rate (CNREER), export volume (EX), Chinese market interest rate (R) and currency supply (M2). The sequence order accords with tradition in relevant literatures.

Figure 2 depicts the dynamic response of China's macro economy toward shocks of commodity price (CRB), RMB real effective exchange rate (CNREER), interest rate and external demand on the scale of one standard deviation.

Response of VAI to Cholesky
One S.D. CRB Innovation

Response of CPI to Cholesky
One S.D. CRB Innovation

Response of R to Cholesky
One S.D. CRB Innovation

Response of M2 to Cholesky
One S.D. CRB Innovation

Response of VAI to Cholesky
One S.D. CNREER Innovation

Response of CPI to Cholesky
One S.D. CNREER Innovation
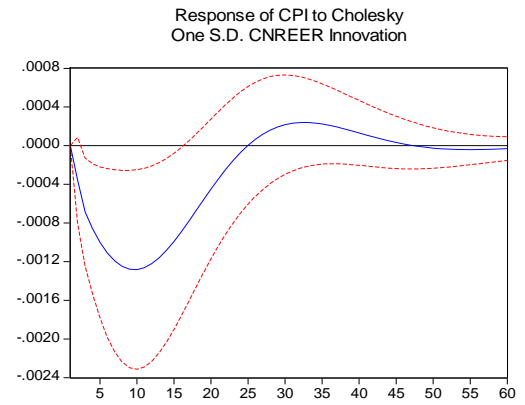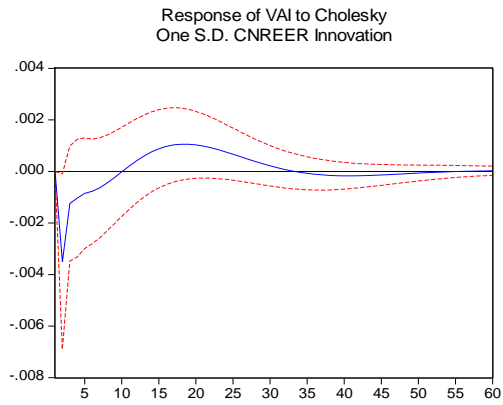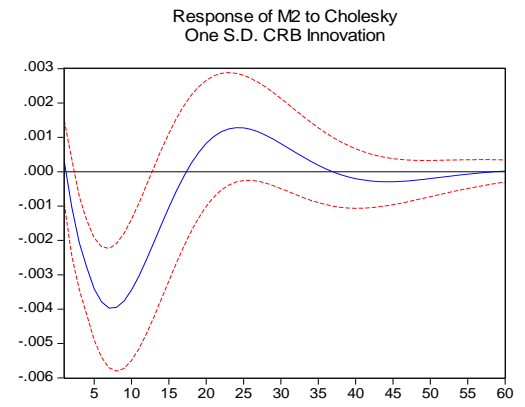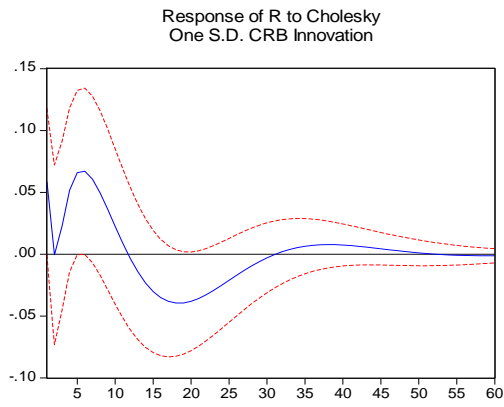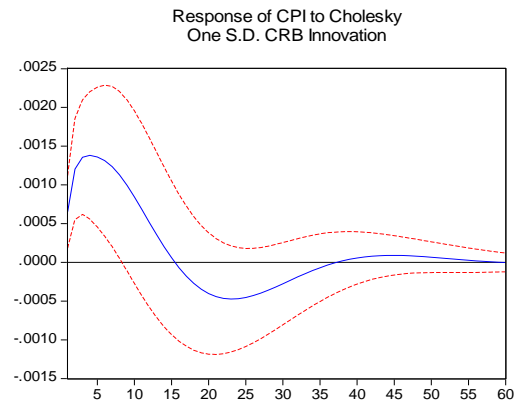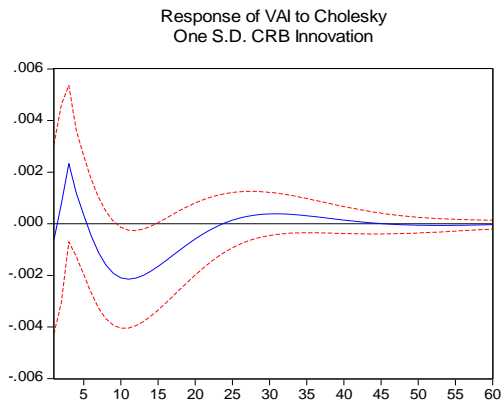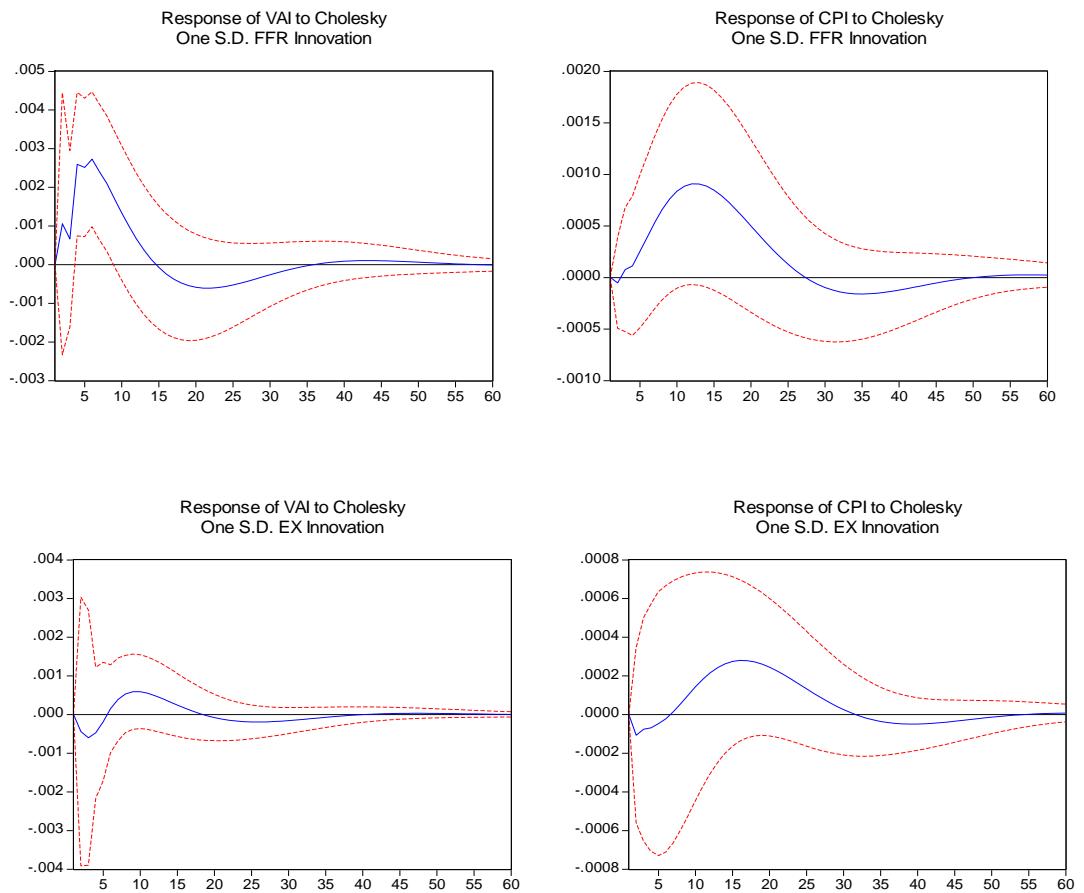
Figure2 Diagram of impulse response of macro economy toward various kinds of external shocks

The following judgment can be made based on analysis of impulse response function diagram:

(1) Commodity price shock

When commodity price went up by 1%, Chinese domestic output experienced a small rise and then swift drop. After it reached the lowest (-0.21%) in the 11th month , it rose up gradually. CPI responded quickly to positive shock of commodity price, and domestic price level reached its peak (0.14%) in the 4th month then the growth rate declined gradually. Domestic interest rate declined in a short while at the beginning of the shock, and it also reached the peak (6.71%) in the 6th month then gradually went down. Currency supply showed obvious decline and reached the lowest point (about -0.40%) in the 7th month.

(2) RMB real effective exchange rate shock

As 1% upward shock of CNREER appeared (RMB appreciation), domestic output obviously declined, and gradually recovered till after it touched the lowest value (-0.35%) in the second month. In the 18th month, the peak value (0.11%) appeared, and afterwards turned gradually to steady state. Domestic market price also declined at first, and to its lowest (0.13%) in the 10th month,

then the downward trend slowed down, and turned to uptrend from the 25th month onwards.

(3) International interest rate shock

As international interest rate declined, the domestic output swiftly went up and reached the peak (0.28%) in the 6th month. Domestic market price also went up after the shock and reached the top (0.10%) in the 12th month.

(4) External demand shock

As external demand declined, domestic output showed a slight increase for a short while and then descended with a quick pace to the lowest in the third month; later on it gradually ascended. As for domestic market price, it descended at the beginning. After it reached the lowest in the second month, it gradually ascended. The amplitude of fluctuation showed that external shock exerted short-term impact on domestic output.

(5)Analysis is made to evaluate impact of world crude oil price and food price variation, as shown in Figure 3.Increase of domestic output accorded with positive oil price shock. Negative effect appeared in the 8th month and afterwards domestic output returned to steady state. As 1% positive shock appeared, domestic output swiftly declined to its lowest in the 10th month and then went up gradually.
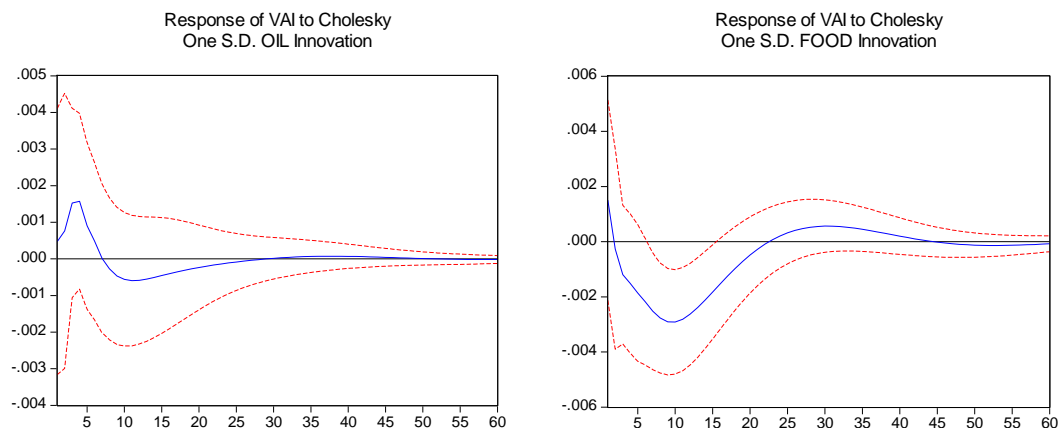
Figure 3 Impulse responding diagram - impact of world crude oil, food price shocks on domestic output

5.2 Variance decomposition

In order to measure the relativity of impacts of various internal and external factors on China's macro economy fluctuation, impulse response function and variance decomposition are applied. According to contribution of each structural shock to endogenous variable variation (measured by variance), the importance of different structural shock is further evaluated. The results of variance analysis of macro economy variables are listed through table 2 to table 5.

(1) Forecast variance of VAI variation relative to international commodity price shock enlarged gradually, and reached 5.03% in 18 months' time then became steady at around 5.23%. CPI variance also enlarged gradually to 17.52% in 9 months, indicating greater impact than that from output, exchange rate and interest rate shocks. Result showed that international commodity price shock is a very important factor pushing CPI upward. The impact on domestic market interest rate variance also enlarged over time, and it reached above 6% after 8 months. Initially forecast variance of M2 was influenced by its variation and CPI. However commodity price shock showed greater impact later on and reached the highest of 32.78% in the 11th month.

(2) Exchange rate shock showed very little impact on output fluctuation variance. The contribution maintained at around 3.2%. Forecast variance of CPI fluctuation increased more quickly, increasing to 15.11% in one year, and the contribution was only minor than variation itself and world food price. The impact on domestic market interest rate fluctuation was also eminent, with the highest of 9.2%. Exchange rate shock on M2 forecast variance also increased over time, and reached 15.53% in the 20th month.

(3) Forecast variance of output fluctuation relative to international interest rate shock enlarged gradually and steady at about 4.74%. The impact on CPI variance enlarges over time and reached 8% in 18 months. The impact on domestic market interest rate was also obvious, staying at the level of about 4.8%. The impact on M2 fluctuation variance was notable in the beginning period, and then it enlarged over time, and steady at around 15%.

(4) Forecast variances of VAI, CPI, R and M2 relative to external demand shock were very small and can be neglected.

5.3. Robustness test

To test the robustness of results, another model test is carried on after adjustment is made to the order of the indexes of US fed fund interest rate, RMB real effective exchange rate, export volume, interbank loan interest rate and currency supply M2. After several model adjustments, it is discovered that empirical results are not very much varied (the processes are omitted), which proves that the SVAR model applied in this paper is robust and empirical results are reliable.

6. Conclusion

Structural VAR is used in this paper to carry out empirical analysis. Impulse responding function and variance decomposition techniques are applied to discuss dynamic influence on China's macro economy fluctuation by external shocks including international commodity price, RMB real effective exchange rate, international interest rate and external demand. Following conclusions are made thereof:

6.1 External shocks are important factors bringing about China's macro economy fluctuation. As China's economy are more and more closely connected with global economy, external shocks exert greater impact on China's macro economy.

6.2 World commodity price shock will cause decrease in output growth and increase in CPI. World commodity price, interest rate and RMB exchange rate fluctuation are major factors leading to rising prices in domestic markets. Domestic market price responds more quickly to world commodity price than to interest rate. From the standpoint of variance decomposition, world commodity price contributes as high as 17.52% to CPI fluctuation, ranking only second to the variation in itself; international interest rate and RMB exchange rate shocks can contribute to CPI as high as 8.67% and 19.11%.

6.3 As an important indicator of international commodity price, crude oil price is individually inspected. It can be observed that increase of oil price does not affect the overall status of China's economy. Empirical studies show that China's economic growth rate does not decline as a result of rising oil price.

6.4 RMB appreciation can restrain domestic output and price level to some extent. As RMB appreciates, the output growth will be suppressed and declination may last about 10 months. RMB appreciation restrains inflation in a slow and long-lasting way, say about 2 years, but in the long run domestic economy may be trapped in deflation.

6.5 Domestic demand did not drop as drastically as predicted. Although in many research paper, China's economy is taken as export-oriented thus external demand fluctuation should influence China's economy greatly. But from empirical analysis, shrink of external demand will bring about decrease in output, but only in a small range and within short period. In addition, external demand change contributes so little to domestic economic fluctuation that it can be basically ignored.

Appendix:

Table 2 VAI variance decomposition

Period	VAI	CRB	FFR	CNREER	EX	CPI	R	M2
1	99.943	0.0567	0	0	0	0	0	0
2	97.311	0.1437	0.1657	1.8175	0.0287	0.2418	0.0308	0.2611
3	94.92	0.8969	0.2184	1.9351	0.0773	0.2348	0.044	1.6732
4	93.483	1.0726	1.1386	2.0396	0.1061	0.2432	0.1135	1.8039
5	92.008	1.0646	1.9628	2.092	0.1082	0.2747	0.322	2.1682
6	90.518	1.0715	2.9015	2.1299	0.1093	0.3722	0.6682	2.2295
7	89.072	1.2144	3.5898	2.1443	0.1271	0.5303	1.059	2.2635
8	87.644	1.5197	4.0857	2.1333	0.1609	0.7556	1.4549	2.2459
9	86.287	1.9573	4.3832	2.1062	0.2019	1.0357	1.8124	2.2164
10	85.024	2.4673	4.5381	2.0748	0.2417	1.3545	2.1161	2.1836
11	83.88	2.9933	4.5938	2.0517	0.2753	1.6908	2.3603	2.1545
12	82.867	3.4897	4.5908	2.0474	0.3004	2.0245	2.5483	2.1315
13	81.988	3.927	4.559	2.0681	0.3173	2.3385	2.6869	2.1146
14	81.24	4.2901	4.5195	2.1162	0.327	2.6199	2.7843	2.1032
15	80.613	4.5752	4.4851	2.19	0.3315	2.8608	2.8488	2.096
16	80.096	4.7864	4.4628	2.2849	0.3325	3.0577	2.8881	2.0918

17	79.676	4.9333	4.4551	2.3947	0.3318	3.2111	2.909	2.0894
18	79.339	5.0275	4.4616	2.5123	0.3304	3.3244	2.9173	2.088
19	79.071	5.0816	4.4798	2.631	0.3294	3.4029	2.9177	2.087
20	78.859	5.1074	4.5067	2.7447	0.3292	3.453	2.9138	2.0861
21	78.693	5.1149	4.5388	2.8489	0.33	3.4814	2.9084	2.085
22	78.561	5.1125	4.573	2.9403	0.3319	3.4945	2.9034	2.0837
23	78.455	5.1064	4.6066	3.0171	0.3347	3.498	2.8999	2.0822
24	78.369	5.1008	4.6376	3.0789	0.3382	3.4964	2.8985	2.0806

Table 3 CPI variance decomposition

Period	CPI	CRB	FFR	CNREER	EX	VAI	R	M2
1	83.832	3.9453	0	0	0	12.223	0	0
2	82.503	9.0598	0.0127	0.6256	0.0552	6.7752	0.9444	0.0243
3	77.779	12.237	0.0276	1.9766	0.0565	4.7116	3.1439	0.068
4	73.596	14.171	0.0537	3.3665	0.0551	3.611	5.0943	0.0524
5	69.993	15.488	0.1787	4.836	0.0498	2.9711	6.4372	0.046
6	66.843	16.423	0.4274	6.3627	0.0438	2.5719	7.2694	0.0582
7	64.061	17.054	0.8362	7.9235	0.0393	2.3159	7.6902	0.0802
8	61.589	17.409	1.3939	9.4893	0.0405	2.1512	7.8161	0.1105
9	59.382	17.525	2.0791	11.026	0.0514	2.0472	7.7471	0.1426
10	57.406	17.444	2.8541	12.498	0.0748	1.9833	7.5664	0.1732
11	55.64	17.219	3.6782	13.868	0.1121	1.9455	7.3368	0.1995
12	54.071	16.903	4.5101	15.106	0.1627	1.9234	7.1033	0.2201
13	52.692	16.545	5.3125	16.186	0.2249	1.91	6.8955	0.2346
14	51.496	16.188	6.0546	17.091	0.2957	1.9003	6.7311	0.2435
15	50.477	15.867	6.7135	17.815	0.3717	1.8913	6.6176	0.2475
16	49.627	15.604	7.2745	18.36	0.4492	1.8812	6.5557	0.248
17	48.934	15.414	7.7313	18.741	0.5247	1.8694	6.5405	0.2463
18	48.384	15.298	8.0849	18.975	0.5953	1.8558	6.5639	0.2435
19	47.96	15.253	8.3425	19.087	0.6587	1.8408	6.6164	0.2409
20	47.645	15.269	8.5156	19.105	0.7134	1.8254	6.688	0.239
21	47.419	15.331	8.6184	19.055	0.7587	1.8101	6.7692	0.2385
22	47.263	15.425	8.6662	18.963	0.7946	1.7958	6.8522	0.2395
23	47.161	15.538	8.6739	18.85	0.8216	1.7829	6.9308	0.2419
24	47.098	15.655	8.6552	18.733	0.8408	1.772	7.0007	0.2457

Table 4 R variance decomposition

Period	R	CRB	FFR	CNREER	EX	VAI	CPI	M2
1	95.619	2.0077	0.7646	0.0909	1.4019	0.0512	0.0644	0
2	94.541	1.4038	0.5718	0.596	1.0627	0.0654	0.8315	0.9278
3	93.49	1.4016	0.5938	0.5167	0.9782	0.1197	1.3048	1.5952
4	91.632	2.1404	0.7724	0.6666	0.8942	0.1933	1.6758	2.0256
5	88.831	3.2937	1.0464	1.1772	0.8347	0.2872	2.0722	2.457
6	85.809	4.3909	1.4386	1.9817	0.7912	0.3946	2.4101	2.7835
7	82.938	5.1997	1.8977	2.9966	0.7615	0.5061	2.6547	3.0459

8	80.44	5.6718	2.3948	4.1058	0.7446	0.6135	2.7975	3.232
9	78.382	5.86	2.8874	5.2077	0.741	0.7083	2.8543	3.3596
10	76.747	5.8634	3.3465	6.2189	0.7498	0.7867	2.8505	3.4371
11	75.475	5.7852	3.7484	7.0834	0.7691	0.8468	2.8156	3.4765
12	74.489	5.7103	4.0794	7.771	0.7961	0.8893	2.7777	3.4874
13	73.714	5.6955	4.3339	8.2754	0.8274	0.9161	2.7591	3.4789
14	73.085	5.7681	4.5142	8.6095	0.8598	0.9302	2.7743	3.4584
15	72.554	5.9309	4.6282	8.7995	0.8905	0.9347	2.8299	3.432
16	72.085	6.1691	4.6879	8.8786	0.9171	0.933	2.9249	3.4041
17	71.657	6.458	4.7067	8.8821	0.9386	0.9277	3.0524	3.3778
18	71.257	6.7697	4.6985	8.8422	0.9544	0.9213	3.2024	3.3548
19	70.882	7.0784	4.6754	8.7855	0.9647	0.9151	3.3633	3.336
20	70.531	7.3637	4.6474	8.7319	0.9703	0.9102	3.5238	3.3214
21	70.208	7.6115	4.6219	8.6939	0.9722	0.907	3.6745	3.3106
22	69.916	7.8144	4.6037	8.6778	0.9714	0.9056	3.8085	3.3029
23	69.655	7.9709	4.5952	8.6849	0.9691	0.9058	3.9215	3.2976
24	69.427	8.0838	4.597	8.7128	0.9661	0.9072	4.0116	3.294

Table 5 M2 variance decomposition

Period	M2	CRB	FFR	CNREER	EX	VAI	CPI	R
1	80.723	0.1167	4.4938	0.0036	0.1306	5.2679	7.8037	1.4606
2	67.445	1.2273	4.1319	0.2964	0.8319	9.3656	15.399	1.3028
3	61.634	4.598	3.3108	0.2727	0.7663	9.7815	17.688	1.9485
4	54.016	9.3987	2.8678	0.3871	0.7276	9.8898	19.305	3.408
5	47.248	15.097	2.9755	0.6424	0.6441	9.0959	19.641	4.656
6	41.109	20.588	3.4463	1.1946	0.5765	8.1459	19.385	5.5542
7	35.991	25.218	4.312	2.0376	0.5239	7.1986	18.745	5.9741
8	31.892	28.678	5.4124	3.1701	0.4924	6.3925	17.934	6.0284
9	28.694	30.982	6.6668	4.5242	0.4819	5.7511	17.058	5.8421
10	26.235	32.278	7.9818	6.0273	0.4929	5.2635	16.186	5.5356
11	24.354	32.775	9.2937	7.5947	0.5243	4.9029	15.357	5.1976
12	22.916	32.686	10.549	9.1476	0.5743	4.6403	14.598	4.8885
13	21.811	32.204	11.708	10.614	0.6403	4.4498	13.927	4.6454
14	20.953	31.497	12.74	11.935	0.7188	4.31	13.359	4.4873
15	20.276	30.699	13.622	13.067	0.8054	4.2043	12.907	4.4199
16	19.731	29.913	14.342	13.982	0.8958	4.1205	12.576	4.4386
17	19.283	29.213	14.897	14.671	0.9854	4.05	12.369	4.5318
18	18.904	28.641	15.292	15.143	1.0701	3.9873	12.279	4.6832
19	18.578	28.216	15.54	15.419	1.1463	3.9293	12.297	4.8743
20	18.29	27.935	15.663	15.533	1.2117	3.8746	12.407	5.0863
21	18.035	27.782	15.684	15.523	1.2648	3.823	12.587	5.3022
22	17.807	27.731	15.63	15.429	1.3053	3.7749	12.816	5.5079
23	17.603	27.753	15.526	15.288	1.3339	3.731	13.072	5.6931
24	17.421	27.819	15.395	15.134	1.3519	3.692	13.336	5.8509

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