

## The Effect of Financial Fragility on the Capital Allocation Efficiency of China's Real Economy

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**Abstract:** In this paper, based on WuZhiWen's 2002 construction method on comprehensive index of financial fragility, respectively from the fragility of the financial market subsystem, the fragility of the banking subsystem, the fragility of the financial supervision subsystem and the fragility of the macro-economic environment subsystem, to measure the degree of China's financial fragility during the period of 1997 to 2016. Then taking the four subsystem indicators and comprehensive indicators into the Wurgler's 2000 model of capital allocation efficiency. The result shows that, firstly, China's financial fragility generally declined in 1997 to 2016, and the fragility of the financial supervision subsystem was the highest. Secondly, the financial fragility has an inhibitory effect on the capital allocation of China's real economic capital, which the financial supervision subsystem has a particularly obvious suppression on it.

**Keywords:** Financial fragility, real economy, capital allocation efficiency.

**INTRODUCTION**

The development of global economy showed a positive trend since 2017, especially in China's economic performance, which not only maintaining the high rapid in economic growth.

But also improving the quality and efficiency of economic growth, but it is undeniable that the financial fragility has always existed in China's financial system.

And many scholars have studied this problem and constructed a comprehensive index to measure the financial fragility of China. As we all known, the ultimate aim of the financial development is to serve the real economy, so it is very necessary to explore how the financial fragility influence the capital allocation of China's real economy. Then according to influence results, to formulate corresponding policies to promote the continuous development of China's real economy.

**RESEARCH OF FINANCIAL FRAGILITY****Literature Review of financial fragility**

There are many scholars having studied financial fragility. Some researchers such as Kregel J. A [1], shows that the competitive market is more fragile because it does not value the possibility that a currently distressed firm could become a provider of liquidity some period in the future. Svetlana Andrianova [2], shows the total value of financial assets in our database is around 50% higher than that accounted for by commercial banks alone. Loayza Norman and Romain Ranciere [3], measures of financial fragility and analyses the effects of financial depth and fragility in classic panel growth regressions. Some Chinese scholars also have studied China's financial fragility in different aspects, such as Huang jinlao [4], Tao xionghua [5] find that the financial fragility indeed influence the development of real economy through the panel data regressions.

**The construction of financial fragility index**

This paper based on the existing research results and the current financial development situation in China, using WuZhiWen's [6] construction method on comprehensive index of financial fragility, also based on the significant statistical study of Detragiache and Demirgiic-Kunt [7], Graciela Kaminsky, Saul Licondo and Garmen M. Reinhart [8] to choose 17 indicators of macro and micro to measure the current fragility of China's financial system during the period of 1997 to 2016. Loayza Norman and Romain Ranciere

Generally speaking, the basic framework of financial fragility index consists of four subsystems: ①the fragility of the financial market subsystem (20%), including the P/E ratio, the stock market value /GDP, the amplitude of shanghai

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composite Index , the debt dependence and the fiscal deficit /GDP, which mainly measure the capital market and the macro-economic situation. ② The fragility of the banking subsystem (40%), including three variables of state banks such as the ratio of non-performing loans, the capital adequacy ratio and the ratio of assets income. This subsystem pays special attention to the security, liquidity and profitability of the state banks. ③ The fragility of the financial supervision subsystem ( 20%), including M2 growth rate, M2/M1, one year real deposit interest rate, the loan growth rate of financial institution, foreign exchange reserve / import exchange (month), the difference of current account /GDP. This subsystem mainly focuses on the situations of financial institutions and foreign trade. ④ The fragility of the macro-economic environment subsystem (20%) including GDP growth rate, fixed investment growth rate and CPI (consumer price index).

According to Wu Zhiwen's construction method of financial fragility index, this paper collects and analyzes the data from 1997 to 2016, and the results as follow:

**Table-1: The comprehensive index of financial market subsystem (%)**

	A <sub>11</sub> P/E ratio	A <sub>12</sub> the stock market value /GDP	A <sub>13</sub> the amplitude of shanghai composite index	A <sub>14</sub> the debt dependence	A <sub>15</sub> the fiscal deficit /GDP	A <sub>1</sub> comprehensive index
1997	20.83	10.00	70.4	68.00	20	37.85
1998	14.50	11.25	14.78	86.25	20	29.36
1999	18.22	20.00	66.55	80.00	35	43.95
2000	45.50	39.00	44.3	77.00	50	51.16
2001	18.97	30.00	32.30	68.00	35	36.85
2002	16.45	22.00	6.38	71.00	50	33.17
2003	16.98	21.00	0	65.00	35	27.60
2004	7.11	21.00	22.4	62.00	20	26.50
2005	0.45	3.75	10	53.00	20	17.44
2006	14.10	31.00	86.6	56	20	41.54
2007	54.50	100.00	88.1	100	0	68.52
2008	20.00	28.00	100	30.00	10	37.60
2009	17.66	60.00	81.1	59.00	35	50.55
2010	14.22	54.00	23.75	56.00	35	36.59
2011	2.01	34.00	25.55	45.00	20	25.31
2012	1.11	33.00	1.3	22.50	35	18.58
2013	2.95	30.00	8.55	30.00	35	21.30
2014	11.15	48.00	56	30.00	35	36.03
2015	20.98	67.00	80	81.9	50	59.98
2016	15.83	68.00	10.9	82.5	60	47.45

**Table-2: The comprehensive index of the banking subsystem (%)**

	B11 the ratio of non-performing loans,	B12 the capital adequacy ratio	B13 the ratio of assets income	B1 comprehensive index
1997	95	46.40	71	70.80
1998	91.58	75.05	51.2	72.61
1999	100	67.85	68	78.62
2000	80.4	58.18	71	69.86
2001	68.36	57.73	72.5	66.20
2002	84.94	63.58	78.5	75.67
2003	70.4	64.03	47	60.48
2004	23.12	33.05	10.31	22.16
2005	17.27	44.375	12.00	24.55
2006	14.97	45.20	11.38	23.85
2007	12.85	17.58	0.46	10.30
2008	2.62	17.32	3.85	7.93
2009	1.18	46.33	3.85	17.12
2010	0.33	17.40	2.31	6.68
2011	0.02	12.73	0.62	4.45
2012	0.00	5.63	0.31	1.98
2013	0.09	15.06	0.00	5.05
2014	0.54	2.51	0.46	1.17
2015	1.30	0.00	2.15	1.15
2016	1.36	1.13	3.54	2.01

**Table-3: The comprehensive index of financial supervision subsystem (%)**

	C <sub>11</sub> M2 growth rate	C <sub>12</sub> M2/M1	C <sub>13</sub> one year real deposit interest rate	C <sub>14</sub> the loan growth rate of financial institution	C <sub>15</sub> foreign exchange reserve / import exchange (month)	C <sub>16</sub> the difference of current account /GDP	C <sub>1</sub> comprehensive index
1997	47.6	28.4	36.7	81.2	14.9	37.6	41.1
1998	19.6	32.6	18.9	81.0	14.4	21.8	31.4
1999	19.4	28.4	11.3	80.8	15.5	13.0	28.1
2000	3.8	23.6	11.3	80.8	17.5	11.4	24.7
2001	18.8	26.6	11.3	81.0	16.1	8.7	27.1
2002	30.8	20	9.9	81.1	15.0	16.2	28.8
2003	47.6	20.6	9.9	81.3	14.9	18.7	32.2
2004	19.4	21.8	11.3	100	13.8	31.2	32.9
2005	35.6	28.4	11.3	80.6	12.2	83.7	42.0
2006	31.4	34.4	12.6	81.0	11.0	94.0	44.1
2007	30.2	28.4	20.7	81.0	8.36	100	44.8
2008	36.8	41.6	11.3	81.0	7.1	96.1	45.6
2009	100	35.6	11.3	81.9	0.0	80.9	51.6
2010	48.2	33.2	13.8	81.2	3.7	80.6	43.4
2011	17.2	46.4	17.5	80.8	6.0	5.5	28.9
2012	17.6	86.0	15.0	80.9	6.0	17.5	37.2
2013	17.2	90.6	13.8	80.8	4.6	10.7	36.3
2014	14.4	100	13.8	80.8	4.6	15.4	38.2
2015	16.6	97.7	7.5	80.9	4.3	18.3	37.6
2016	12.6	87.2	10.0	80.8	5.2	11.7	34.6

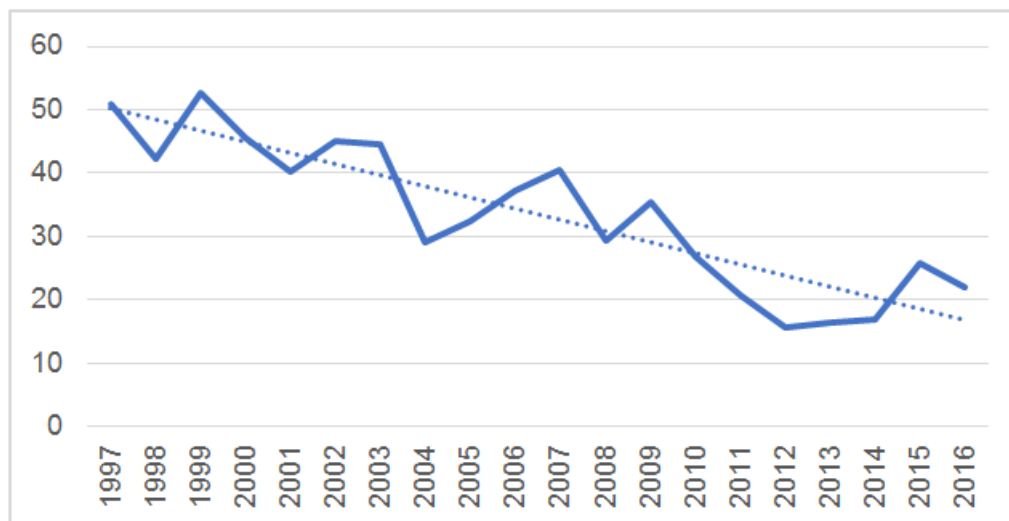
**Table-4: The comprehensive index of macro-environment subsystem (%)**

	D11 GDP growth rate	D12 fixed investment growth rate	D13 CPI	D14 comprehensive index
1997	18.7	69	14.1	33.9
1998	8.7	3	4.2	5.3
1999	7.3	88	7.1	34.1
2000	12.7	21	1.3	11.7
2001	12	0	3.6	5.2
2002	17.3	13	3.9	11.4
2003	30	89.2	5.8	41.7
2004	12	93.6	19.4	41.7
2005	56	96	9.1	53.7
2006	82.4	69	7.3	52.9
2007	100	78	27.5	68.5
2008	22	83.6	38.6	48.1
2009	18.0	100	3.5	40.5
2010	38.0	68	16.6	40.9
2011	18.7	68	34.1	40.23
2012	8.7	33	13.3	18.3
2013	7.80	21	13.2	14.0
2014	5.67	7.3	9.95	7.64
2015	2.67	78	7.2	29.29
2016	1.33	59	10	23.44

**Table-5: The comprehensive index of financial fragility (%)**

	A <sub>1</sub>	B <sub>1</sub>	C <sub>1</sub>	D <sub>1</sub>	$Z=(A_1+2B_1+C_1D_1)/5$
1997	37.85	70.8	41.07	33.92	50.89
1998	29.36	72.61	31.38	5.3	42.25
1999	43.95	78.62	28.06	34.12	52.67
2000	51.16	69.86	24.73	11.67	45.46
2001	36.85	66.2	27.07	5.2	40.30
2002	33.17	75.67	28.84	11.38	44.95
2003	27.6	60.48	32.17	41.67	44.48
2004	26.5	22.16	32.9	41.67	29.08
2005	17.44	24.55	41.95	53.7	32.44
2006	41.54	23.85	44.05	52.9	37.24
2007	68.52	10.3	44.77	68.5	40.48
2008	37.6	7.93	45.63	48.07	29.43
2009	50.55	17.12	51.61	40.5	35.38
2010	36.59	6.68	43.44	40.85	26.85
2011	25.31	4.45	28.92	40.26	20.68
2012	18.58	1.98	37.17	18.31	15.60
2013	21.3	5.05	36.27	13.98	16.33
2014	36.03	1.17	38.16	7.64	16.83
2015	59.98	1.15	37.57	29.29	25.83
2016	47.45	2.01	34.57	23.44	21.90

From the table 1-6 and figure 1, we can find that the financial fragility of China has shown a general downward trend in the last 20 years. There are 6 peaks in the period of 1998, 2000, 2004, 2008, 2010 and 2016, which the highest is 50.89 in 1997. The average level of the financial fragility index is 33.45, which is a normal level in the last 20 years. Among the four subsystems, the fragility of the financial supervision subsystem is higher one, the average level is 36.52, then followed by the sub-system of the financial market, the banking subsystem and the macroeconomic environment.



**Fig-1: The general trend of China's financial fragility**

## Empirical analysis

### The selection of model

Wurgler uses the panel data of 65 countries provided by the world bank from 1963 to 1995 as samples to construct an estimation model of the efficiency of capital allocation and calculates the differences in the efficiency of capital allocation in different countries. It is found that the efficiency of capital allocation in developed countries such as Germany, the United States, Switzerland and New Zealand is generally high, while the efficiency of capital allocation in developing countries such as India and Kuwait are generally low, thus concluded that "the more developed the financial market is, the higher the efficiency of capital allocation". At the same time, it is also found that in the "rising" industry, we should continue to increase investment, while in the "down" industry, we should reduce capital inflows. Here's wurgler's capital allocation efficiency estimation model as follows:

$$\ln \frac{I_{i,t}}{I_{i,t-1}} = \alpha + \eta \ln \frac{V_{i,t}}{V_{i,t-1}} + \varepsilon_{i,t}$$

In the above equation,  $I_{i,t}$  is the total fixed capital of sample I in year t,  $V_{i,t}$  is the industrial added value of sample I in year t,  $\varepsilon$  is a random perturbation term,  $\eta$  is the ratio of the capital allocation efficiency, which explains the part of the increment in the investment growth rate caused by the increment in the growth rate of the industrial added value, the greater the  $\eta$ , the higher the efficiency of capital allocation. At the same time, if  $\eta > 0$ , which represents the capital allocation is efficient, if  $\eta < 0$ , which represents the invalid capital allocation.

$$\ln \frac{I_{i,t}}{I_{i,t-1}} = \alpha + \beta_1 \ln \frac{V_{i,t}}{V_{i,t-1}} + \beta_2 \ln F_{i,t} + \beta_3 \ln \frac{V_{i,t}}{V_{i,t-1}} * \ln F_{i,t} + \varepsilon_{i,t}$$

In the above equation,  $F_{i,t}$  represents the comprehensive index of financial fragility in the sample. Then taking the four comprehensive indexes of subsystems into this equation. According to the regression results, to find the effects of financial market subsystem, banking subsystem, financial monitoring subsystem and macro environment subsystem on the capital allocation of real economy.

### Unit root test

It's necessary to have a unit root test on the data to avoid the spurious regression. From the test results of table 6, we can see that all the variables do not reject the null hypothesis at the significant level of 1%, but they all reject the null hypothesis after the one order difference. So we can think that all variables are stable, and there is no possibility of spurious regression.

**Table-6: The results of unit root test**

	t-bar (ADF)	1 0%	5 %	1 %	p 值
$\ln(I_{i,t}/I_{i,t-1})$	-0.700	-1.607	-1.960	-2.692	0.415
$\ln(V_{i,t}/V_{i,t-1})$	-0.742	-1.607	-1.960	-2.692	0.381
$\ln FF_{i,t}$	-1.107	-1.607	-1.960	-2.692	0.267
$\ln FA_{i,t}$	-3.100	-2.661	-3.040	-3.857	0.445
$\ln FB_{i,t}$	-4.169	-3.277	-3.674	-4.533	0.020
$\ln FC_{i,t}$	-2.204	-3.277	-3.674	-4.533	0.461
$\ln FD_{i,t}$	-2.726	-3.277	-3.674	-4.533	0.238
$D.\ln(I_{i,t}/I_{i,t-1})$	-4.762	-1.607	-1.961	-2.699	0.000
$D.\ln(V_{i,t}/V_{i,t-1})$	-5.697	-1.607	-1.961	-2.699	0.000
$D.\ln FF_{i,t}$	-4.884	-1.607	-1.961	-2.699	0.000
$D.\ln FA_{i,t}$	-4.268	-1.607	-1.961	-2.699	0.000
$D.\ln FB_{i,t}$	-5.354	-1.607	-1.961	-2.699	0.000
$D.\ln FC_{i,t}$	-4.395	-1.607	-1.961	-2.699	0.000
$D.\ln FD_{i,t}$	-6.968	-1.607	-1.961	-2.699	0.000

### THE RESULTS REGRESSION

The model (1) mainly analyses the capital allocation efficiency of China's real economy, Model (2) analyses the influence of financial fragility comprehensive index on the capital allocation of real economy. Model (3), (4), (5), (6) respectively analyze the influence of financial market subsystem, the bank subsystem, the financial supervision subsystem and macro-economic environment subsystem on the capital allocation of real economy. The results of regression are shown in Table-7.

Table-7: The results of regression

解释变量	模型					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(V_{i,t}/V_{i,t-1})$	0.862	2.290	0.691	1.036	6.449	2.179
$\ln FF_{i,t}$		0.070				
$\ln(V_{i,t}/V_{i,t-1}) * \ln FF_{i,t}$		-0.407				
$\ln FA_{i,t}$			-0.024			
$\ln(V_{i,t}/V_{i,t-1}) * \ln FA_{i,t}$			0.053			
$\ln FB_{i,t}$				0.015		
$\ln(V_{i,t}/V_{i,t-1}) * \ln FB_{i,t}$				-0.055		
$\ln FC_{i,t}$					0.163	
$\ln(V_{i,t}/V_{i,t-1}) * \ln FC_{i,t}$					-1.551	
$\ln FD_{i,t}$						0.026
$\ln(V_{i,t}/V_{i,t-1}) * \ln FD_{i,t}$						-0.329
常数项	0.026	-0.216	0.114	-0.013	-0.551	-0.076
$R^2$	0.507	0.551	0.520	0.584	0.570	0.520

In the model (1), the coefficient of  $\ln(V_{i,t}/V_{i,t-1})$  is positive, indicating that China's real economic capital allocation is effective. In the model (2), when the comprehensive index of financial fragility add to the formular, the coefficient of  $\ln(V_{i,t}/V_{i,t-1}) * \ln FF_{i,t}$  are negative, which shows that the financial fragility of our country has indeed suppressed the efficiency of the capital allocation in the real economy. The coefficient of  $\ln(V_{i,t}/V_{i,t-1}) * \ln FA_{i,t}$  is positive when add the index of the fragility of the financial market subsystem in the model (3), according to the construction of this index, it shows that the prosperity of the stock market and the expansion of the debt scale indeed promote the allocation of economic capital in some degree. As the same way, when add the other subsystems of financial fragility index into the model (4), (5), (6), we can see the coefficient of these are all negative, which shows that the banking system, the financial supervision system and the fragility of the macro-economic environment have suppressed the effect on the capital allocation of China's real economy, and the financial supervision system has the higher inhibitory effect. In the model (5), when add financial supervision comprehensive index alone, the intercept becomes significantly larger, according to the construction of this index, we can conclude that the development of the finance and foreign trade indeed improve the efficiency of the capital allocation of the real economy in China, but It also has a reverse effect.

## THE CONCLUSIONS AND SUGGESTIONS

Financial fragility is closely related to economic development and financial security. According to the above analysis, we can find that: firstly, China's financial fragility generally declined in 1997 to 2016, and the fragility of the financial supervision subsystem was the highest. Secondly, the financial fragility did have an inhibitory effect on the capital allocation of China's real economic capital, which the financial supervision subsystem has a particularly obvious suppression on it.

Based on the above analysis results and the current situation of financial development in China, here are some suggestions as follows:

- It is particularly important to pay more attention to the research work of financial fragility in China, especially with a scientific and effective construction method of index system and measurement method to monitor China's overall financial security. In the first formal assessment of China's financial sector in 2011, IMF pointed out that China's financial system is generally stable, but the fragility is increasing gradually. To solve this problem, we can learn the experience from western countries, setting up a special financial fragility research group, which can effectively identify the level of financial fragility in China.
- It is necessary to strengthen the financial supervision in China. According to the results of the regression model, we can see that the financial supervision subsystem has a particularly obvious suppression on the capital allocation. As we all known, the financial supervision system is the guarantee of the development of modern financial industry. Therefore, we should actively take effective ways to strengthen the supervision of financial activities, such as establishing a safety net of financial management institutions to strengthen the mechanism of financial information disclosure, and constantly improve the level of financial legislation in the legal system.
- We must insist that finance should serve the development of the real economy. It can be seen from the model (3) that the prosperity and development of the financial market in China has promoted the capital allocation of the real

economy. But In the last few years, the proportion of the total stock market value /GDP is constantly increasing, which indicates that the most of capital flows to the virtual economy, so it's necessary to a guide the financial capital return to the real economy and prevent the "hollowing" phenomenon of the real economy.

- The innovation of the financial system also need to strengthen to prevent the risk of finance. With the deepening of the internationalization in the financial industry, the original financial system has been unable to adapt to the new economic and financial situation. For what we can promote the reform of the property rights system of large state-owned banks, establish a modern corporate governance structure based on the clear property rights system, and constantly strengthen the awareness of internal control and the prevention of risk. At the same time, we need to strengthen the development of financial asset management companies, which can promote their market-oriented transformation and dispose the non-performing assets effectively.

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