

# An Empirical Analysis on Consumption Effect of Chinese Growth Enterprise Market—Based on a State Space Model

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**Abstract.** Since the concept of consumption effect put forward, scholars at home and abroad mainly focus on the main board market (MBM), lacking the study of Growth Enterprise Market (GEM). This paper aims at the consumption effect on GEM with the comparison with MBM. A time-varying parameter state space model is used to examine the dynamic consumption effect of Chinese GEM and MBM, finding that both two markets have significant positive dynamic consumption effect, but there are significant differences between them, namely the former one is obviously lower than the latter one. We can draw a conclusion that both GEM and MBM have a significant consumption effect, but there are obvious differences between them.

## Introduction

Modigliani (1954), an American economist, was the first to put forward the concept of the consumption effect of the financial markets [1]. Zandi (1999) thought that the consumer confidence got enhanced with the development of the security market [2]. Stieglitz (1997) found that the stock market effect on consumption is small through the empirical study on the stock market of the United States in 1987. [3]. Martha (1998), using the SRC consumer survey data of Michigan, found that 85% of respondents believed that the stock market had no effect on their spending and savings [4]. Jansen, etc (2002) took 11 European nations' data from 1986 to 2001 to analyze the relationship between stock index and consumer spending. The results showed that the change of the stock market could affect consumers' confidence in the short term but did not exist further influence in the long term [5].

Research in China started in Zang (1995)[6]. Then Lu (2006) came to a conclusion that every point the stock price index increased, social retail consumer goods per person increased by 0.0157 Yuan [7]. Shi, Jiang(2004) explained the consumption effect of stock market from the capital structure point [8]. Luo (2004) concluded that the Chinese stock market had weak consumption effect and the MPC of financial assets was 0.00486 by using regression analysis based on LC-PIH [9]. Yang (2006) also drew the same conclusion based on a VAR model [10]. Li and Xu (2003) revealed that the Chinese stock market consumption effect was very weak through the empirical analysis. [11].

## Methodology

A state space model is employed in this paper, aiming at analyzing the consumption effect from a dynamic point of view.

## State Space Model

This paper employs state space model to do empirical analysis of dynamic consumption effect of Chinese GEM and MBM. Akaike (1990) was the first to present state space model. The specific expression of state space model in this paper is as follows:

$$\begin{cases} x_t = Z_t \alpha_t + d_t + u_t \\ \alpha_t = T_t \alpha_{t-1} \end{cases} \quad (1)$$

The first equation is signal equation and the second one is state equation.  $Z$  is the independent variable vector.  $\alpha$  is unobservable state vector.  $d$  and  $u$  are estimated parameters.  $T$  is coefficient of state equation.

### Data's Selection and Processing

We select the per capita consumption expenditure of urban households (hereinafter referred to as consumption, PC) as the dependent variable. Then we take per capita disposable income of urban households (hereinafter referred to as income, PD), Shenzhen GEM index (hereinafter referred to as GEM index, VI) and Shanghai securities composite index (hereinafter referred to as main board index, MI) as the independent variable. These data are monthly data from the national bureau of statistics (NBS) and sina.com. Sample interval is selected for June 2010 to December 2015. Due to Chinese consumption (PC) and income (PI) only have quarterly data; we take the total retail sales of social consumer goods as the weights to divide the quarterly data into monthly data. As consumption (PC) and income (PI) present obvious seasonal, we use the method of X12 to make seasonal adjustment. As the natural logarithm processing of data does not change the original quantitative relation, can make its trend linearization and eliminate heteroscedasticity of time-series, we take logarithm of variables, including consumption, income, the GEM index and the MBM index and respectively shorthand for LPC, LPD, LVI and LMI.

### Empirical Analysis on the Dynamic Consumption Effect of Two Stock Markets Based on State Space Model

As the comprehensively deepen reforms gradually develop and deepen, it determines that the stock index and the marginal propensity to consume of income will present a phased variation with deepening the reform. And the use of time-varying parameter model of state space model can analyze the dynamic change of the income and the consumption effect on stock market.

**The Empirical Test on the Dynamic Consumption Effect on the GEM.** Time-varying Parameter Model of GEM. The signal equation:

$$LPC = sv1 * LPD + sv2 * LVI + [\text{var} = \exp(c(1))] \quad (2)$$

The state equation:

$$sv1 = sv1(-1) \quad (3)$$

$$sv2 = sv2(-1) \quad (4)$$

Parameter Estimation of GEM. We use EIVEWS 7.0 to do parameter estimation at the time-varying parameter model of both GEM and MBM, the estimated results are shown as Table 8. It can be seen that the test results each fixed and time-varying parameters of the final estimate results are significant at the 1% significant level according to the Z-statistic, which shows that the estimation of GEM time-varying parameter model is fairly reliable.

Table 1 Estimation of time-varying parameters model about GEM

Fixed parameters	coefficient	Standard deviation	Z-stat	prob
C(1)	-8.5031***	0.1922	-44.2450	0.0000
Time-varying parameters	final state	Error of mean square	Z-stat	prob
SV1	0.9244***	0.0085	109.0027	0.0000
SV2	0.0283***	0.0094	2.9952	0.0027

PS: \*\*\* means significant at the 1% level;

The Result Analysis. In order to guarantee the stability of the time-varying parameters, we abandon a few initial unstable values and get the dynamic effects of fairly stable income (LPD) and

GEM index (LVI) on consumption, namely dynamic marginal propensity to consume. We can see specific at Table 1. From Table 1, we can see that marginal consumption (MPC) of income (LPD) in GEM is fairly high on the whole. The average value is 0.914 and the fluctuation is steady, ranging from 0.8946 to 0.9363. The marginal consume (MPC) of Gem index (LVI) is moderate on the whole. The average value is 0.0370 but presents a trend of cycle fluctuation, ranging from 0.0169 to 0.0612.

Table 2 Descriptive about dynamic MPC of GEM

	average	median	maximum	minimum	variance	skewness	kurtosis	J-Bstat	prob
MPC of income	0.9174	0.9167	0.9363	0.8946	0.0110	-0.1448	2.0704	1.4615	0.4815
MPC of GEM index	0.0370	0.0380	0.0612	0.0169	0.0118	0.1528	2.0490	1.5381	0.4635

**Parameter Estimation of MBM.** Results in Table 3, show that each parameters of the final estimation are significant at the 1% significant level, which shows that the estimation of MBM time-varying parameter model is fairly reliable.

Table 3 Estimation of time-varying parameters model about MBM

Fixed parameter	coefficient	Standard deviation	Z-stat	prob
C(1)	-18.8012****	0.000001	-40344233	0.0000
Time-varying parameter	Final state	Error of mean square	Z-stat	prob
SV1	0.8874****	0.0001	15352.0300	0.0000
SV2	0.0607****	0.0001	1078.5990	0.0000

PS: \*\*\* means significant at the 1% level;

The Result Analysis. In order to guarantee the stability of the time-varying parameters, we abandon a few initial unstable values and get the dynamic effects of fairly stable income (LPD) and MBM index (LMI) on consumption, namely dynamic marginal propensity to consume. We can see specific at Table 2. From Table 2, we can see that marginal consumption (MPC) of income (LPD) in MBM is fairly high on the whole. The average value is 0.88329 and the fluctuation is steady, ranging from 0.8164 to 0.9146. The marginal consume (MPC) of MBM index (LMI) is high. The average value is 0.0370 but presents a trend of cycle fluctuation, ranging from 0.0351 to 0.1267.

Table 4 Descriptives about dynamic MPC of GEM

	average	media	maximu	minimu	varianc	skewnes	kurtosi	J-Bsta	prob
	e	n	m	m	e	s	s	t	
MPC of income	0.8829	0.8942	0.9146	0.8164	0.0336	-1.0084	2.4425	6.7500	0.0342
MPC of MBM	0.0647	0.0543	0.1267	0.0351	0.0313	1.0033	2.4384	6.6933	0.0352

### Comparative Analysis of Dynamic Consumption Effect on GEM and MBM

**The Comparison of the Propensity to Consume of Income.** The marginal propensity to consume of income of the GEM and MBM presents some features as follows: the marginal propensity to consume (MPC) of income (LPD) is high on the whole; the fluctuation trend is basically the same, namely a steady trend of fluctuations, which is basically valued at about 0.9. (2) The comparison of the propensity to consume of stocks. The marginal propensity to consume of income of the GEM and MBM presents some features as follows: from the perspective of horizontal trend, values of both two stock markets are positive; but there are obvious differences, which indicates that the MBM consumption tendency is obviously higher than the GEM; the former's average is 1.75 times of the latter's; but in recent years the gap between the markets has been reducing; from the

perspective volatility trends, both two markets present a trend of cycle fluctuation and the fluctuation range is very big; generally speaking, the MPC fluctuation trend of MBM is higher than the GEM, but the fluctuation trend gap between two markets has been gradually disappeared in recent years.

## Conclusion

A time-varying parameter state space model is employed to examine the dynamic consumption effect of the GEM and MBM and compare the differences between them. Research has shown that both two stock markets have significantly positive dynamic consumption effect, but there are large differences between them. From the point of horizontal trend, both the stock markets have significantly positive consumption effect, but the dynamic consumption effect of MBM is always higher than GEM and the former one is 1.75 times of the latter one. From the point of fluctuation trends, both the stock markets present a cycle trend of fluctuations and the fluctuation range is very big. Generally speaking, the MPC fluctuation trend of MBM is higher than the GEM, but the fluctuation trend gap between two markets have been gradually disappeared in recent years. We need try to reach a dynamic unification with the MBM.

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