

## **Is Consumer Sentiment Index Useful in Predicting Household Consumption? A Directional Analysis with Korean Data \***

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This paper examines whether the consumer sentiment index (CSI) in Korea is useful in forecasting household consumption. The methodology used is a directional analysis which tests the predictability of the CSI on the direction of changes in consumption. The direction of changes in consumption is considered as either positive versus negative growth or high versus low growth. The study finds that the CSI has little explanatory power for the direction of future consumption changes in Korea. However, the sentiment index is closely related to current period consumption variations. The CSI in Korea seems to have a limited value that can be used as an indicator of current consumer behavior. This paper also finds that the individual expectation indexes included in consumer surveys do not provide useful information on future consumption changes.

JEL Classification: D12

Keywords: consumer sentiment index (CSI),  
household consumption spending, directional analysis

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\* Received May 1, 2008. Accepted July 29, 2008. This work was supported by Hankuk University of Foreign Studies Research Fund of 2008. The authors thank two anonymous referees for helpful comments and suggestions.

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## 1. INTRODUCTION

The consumer sentiment index (CSI) is widely used as an indicator of future consumption spending. In an economic downturn, decreasing consumer sentiment is often quoted by the media as an indicator of depressed economic conditions for the coming months. The CSI is even officially included as one of several components in calculating leading economic indicators in many countries such as Korea and the United States.

Despite the widespread attention given to the CSI, the relationship between consumer sentiment and household spending is less well understood. Economists have examined the predictive power of the CSI for future consumption expenditures since the early study by Mueller (1963) who proposed the use of the CSI in forecasting consumer spending, but the empirical studies have not provided a consensus of evidence on this issue. For example, with the US data, Carroll *et al.* (1994) and Bram and Ludvigson (1998) found some predictive power for future consumption in the CSI, but Garner (1991) and Croushore (2005) found that the CSI in the US was seldom useful in forecasting consumer spending.<sup>1)</sup> Studying the UK data, Acemoglu and Scott (1994) found the usefulness of the CSI in predicting consumption. Fan and Wong (1998) also found the usefulness of the CSI in Hong Kong, but the study by Goh (2003) could not find any significant value of the CSI in New Zealand. Despite of the importance of the CSI, there have been only a few studies on the CSI in Korea. Choi (2002) reported that the CSI provides significant information about future consumption, but Kim and Goo (2005) found that the CSI in Korea did not have a reliable predictive power for future consumption. In Park and Choi (2006), the correlation between the CSI and future consumption was very low and the CSI was significantly influenced by the media.

Previous empirical studies on the CSI used regression analysis to determine

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<sup>1)</sup> Bram and Ludvigson (2004) examined two popular CSIs in the US and reported that the Conference Board Index contains meaningful information about future consumption, but not so in the case of the Michigan University Index.

whether the CSI has any power in explaining future consumption. Recently, a new approach in evaluating the CSI was suggested by Easaw and Heravi (2004). They applied a nonparametric directional approach to test the value of the CSI in the UK. They examined whether the CSI is a useful predictor of household consumption behavior by looking into the direction of changes in consumption. The CSI is identified as a useful indicator if it is able to predict actual directions of changes or turning points in consumption. This kind of qualitative analysis complements the previous regression based quantitative analysis. Since it is very difficult to find reliable quantitative forecasts for consumption growth, qualitative forecasts such as high growth or low growth in consumption could be valuable information.

This paper provides new empirical evidence on the usefulness of the CSI by applying a directional analysis method to Korean data. This study will complement the previous quantitative analysis on the Korean CSI by providing qualitative answers for the value of the CSI in predicting directions of household consumption growth. This study is to improve the understanding of the Korean CSI by comparing the test results with previous regression based studies in Korea and also with the empirical test results in foreign countries.

In the directional analysis, the growth rate of consumption is divided with two criteria: first, by positive growth versus negative growth, second, by high growth versus low growth. Easaw and Heravi (2004) and Easaw *et al.* (2005) dichotomized the consumption growth by positive versus negative growth only, but it is important to also consider the consumption growth categorized by high growth versus low growth. This second categorization needs to be considered because the average growth rate of consumption is typically positive, so higher (lower) consumer confidence may better match to consumption growth rate of higher (lower) than the average rate instead of zero growth rate. Empirical analysis reveals that the CSI has little explanatory power for the direction of future consumption changes in Korea and appears to have only limited value as an indicator of current conditions of household consumption.

This paper is organized as follows. Section 2 briefly explains the CSI and household consumption data in Korea. Section 3 outlines the empirical methodology. Section 4 reports the empirical results. Section 5 offers conclusions and some implications.

## 2. THE DATA

The CSI data analyzed in this paper are from the Samsung Economic Research Institute (SERI) and the Bank of Korea (BOK).<sup>2)</sup> The SERI index was first announced in 1991:4Q, while the BOK index is available from 1996:2Q.<sup>3)</sup> The composite CSIs from the two institutes are based on several individual components as shown in table 1. The first four questions are included both in the SERI and the BOK. But the comparing time periods are different between the two surveys. As for the questions on current financial condition and general economic situation (questions 1 and 2), the SERI survey compares current condition with one year ago, while the BOK compares with six months ago. For the household expectations on future financial condition and general economic situation (questions 3 and 4), the SERI survey asks about the expected condition for the next year, while the BOK survey is for the next six months. The next three questions are included only in one of the surveys. The question of whether households consider the present time good for buying durable goods (question 5) is included only in the composite CSI from the SERI. The questions about the expected income and expected consumption spending (questions 6 and 7) are considered as components of the composite CSI from the BOK. The question on the expected income asks the expectations for the next one year, while the question on the expected consumption spending asks for the next

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<sup>2)</sup> The Korea National Statistical Office (KNSO) also has published CSI since December 1998. This paper does not analyze this CSI because of the relatively short data series.

<sup>3)</sup> The BOK began to announce several individual consumer sentiment indexes from 1995:3Q, but the composite CSI has been reported from 1996:2Q.

**Table 1 Survey Questions in the Composite CSI from SERI and BOK**

	SERI	BOK
1. Current household financial condition	○	○
2. Current general economic situation	○	○
3. Expected household financial condition	○	○
4. Expected general economic situation	○	○
5. Current durable goods purchase sentiment	○	
6. Expected household income		○
7. Expected household consumption spending		○

Note: ○ if this kind of question is included.

six months.<sup>4)</sup>

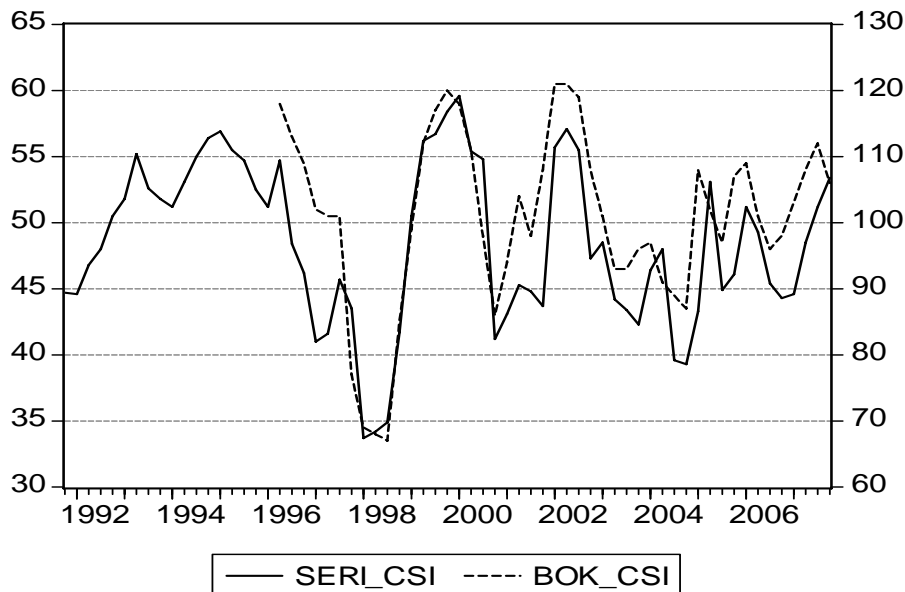
The answers for the questions generally consist of ‘very high’, ‘somewhat high’, ‘the same’, ‘somewhat low’, and ‘very low’. By assigning numbers for each type of answers the index numbers for each question are derived and then the composite CSI is calculated from the several individual index numbers. The composite CSI from the SERI is the sample mean of index numbers from the five questions. The base number is 50, which occurs when consumers select ‘the same’ answer on average. Thus, consumer confidence is high if the CSI is above 50. The base number for the BOK CSI is selected as 100. The announced composite CSI of the BOK is adjusted from the sample mean of the six indexes to make the average CSI become 100 for the entire sample period.<sup>5)</sup>

<sup>4)</sup> The question of expected household consumption spending is also asked in the SERI survey, but this question is not included as one of the five components for the composite CSI of the SERI. The time span of expectations in this question is one year from current time in the SERI survey and six months in the BOK survey.

<sup>5)</sup> In general, the simple average of the six individual indexes in the composite CSI of the BOK is below 100, probably because economic agents are somewhat pessimistic about current and future economic situations. The BOK adjusts the individual indexes to make the average of the CSI for the entire sample period become 100 which is considered the benchmark number for consumer confidence.

The CSIs from the SERI and BOK are announced every quarter. The SERI survey is done in the first month of the survey quarter and announced early in the second month, while the BOK surveys at the beginning of the third month and announced at the end of the third month. In 2007, for example, the fourth quarter CSI from the SERI was surveyed from October 11<sup>th</sup> to 16<sup>th</sup> and published on November 6<sup>th</sup>.<sup>6)</sup> The same quarter CSI from the BOK was surveyed during the period of December 3<sup>rd</sup> to 14<sup>th</sup>, and announced on December 24<sup>th</sup>.<sup>7)</sup> The SERI surveys 1,000 households based on a telephone survey, while the BOK surveys 2,500 households through direct mail and a telephone survey. Since the survey of the SERI started earlier than the BOK, the sample period for the SERI CSI is from 1991:4Q to 2007:4Q, while that

**Figure 1 CSIs from SERI and BOK**



Note: Left scale for the SERI and right scale for the BOK.

<sup>6)</sup> Samsung Economic Research Institute (2007).

<sup>7)</sup> Bank of Korea (2007).

for the BOK is from 1996:2Q to 2007:4Q. The CSIs from the two institutes are shown in figure 1. They move in similar patterns with the correlation coefficient 0.84.

Household consumption data are from the BOK. They are seasonally adjusted real data. The total household consumption is divided by four types; durable goods, semi-durable goods, non-durable goods, and services. For example durable goods are automobiles and electronic appliances, semi-durable goods are clothes and footwear, non-durable goods are food and cosmetics. In 2007, the portions out of total household consumption were 8.4% for durable goods, 6.6% for semi-durable goods, 25.4% for non-durable goods, and 56.0% for services.<sup>8)</sup> This paper explicitly examines the components of total household consumption because the relationship with the CSI may be different among the types of total consumption.<sup>9)</sup>

### 3. STATISTICAL METHODS

This paper uses the directional approach introduced by Merton (1981) and Henriksson and Merton (1981) to test whether the CSI would be of value in forecasting household consumption.<sup>10)</sup> According to Merton (1981), if the forecast of a market timer is to be of value to an investor, it must provide information that would modify the prior beliefs about the possible

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<sup>8)</sup> The remaining 3.6% was from net direct purchases abroad by resident households.

<sup>9)</sup> Easaw *et al.* (2005) found that the UK CSI is useful in predicting durable goods, but not for non-durable goods.

<sup>10)</sup> Since Merton (1981) and Henriksson and Merton (1981) developed a directional analysis technique to evaluate market timing by financial managers, economists have applied the directional analysis methodology to macroeconomic forecasts. Schnader and Stekler (1990) and Stekler (1994) examined the value of real US GNP forecasts announced by economic forecasting organizations. Ash *et al.* (1998) analyzed OECD forecasts for the G7 economies in main components of aggregate demand and output, inflation and the balance of payments. In Easaw and Heravi (2004) and Easaw *et al.* (2005), the directional approach was applied to examine the relationship between the CSI and consumption in the UK and the US.

distribution of future asset returns.<sup>11)</sup> The CSI is useful (or valuable in the terminology of Merton) if it forecasts the direction of future consumption changes significantly better than a naive model, for example a model always predicting negative changes. The test by Henriksson and Merton (1981) is identical to the test for independence by Fisher (1941), which is also asymptotically equal to the Chi-Square test for independence.<sup>12)</sup> Pesaran and Timmermann (1992) later developed another nonparametric test on the prediction of the direction of actual changes and their test statistic is also asymptotically equal to the Chi-Square test statistic.<sup>13)</sup> Following Easaw and Heravi (2004), the paper performs three alternative tests for the directional usefulness of the CSI in predicting household consumption changes. The three tests are explained in detail in Appendix 1.

The CSI is an index varying around a base number. This base number is arbitrarily set by the survey institutes. They are 50 for the SERI and 100 for the BOK. When the CSI is higher than the base number, it is considered a positive indicator for future household consumption. This paper divides the growth rate of household consumption in two different ways. First, the growth rates are dichotomized by negative growth versus non-negative growth, which is the typical approach in the directional analysis. Second, the growth rates are divided by low growth versus high growth. This second approach is intended to incorporate the reciprocal view that higher consumer confidence is associated with consumption growth above a trend line.<sup>14)</sup> Since household consumption generally increases, this approach might be more meaningful than the first approach with signs of changes. If the average consumption growth rate is 1%, high consumer confidence would not be relevant with a consumption growth rate lower than 1%. For example, a consumption growth rate of 0.5% would be related with low consumer confidence, although this number is supposed to be related with

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<sup>11)</sup> Market timing forecasts are to predict the better performance of stocks versus bonds.

<sup>12)</sup> Stekler (1994), p. 496.

<sup>13)</sup> Stekler and Petrei (2003), p. 736.

<sup>14)</sup> Stekler (1994) also divided the data into high versus low growth in testing the usefulness of forecasts for the US GNP.



high consumer confidence in the approach with signs of changes.

In this analysis, the trend growth rate is chosen as simple mean for the entire sample period for the SERI CSI (1991:4Q~2007:4Q). The sample mean for the quarterly growth rate of total consumption is 1.03%. It is 1.15% for durable goods, 0.85% for semi-durable goods, 0.57% for non-durable goods, and 1.22% for services.

#### 4. EMPIRICAL RESULTS

The SERI data starts from 1991:4Q, but this paper first analyzes the CSI for the sample period of 1996:2Q~2007:4Q with both the SERI and BOK data. The BOK data are available from 1996:2Q. The sample periods are set the same for the analysis with the CSI data from the two institutes since different sample periods may cause different test results. Section 4.3 tests the SERI data with the entire sample period of 1991:4Q~2007:4Q to see if there is any difference in the test results between the two sample periods. The time lags in the test are chosen to be four quarters, but in most cases the test statistics for more than two quarters are not significant and the results are reported up to two quarters for the types of consumption. The test results for the same quarter are also reported. The CSI could provide useful information if it is highly correlated with current quarter consumption since the CSI is announced in the middle of a quarter and the preliminary consumption data from the GDP account becomes public in the middle of the next quarter.

##### 4.1. Signs of Changes

Test results of whether CSI is useful in predicting positive growth or negative growth in consumption are shown in table 2. As shown in Panel A of table 2, the SERI CSI appears to be a meaningful indicator only for the current total consumption, durables, and semi-durables, but it is not significantly useful in predicting current quarter non-durables and services,

**Table 2 Test Results for Signs of Changes**

	Type	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
P A N E L  A.  S E R I	Total consumption	$t$	10	37	1.00	0.41	1.41	0.012*	4.235*	6.084*
		$t-1$	10	36	0.80	0.33	1.13	0.347	0.178	0.672
		$t-2$	9	36	0.78	0.31	1.08	0.482	0.007	0.249
		$t-3$	9	35	0.56	0.26	0.81	0.931	0.475	1.235
		$t-4$	8	35	0.75	0.31	1.06	0.542	0.005	0.131
	Durables	$t$	19	28	0.84	0.43	1.27	0.049*	2.673	3.900*
		$t-1$	19	27	0.74	0.33	1.07	0.430	0.034	0.265
		$t-2$	18	27	0.67	0.26	0.93	0.809	0.041	0.295
	Semi- durables	$t$	16	31	1.00	0.48	1.48	0.000**	9.253**	11.618**
		$t-1$	16	30	0.81	0.37	1.18	0.179	0.849	1.617
		$t-2$	15	30	0.80	0.33	1.13	0.285	0.338	0.885
	Non- durables	$t$	14	33	0.79	0.36	1.15	0.258	0.439	1.031
		$t-1$	14	32	0.71	0.31	1.03	0.573	0.028	0.034
		$t-2$	13	32	0.69	0.28	0.97	0.710	0.034	0.032
	Services	$t$	3	44	1.00	0.34	1.34	0.306	0.343	1.535
$t-1$		3	43	1.00	0.33	1.33	0.327	0.287	1.435	
$t-2$		3	42	0.67	0.29	0.95	0.804	0.234	0.032	
P A N E L  B.  B O K	Total consumption	$t$	10	37	0.60	0.62	1.22	0.185	0.805	1.616
		$t-1$	10	36	0.40	0.56	0.96	0.727	0.012	0.064
		$t-2$	9	36	0.33	0.53	0.86	0.870	0.141	0.575
		$t-3$	9	35	0.22	0.49	0.71	0.977	1.426	2.520
		$t-4$	8	35	0.13	0.46	0.58	0.997	3.045	4.679*
	Durables	$t$	19	28	0.58	0.68	1.26	0.073	2.108	3.137
		$t-1$	19	27	0.53	0.63	1.16	0.227	0.560	1.128
		$t-2$	18	27	0.39	0.52	0.91	0.821	0.094	0.384
	Semi- durables	$t$	16	31	0.56	0.65	1.21	0.146	1.109	1.902
		$t-1$	16	30	0.56	0.63	1.20	0.168	0.929	1.665
		$t-2$	15	30	0.33	0.50	0.83	0.917	0.551	1.151
	Non- durables	$t$	14	33	0.71	0.70	1.41	0.011*	5.223*	6.949*
		$t-1$	14	32	0.64	0.66	1.30	0.060	2.433	3.624
		$t-2$	13	32	0.46	0.56	1.02	0.571	0.034	0.022
	Services	$t$	3	44	0.67	0.59	1.26	0.387	0.073	0.779
$t-1$		3	43	0.67	0.58	1.25	0.401	0.056	0.718	
$t-2$		3	42	0.33	0.55	0.88	0.838	0.040	0.164	

Notes:  $N_1$ : number of outcomes that are negative,  $N_2$ : number of outcomes that are non-negative,  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

and all kinds of future consumption spending. The test results are worse for the BOK data as shown in Panel B of table 2. The BOK CSI is not a useful indicator of contemporary consumption growth as well as future consumption growth. It is useful only for the case of current non-durables. The Pesaran-Timmermann test appears to indicate that the BOK CSI is significant in predicting four quarters ahead total consumption, but the sum of probability of correct forecasting ( $\hat{p}$ ) is only 0.58 when the maximum is 2.0, which implies that the forecasting is generally in an opposite direction. This may be a sign of irrationality, but this paper disregards it since this abnormality is observed only in this case. From the test based on the signs of changes in consumption, the paper finds that the value of CSI is very limited in that only the SERI CSI can be considered as a useful indicator of current quarter consumption changes, while the predictive power of the CSI for future consumption is not detected from both the SERI and the BOK.

#### **4.2. High versus Low Growth**

The test results of whether the CSI is useful in predicting high growth or low growth of consumption are shown in table 3. The same composite CSIs from the SERI and the BOK as in the previous section are used to test if a current quarter or future high versus low consumption growth is explained by the current CSI. Test results show that the SERI CSI is a useful indicator of contemporary consumption growth for total consumption and all other types of consumption. As for the prediction of future consumption, the SERI CSI is not significantly useful for any type of consumption.

For the case of the BOK CSI, it is significant only for the contemporary total consumption. The three and four quarter ahead forecasts for total consumption are also significant, but the sums of probability of correct forecasting ( $\hat{p}$ ) are only 0.64 and 0.65, which indicate that the forecasting is significantly incorrect. As in the previous section, this result is disregarded as it might happen by chance.

When the consumption growth is divided with high versus low growth, the

**Table 3 Test Results for High versus Low Growth**

	Type	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
<b>P A N E L  A.  S E R I</b>	Total consumption	$t$	27	20	0.85	0.55	1.40	0.004**	6.789**	8.724**
		$t-1$	27	19	0.67	0.54	0.93	0.797	0.034	0.265
		$t-2$	26	19	0.69	0.26	0.96	0.743	0.000	0.108
		$t-3$	26	18	0.65	0.22	0.88	0.890	0.302	0.803
		$t-4$	25	18	0.68	0.28	0.96	0.735	0.002	0.091
	Durables	$t$	23	24	0.83	0.46	1.28	0.037*	3.161	4.467*
		$t-1$	22	24	0.77	0.54	1.31	0.222	0.588	1.209
		$t-2$	21	24	0.71	0.29	1.01	0.613	0.082	0.002
	Semi-durables	$t$	25	22	0.84	0.50	1.34	0.014*	4.759*	6.361*
		$t-1$	25	21	0.72	0.54	1.05	0.471	0.005	0.157
		$t-2$	24	21	0.67	0.24	0.90	0.849	0.140	0.506
	Non-durables	$t$	14	33	0.71	0.70	1.41	0.011*	5.223*	6.949*
		$t-1$	14	32	0.64	0.66	1.30	0.060	2.433	3.624
		$t-2$	13	32	0.46	0.56	1.02	0.571	0.034	0.022
	Services	$t$	23	24	0.87	0.50	1.37	0.007**	5.779*	7.543**
$t-1$		23	23	0.78	0.54	1.17	0.168	0.924	1.679	
$t-2$		23	22	0.78	0.36	1.15	0.226	0.567	1.197	
<b>P A N E L  B.  B O K</b>	Total consumption	$t$	27	20	0.59	0.80	1.39	0.008**	5.727*	7.402**
		$t-1$	27	19	0.44	0.54	1.02	0.558	0.021	0.025
		$t-2$	26	19	0.35	0.42	0.77	0.969	1.559	2.464
		$t-3$	26	18	0.31	0.33	0.64	0.996	4.175*	5.657*
		$t-4$	25	18	0.32	0.33	0.65	0.995	3.758	5.176*
	Durables	$t$	23	24	0.57	0.71	1.27	0.054	2.563	3.673
		$t-1$	22	24	0.50	0.54	1.13	0.289	0.310	0.746
		$t-2$	21	24	0.48	0.58	1.06	0.460	0.010	0.164
	Semi-durables	$t$	25	22	0.52	0.68	1.20	0.135	1.212	1.992
		$t-1$	25	21	0.48	0.54	1.10	0.354	0.142	0.466
		$t-2$	24	21	0.33	0.43	0.76	0.972	1.698	2.630
	Non-durables	$t$	26	21	0.54	0.71	1.25	0.074	2.090	3.102
		$t-1$	26	20	0.54	0.54	1.24	0.093	1.735	2.674
		$t-2$	25	20	0.40	0.50	0.90	0.835	0.136	0.460
	Services	$t$	23	24	0.52	0.67	1.19	0.156	1.022	1.742
$t-1$		23	23	0.48	0.54	1.09	0.383	0.088	0.362	
$t-2$		23	22	0.39	0.50	0.89	0.849	0.188	0.550	

Notes:  $N_1$ : number of outcomes that are low growth,  $N_2$ : number of outcomes that are high growth,  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

improvement in predictive power of the CSI is marginal for both SERI and BOK. The SERI CSI becomes more useful only in indicating current quarter non-durables and services. The improvement in the BOK CSI is also limited in that it is a useful indicator only for the contemporary total consumption changes.

#### **4.3. Test for the SERI CSI from 1991 to 2007**

The SERI CSI for the sample period of 1991:4Q is retested through 2007:4Q since the SERI CSI data are available from 1991:4Q. The test results are shown in table 4. For the test with the signs of changes, the CSI is still significant for the direction of current quarter changes in total consumption, durables, semi-durables, and non-durables. This result is very similar to the test with the short sample period (1996:2Q~2007:4Q).

The case of the high versus low growth test still finds a clear usefulness of the CSI as an indicator of current consumption changes. Moreover, the predictability of the CSI for future consumption improves in this case. Except for total consumption, the SERI CSI is useful in predicting one quarter ahead consumption changes in all subcategories of consumption. For the case of services, the CSI has predictability for consumption changes two quarters ahead.

A possible reason for the improvement of predictability of the CSI for future consumption in the longer sample period may be found in increasing variation of consumption expenditures in recent years. The standard deviation of quarterly total consumption growth was 0.8% during 1991:4Q~1996:1Q, while it increased to 2.8% from 1996:2Q to 2007:4Q. When the period of Korean currency crisis is dropped and the standard deviation is calculated for the period of 1999:1Q to 2007:4Q, it lowers to 1.2 percent, but still higher than the period before 1996. It seems that with more fluctuations in consumer spending, consumer sentiment may not be well correlated with future consumption. Increased fluctuations in consumer spending may not be related to a growing variation of lagged consumer sentiment,

**Table 4 Test Results for the SERI CSI during 1991:4Q~2007:4Q**

	Type	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
<b>Panel A.</b> <b>Sings of Changes</b>	Total consumption	$t$	10	55	1.00	0.53	1.53	0.001**	7.506**	9.669**
		$t-1$	10	54	0.80	0.48	1.28	0.095	1.693	2.760
		$t-2$	10	53	0.70	0.45	1.15	0.296	0.300	0.815
		$t-3$	10	52	0.50	0.42	0.92	0.788	0.010	0.205
		$t-4$	10	51	0.60	0.45	1.05	0.524	0.003	0.090
	Durables	$t$	22	43	0.77	0.56	1.33	0.010**	5.178*	6.549**
		$t-1$	22	42	0.68	0.50	1.18	0.130	1.271	1.970
		$t-2$	21	42	0.57	0.43	1.00	0.608	0.073	0.000
	Semi-durables	$t$	17	48	0.94	0.58	1.52	0.000**	11.935**	14.195**
		$t-1$	17	47	0.76	0.51	1.28	0.045*	2.809	3.907*
		$t-2$	17	46	0.71	0.48	1.18	0.153	1.049	1.746
	Non-durables	$t$	14	51	0.79	0.51	1.30	0.045*	2.778	3.943*
		$t-1$	14	50	0.71	0.48	1.19	0.161	0.981	1.704
		$t-2$	14	49	0.64	0.45	1.09	0.383	0.094	0.381
	Services	$t$	3	62	1.00	0.47	1.47	0.163	0.994	2.573
		$t-1$	3	61	1.00	0.46	1.46	0.171	0.938	2.487
		$t-2$	3	60	0.67	0.43	1.10	0.608	0.066	0.119
	<b>Panel B.</b> <b>High versus Low Growth</b>	Total consumption	$t$	30	35	0.84	0.69	1.52	0.000**	15.574**
$t-1$			30	34	0.67	0.53	1.20	0.092	1.757	2.529
$t-2$			29	34	0.66	0.50	1.16	0.162	0.970	1.564
$t-3$			29	33	0.66	0.52	1.17	0.137	1.195	1.851
$t-4$			28	33	0.64	0.52	1.16	0.164	0.959	1.558
Durables		$t$	27	38	0.78	0.61	1.38	0.002**	7.886**	9.519**
		$t-1$	27	37	0.70	0.54	1.24	0.045*	2.856	3.844*
		$t-2$	26	37	0.62	0.46	1.07	0.371	0.111	0.355
Semi-durables		$t$	27	38	0.81	0.63	1.45	0.000**	10.987**	12.928**
		$t-1$	27	37	0.70	0.54	1.24	0.045*	2.856	3.844*
		$t-2$	27	36	0.63	0.47	1.10	0.291	0.304	0.664
Non-durables		$t$	29	36	0.72	0.58	1.31	0.012*	4.964*	6.241*
		$t-1$	29	35	0.72	0.54	1.30	0.016*	4.493*	5.719*
		$t-2$	29	34	0.66	0.50	1.16	0.162	0.970	1.564
Services		$t$	31	34	0.74	0.62	1.36	0.004**	7.092**	8.618**
		$t-1$	31	33	0.71	0.54	1.29	0.020*	4.196*	5.376*
		$t-2$	30	33	0.70	0.55	1.25	0.043*	2.929	3.928*

Notes :  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

but to other factors such as business cycles or income changes not captured in consumer sentiment. This interpretation suggests that the CSI might not be very useful during a period of economic turmoil, which is the exact time period that needs a strong predictor of future macroeconomic variables such as consumption expenditures.<sup>15)</sup>

#### 4.4. Usefulness of Individual Expectation Indexes

The previous sections tested the composite CSI announced by the SERI and the BOK. Since the composite index includes consumer sentiment of current situations compared to the previous time, it may not be very useful for the purpose of predicting future consumption. This section tests the usefulness of individual expectation indexes such as expected household financial condition index, expected general economic situation index, and expected consumption spending index. Both the SERI and the BOK data are tested for the sample period of 1996:2Q~2007:4Q with total consumption.<sup>16)</sup> The expected consumption spending index from the SERI is examined for the sample period of 1996:4Q~2007:4Q, because the data are available from that time.

Test results are shown in Appendix 2 and no usefulness of individual expectation indexes are found except the current quarter expected general economic situation index from the BOK. The lack of correlation with current quarter consumption is understandable because these indexes are

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<sup>15)</sup> The empirical evidence for decreasing predictability of the SERI CSI for future consumption changes with the short sample data (1996:2Q~2007:4Q) is not strong. When the one quarter ahead forecast is considered with the high versus low growth criterion, the increase in probability of correct forecast ( $\hat{p}$ ) with the long sample period is small or, in some cases, negative. For example,  $\hat{p}$  for services is 1.29 for the long sample, while it is 1.17 for the short sample. For the case of durables, it is 1.24 for the long sample, while it is 1.31 for the short sample. A separate analysis is also performed for a sample of 1991:4Q~1996:1Q, but the test results were not reliable because of a small sample size and little variation in consumption.

<sup>16)</sup> The test results are similar when the SERI data is tested for the entire sample period of 1991:4Q~2007:4Q.

designed to measure consumer sentiment for future economic conditions, not for current conditions. The problem is that all of the three expectation indexes are not significant in explaining future total consumption changes. Note that several significant results are not meaningful because of the lower probability of correct forecasting.

In Kim and Goo (2005), the expected consumption spending index from the BOK was useful in predicting future consumption, but that is not the case in this analysis. It appears that the probability of correct forecasting is low when the consumption growth rate is very low or below zero. This may be caused by the tendency of consumer expectations of rising future consumption expenditures. In the directional analysis, the level of sentiment index relative to the base number is important, while in a regression analysis as in Kim and Goo (2005), the difference of individual sentiment index from the average sentiment index is important for the significance of independent variables.

The base numbers of the CSI from the SERI and the BOK are 50 and 100, respectively. In general, the average index numbers for the entire sample period do not coincide with the base number unless the average index is adjusted to the base number. The published composite CSI from the BOK is adjusted for the average index to be the base number 100, but other indexes are not adjusted. For the sample period of 1996:2Q~2007:4Q, the average indexes of expected household financial condition index, expected general economic situation index, and expected consumption spending index from the SERI are 55.3, 52.7, and 50.7, for the BOK, they are 88.5, 84.4, and 106.9. It appears that the consumers from the SERI survey expect improvement in future financial and economic conditions, while the consumers from the BOK survey respond with pessimistic forecasts. A possible reason for the different response seems to be from the different time span in survey questions. The questions from the SERI survey ask consumer expectations for the next one year, while it is for the next six months in the BOK survey. Consumers tend to expect better economic conditions in the distant future than in the near future compared to the current



situation.<sup>17)</sup>

Considering this tendency in consumer expectations, this paper adjusts the individual expectation indexes by making the sample average as new base numbers and retests the usefulness of the expectation indexes in predicting future consumption changes. As shown in Appendix 3, the adjusted expectation indexes are not significant in predicting future consumption variations. For the case of the BOK, however, all of the individual expectation indexes are good indicators of current quarter consumption changes.

## 5. CONCLUSION

The usefulness of the CSI is found in the predictive power of future consumption expenditure. This study tests whether the CSIs from the SERI and the BOK are directionally correct in predicting future household consumption in Korea. In this test, the direction of consumption changes is based on the two criteria of positive versus negative growth and high versus low growth. The high versus low growth criterion divides the consumption growth rates by the average growth rate during the entire sample period.

The test results are summarized as follows. First, the CSI has little explanatory power for the direction of future consumption changes in Korea. Although the SER CSI shows some significant predictive power for several types of consumption goods when high versus low growth criterion is tested for the entire sample period, it loses significance when tested with more recent data. It is also found that the results are insignificant depending on the types of consumption goods.

Second, the CSI is a useful indicator of current quarter household consumption. Although this result shows only a contemporary correlation

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<sup>17)</sup> For the case of expected consumption spending index, the averages of the indexes from both the SERI and the BOK are greater than the base numbers. This reveals that consumers are worried about the need for increased consumption spending in the future.

between the CSI and consumption, the CSI still provides valuable information because the current consumption data are not available until the next quarter. Both the CSIs of SERI and BOK are significant in explaining current quarter total consumption, but the SERI CSI is also significant for several subcategories of consumption.

Third, the individual expectation indexes of consumer surveys do not provide useful information on future consumption changes. This paper does not find usefulness in the individual expectation indexes such as expected household financial condition index, expected general economic situation index, and expected consumption spending index.

The CSI has received widespread attention by the media and financial analysts, but the usefulness has not been thoroughly tested, especially in Korea. A directional analysis is an attempt for a better understanding of the Korean CSI. Test results imply a need for caution in using the CSI to explain consumer behavior or more general business cycles. This result is generally consistent with Kim and Goo (2005). The CSI in Korea has only a limited value as an indicator of current conditions in consumer spending.

Reasons for the low predictability of the CSI in Korea are subjects for future research. It is possible to conjecture some possible explanations from the literature. As mentioned in Kim and Goo (2005), consumers might have the best understanding on current consumption, but consumer expectations may not be realized in the future when unexpected factors intervene. Moreover, in the case of high uncertainty as in Korea, the precautionary saving of consumers could result in a negative relationship between the CSI and future consumption growth.<sup>18)</sup> Finally, as suggested by Park and Choi (2006), since the consumer sentiment in Korea is vastly influenced by the media rather than economic fundamentals, consumer sentiments may not be closely related with future consumption changes.

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<sup>18)</sup> Carroll (1992) explained this relationship in the buffer-stock model of saving.

## APPENDIX

### A1. The Three Statistical Tests<sup>19)</sup>

This paper explains the three test statistics with the categorization of negative versus non-negative consumption growth for simplicity, but the same method can be applied to a high versus low consumption growth case.

#### A1.1. Henriksson and Merton's Test

Let  $x_t$  be the CSI, and  $y_t$  be the predictor of the growth rate of household consumption where  $t$  denotes the time period. Then, equations (1) and (2) define the probabilities of a directionally correct forecast conditional upon the sign of the outcome.

$$p_1(t) = \text{prob}(x_t y_t > 0 \mid y_t < 0), \quad (1)$$

$$p_2(t) = \text{prob}(x_t y_t > 0 \mid y_t \geq 0). \quad (2)$$

Here  $p_1(t)$  denotes the probability of a directionally correct forecast conditional upon an actual downturn at  $t$ , and  $p_2(t)$  is the probability of a directionally correct forecast conditional upon no actual fall in household consumption. The paper also defines the following sample statistics:  $N_1$  = number of observations for which  $y_t < 0$ ,  $N_2$  = number of observations for which  $y_t \geq 0$ ,  $N = N_1 + N_2$ ;  $n_1$  = number of correct forecasts given an actual fall,  $(x_t y_t > 0 \mid y_t < 0)$ ,  $n_2$  = number of incorrect forecasts given no actual fall,  $(x_t y_t < 0 \mid y_t \geq 0)$ , and  $n = n_1 + n_2$ . Henriksson and Merton (1981) demonstrate that under the null hypothesis of no value from forecasting,  $p_1(t) + p_2(t) = 1$ , the distribution of  $n_1$  conditional on  $N_1$ ,  $N$ , and  $n$  is given by the hypergeometric distribution as equation (3).

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<sup>19)</sup> Much of the discussion in this section is from Ash *et al.* (1988).

$$\text{prob}(n_1 = x | N_1, N, n) = \frac{\binom{N_1}{x} \binom{N - N_1}{n - x}}{\binom{N}{n}}, \quad (3)$$

where the feasible range for  $n_1$  is defined by

$$\underline{n}_1 = \max\{0, n - N_2\} \leq n_1 \leq \min\{N_1, n\} = \bar{n}_1$$

If a forecaster is rational, it will not be true that  $p_1(t) + p_2(t) < 1$ . As suggested by Henriksson and Merton (1981), a one-tail test is performed with a probability confidence level of  $c$  that the null hypothesis would be rejected if  $n_1 \geq x^*(c)$  where  $x^*(c)$  is defined as the solution to

$$\sum_{x=x^*}^{\bar{n}_1} \frac{\binom{N_1}{x} \binom{N - N_1}{n - x}}{\binom{N}{n}} = 1 - c. \quad (4)$$

Merton (1981) shows that a necessary and sufficient condition for a prediction to have no value is that  $p_1(t) + p_2(t) = 1$  and, Henriksson and Merton (1981) developed a nonparametric test to determine whether  $p_1(t) + p_2(t) > 1$  against the null hypothesis that  $p_1(t) + p_2(t) = 1$ . This test is identical to Fisher's exact test, which is uniformly the most powerful and unbiased test for independence.<sup>20)</sup>

### A1.2. Chi-Square Independence Test

The Chi-Square test provides a general method to determine whether there is any association between the actual changes and predicted changes. Under the null hypothesis, the actual changes are independent with the predicted changes. The contingency table with both the observed frequency and the expected frequency under the null hypothesis is given in table 2. The notations in table 2 are from the previous subsection.

<sup>20)</sup> According to Stekler (1994), the Henriksson and Merton's test and the Fisher's exact test yield identical results because the Fisher's exact test is based on the same hypergeometric distribution.

**Table A1 Contingency Table: Frequencies Observed versus Expected under  $H_0$**

		Actual				Sum
		< 0		≥ 0		
		Observed	Expected under $H_0$	Observed	Expected under $H_0$	
Forecasted	< 0	$n_1$	$\frac{nN_1}{N}$	$n_2$	$\frac{nN_2}{N}$	$n$
	≥ 0	$N_1 - n_1$	$\frac{(N - n)N_1}{N}$	$N_2 - n_2$	$\frac{(N - n)N_2}{N}$	$N - n$
	Sum	$N_1$		$N_2$		$N$

The Chi-Square test statistic for the above 2x2 contingency table is

$$\chi_1^2 = \sum_{i=1}^4 \frac{(|O_i - E_i| - 0.5)^2}{E_i}, \tag{5}$$

where  $O_i$  is observed frequency and  $E_i$  is expected frequency under the null hypothesis of independence. Following Schnader and Stekler (1990), the Yates' correction for continuity is applied in equation (5) by subtracting 0.5 from the term in the parenthesis of the numerator of each element in the test statistic.

**A1.3. Pesaran and Timmermann's Test**

Pesaran and Timmermann (1992) test whether there is any significant difference between the observed sample estimate of the probability of a correctly signed forecast and the estimate of probability that would be under the null hypothesis of independence between forecasts and outcomes. With  $x_t$  denoting the predictor of  $y_t$ , they introduce the following indicator variables

$$Y_t = 1 \text{ if } y_t > 0, \quad Y_t = 0 \text{ otherwise,}$$

$$X_t = 1 \text{ if } x_t > 0, \quad X_t = 0 \text{ otherwise,}$$

$$Z_t = 1 \text{ if } x_t y_t > 0, \quad Z_t = 0 \text{ otherwise.}$$

Let  $p_y = \text{prob}(y_t > 0)$ ,  $p_x = \text{prob}(x_t > 0)$ ,  $p_* = \text{prob}(Z_t = 1)$ , then  $\hat{p}_y = \bar{Y}$ ,  $\hat{p}_x = \bar{X}$ ,  $\hat{p} = \bar{Z}$ , and  $\hat{p}_* = \hat{p}_y \hat{p}_x + (1 - \hat{p}_y)(1 - \hat{p}_x)$  where  $\hat{\cdot}$  and  $\bar{\cdot}$  denote estimates and sample means, respectively.  $\hat{p}$  is the sample estimate of the probability of a correctly signed forecast,  $\hat{p}_*$  is the estimator of expectations obtained under the null hypothesis that forecasts and outcomes are independent.

Then, the Pesaran and Timmermann test statistic is shown in equation (6).

$$S_n^2 = \frac{(\hat{p} - \hat{p}_*)^2}{\text{var}(\hat{p}) - \text{var}(\hat{p}_*)} \sim \chi_1^2, \quad (6)$$

where

$$\text{var}(\hat{p}) = \frac{\hat{p}_*(1 - \hat{p}_*)}{N},$$

and

$$\begin{aligned} \text{var}(\hat{p}_*) \\ = \frac{(2\hat{p}_y - 1)^2 \hat{p}_x(1 - \hat{p}_x) + (2\hat{p}_x - 1)^2 \hat{p}_y(1 - \hat{p}_y) + 4\hat{p}_y \hat{p}_x(1 - \hat{p}_y)(1 - \hat{p}_x) / N}{N}. \end{aligned}$$

**Table A2.1 Expected Household Financial Condition Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	10	37	0.10	0.92	1.02	0.436	0.201	0.037
	$t-1$	10	36	0.00	0.89	0.89	0.972	0.220	1.244
	$t-2$	9	36	0.00	0.89	0.89	1.000	0.154	1.123
	$t-3$	9	35	0.00	0.89	0.89	1.000	0.171	1.158
	$T-4$	8	35	0.00	0.89	0.89	1.000	0.109	1.032
BOK	$t$	10	37	0.90	0.22	1.12	0.375	0.141	0.702
	$t-1$	10	36	0.80	0.19	0.99	0.701	0.169	0.002
	$t-2$	9	36	0.67	0.17	0.83	0.937	0.425	1.278
	$t-3$	9	35	0.56	0.14	0.70	0.990	2.363	4.095*
	$t-4$	8	35	0.75	0.20	0.95	0.793	0.028	0.101
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	27	20	0.11	0.95	1.06	0.426	0.046	0.563
	$t-1$	27	19	0.07	0.54	0.97	0.816	0.026	0.140
	$t-2$	26	19	0.00	0.79	0.79	1.000	3.689	6.144*
	$t-3$	26	18	0.00	0.78	0.78	1.000	3.951*	6.503*
	$t-4$	25	18	0.00	0.78	0.78	1.000	3.775	6.271*
BOK	$t$	27	20	0.89	0.30	1.19	0.106	1.568	2.705
	$t-1$	27	19	0.85	0.54	1.12	0.275	0.349	0.958
	$t-2$	26	19	0.73	0.11	0.84	0.963	0.962	1.887
	$t-3$	26	18	0.73	0.11	0.84	0.956	0.807	1.672
	$t-4$	25	18	0.72	0.11	0.83	0.962	0.928	1.847

Notes :  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:2Q~2007:4Q. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

**Table A2.2 Expected General Economic Situation Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	10	37	0.40	0.57	0.97	0.703	0.031	0.035
	$t-1$	10	36	0.30	0.53	0.83	0.911	0.374	0.966
	$t-2$	9	36	0.33	0.53	0.86	0.870	0.141	0.575
	$t-3$	9	35	0.22	0.49	0.71	0.977	1.426	2.520
	$t-4$	8	35	0.50	0.57	1.07	0.507	0.001	0.138
BOK	$t$	10	37	1.00	0.38	1.38	0.018*	3.732	5.506*
	$t-1$	10	36	0.80	0.33	1.13	0.347	0.178	0.672
	$t-2$	9	36	0.78	0.31	1.08	0.482	0.007	0.249
	$t-3$	9	35	0.56	0.26	0.81	0.931	0.475	1.235
	$t-4$	8	35	0.75	0.31	1.06	0.542	0.005	0.131
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	27	20	0.48	0.65	1.13	0.274	0.364	0.830
	$t-1$	27	19	0.37	0.54	0.84	0.912	0.560	1.128
	$t-2$	26	19	0.27	0.32	0.59	0.999	6.068*	7.830*
	$t-3$	26	18	0.38	0.44	0.83	0.923	0.659	1.283
	$t-4$	25	18	0.40	0.50	0.90	0.832	0.116	0.434
BOK	$t$	27	20	0.89	0.55	1.44	0.002*	8.587*	10.812
	$t-1$	27	19	0.74	0.54	1.11	0.319	0.218	0.642
	$t-2$	26	19	0.65	0.21	0.86	0.909	0.434	1.005
	$t-3$	26	18	0.62	0.17	0.78	0.974	1.493	2.484
	$t-4$	25	18	0.68	0.28	0.96	0.735	0.002	0.091

Notes :  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:2Q~2007:4Q. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.



**Table A2.3 Expected Consumption Spending Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	9	36	0.22	0.64	0.86	0.885	0.156	0.639
	$t-1$	9	35	0.22	0.63	0.85	0.895	0.201	0.726
	$t-2$	8	35	0.25	0.63	0.88	0.856	0.057	0.433
	$t-3$	8	34	0.13	0.59	0.71	0.981	1.239	2.376
	$t-4$	8	33	0.00	0.58	0.58	1.000	3.440	5.283*
BOK	$t$	10	37	0.20	0.81	1.01	0.625	0.141	0.006
	$t-1$	10	36	0.10	0.78	0.88	0.915	0.169	0.759
	$t-2$	9	36	0.00	0.75	0.75	1.000	1.467	2.876
	$t-3$	9	35	0.00	0.74	0.74	1.000	1.544	2.977
	$t-4$	8	35	0.00	0.74	0.74	1.000	1.280	2.664
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	26	19	0.35	0.68	1.03	0.545	0.011	0.047
	$t-1$	26	18	0.27	0.54	0.82	0.937	0.778	1.487
	$t-2$	25	18	0.20	0.44	0.64	0.997	4.364*	5.963*
	$t-3$	25	17	0.28	0.53	0.81	0.944	0.878	1.640
	$t-4$	24	17	0.25	0.53	0.78	0.964	1.284	2.207
BOK	$t$	27	20	0.22	0.85	1.07	0.407	0.061	0.396
	$t-1$	27	19	0.19	0.54	0.97	0.725	0.027	0.047
	$t-2$	26	19	0.08	0.63	0.71	0.998	4.150*	5.962*
	$t-3$	26	18	0.04	0.56	0.59	1.000	8.424*	11.025
	$t-4$	25	18	0.04	0.56	0.60	1.000	8.044*	10.590

Notes :  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:4Q~2007:4Q for SERI and 1996:2Q~2004:4Q for BOK. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

### A3. Test Results for Adjusted Individual Expectation Indexes

**Table A3.1 Adjusted Expected Household Financial Condition Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	10	37	0.50	0.54	1.04	0.549	0.017	0.053
	$t-1$	10	36	0.30	0.47	0.77	0.951	0.842	1.663
	$t-2$	9	36	0.44	0.50	0.94	0.748	0.006	0.091
	$t-3$	9	35	0.33	0.46	0.79	0.934	0.559	1.286
	$t-4$	8	35	0.50	0.51	1.01	0.624	0.102	0.005
BOK	$t$	10	37	0.70	0.62	1.32	0.073	2.122	3.366
	$t-1$	10	36	0.50	0.56	1.06	0.516	0.002	0.100
	$t-2$	9	36	0.33	0.50	0.83	0.899	0.273	0.822
	$t-3$	9	35	0.33	0.49	0.82	0.912	0.354	0.961
	$t-4$	8	35	0.25	0.46	0.71	0.973	1.217	2.288
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	27	20	0.56	0.65	1.21	0.135	1.212	1.992
	$t-1$	27	19	0.37	0.54	0.74	0.980	2.092	3.117
	$t-2$	26	19	0.35	0.32	0.66	0.995	3.759	5.135*
	$t-3$	26	18	0.42	0.39	0.81	0.938	0.846	1.539
	$t-4$	25	18	0.44	0.44	0.88	0.855	0.192	0.573
BOK	$t$	27	20	0.63	0.80	1.43	0.004*	6.930*	8.767*
	$t-1$	27	19	0.48	0.54	1.06	0.459	0.011	0.168
	$t-2$	26	19	0.38	0.42	0.81	0.945	0.976	1.704
	$t-3$	26	18	0.35	0.33	0.68	0.992	3.189	4.482*
	$t-4$	25	18	0.36	0.33	0.69	0.990	2.807	4.033*

Notes: The average expected household financial condition indexes are 55.3 for SERI and 88.5 for BOK.  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:2Q~2007:4Q. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

**Table A3.2 Adjusted Expected General Economic Situation Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	10	37	0.60	0.46	1.06	0.512	0.001	0.115
	$t-1$	10	36	0.50	0.42	0.92	0.797	0.012	0.226
	$t-2$	9	36	0.78	0.47	1.25	0.164	0.962	1.887
	$t-3$	9	35	0.44	0.37	0.82	0.916	0.387	1.027
	$t-4$	8	35	0.63	0.43	1.05	0.553	0.014	0.079
BOK	$t$	10	37	0.80	0.51	1.31	0.063	1.991	3.199
	$t-1$	10	36	0.60	0.44	1.04	0.547	0.012	0.064
	$t-2$	9	36	0.67	0.44	1.11	0.416	0.051	0.373
	$t-3$	9	35	0.44	0.37	0.82	0.916	0.387	1.027
	$t-4$	8	35	0.38	0.37	0.75	0.956	0.836	1.761
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	27	20	0.67	0.60	1.27	0.064	2.315	3.377
	$t-1$	27	19	0.52	0.54	0.89	0.856	0.211	0.593
	$t-2$	26	19	0.50	0.32	0.82	0.939	0.865	1.562
	$t-3$	26	18	0.54	0.33	0.87	0.878	0.290	0.740
	$t-4$	25	18	0.60	0.44	1.04	0.508	0.000	0.087
BOK	$t$	27	20	0.74	0.70	1.44	0.003*	7.334*	9.226*
	$t-1$	27	19	0.63	0.54	1.16	0.227	0.560	1.128
	$t-2$	26	19	0.54	0.37	0.91	0.824	0.102	0.399
	$t-3$	26	18	0.50	0.28	0.78	0.964	1.351	2.223
	$t-4$	25	18	0.52	0.33	0.85	0.899	0.420	0.947

Notes: The average expected household financial condition indexes are 52.9 for SERI and 84.4 for BOK.  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:2Q~2007:4Q. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

**Table A3.3 Adjusted Expected Consumption Spending Index**

Panel A. Signs of Changes in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	9	36	0.22	0.58	0.81	0.933	0.479	1.184
	$t-1$	9	35	0.22	0.57	0.79	0.940	0.563	1.316
	$t-2$	8	35	0.25	0.57	0.82	0.912	0.282	0.889
	$t-3$	8	34	0.13	0.53	0.65	0.991	1.936	3.289
	$t-4$	8	33	0.00	0.52	0.52	1.000	4.487*	6.520*
BOK	$t$	10	37	0.70	0.59	1.29	0.097	1.688	2.804
	$t-1$	10	36	0.50	0.53	1.03	0.578	0.041	0.025
	$t-2$	9	36	0.44	0.50	0.94	0.748	0.006	0.091
	$t-3$	9	35	0.33	0.46	0.79	0.934	0.559	1.286
	$t-4$	8	35	0.38	0.46	0.83	0.895	0.216	0.752
Panel B. High versus Low Growth in Total Consumption									
Institute	Period	$N_1$	$N_2$	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}$	FE	$\chi^2$	P-T
SERI	$t$	26	19	0.38	0.63	1.02	0.581	0.040	0.013
	$t-1$	26	18	0.31	0.54	0.81	0.945	0.947	1.698
	$t-2$	25	18	0.28	0.44	0.72	0.984	2.271	3.403
	$t-3$	25	17	0.32	0.47	0.79	0.953	1.075	1.887
	$t-4$	24	17	0.29	0.47	0.76	0.969	1.470	2.423
BOK	$t$	27	20	0.63	0.75	1.38	0.011*	5.213*	6.795*
	$t-1$	27	19	0.56	0.54	1.19	0.171	0.905	1.600
	$t-2$	26	19	0.42	0.42	0.84	0.909	0.535	1.092
	$t-3$	26	18	0.35	0.28	0.62	0.995	4.607*	6.157*
	$t-4$	25	18	0.40	0.33	0.73	0.980	2.007	3.049

Notes: The average expected household financial condition indexes are 50.7 for SERI and 106.9 for BOK.  $N_1$ : number of outcomes that are negative (low growth),  $N_2$ : number of outcomes that are non-negative (high growth),  $\hat{p}_1(\hat{p}_2)$ : estimate of  $p_1(p_2)$ ,  $\hat{p} = \hat{p}_1 + \hat{p}_2$ , FE: Fisher's exact test,  $\chi^2$ : Chi-square test, P-T: Pesaran-Timmermann test. Samples are 1996:4Q~2007:4Q for SERI and 1996:2Q~2004:4Q for BOK. \*\* Null hypothesis rejected at 1% level. \* Null hypothesis rejected at 5% level.

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