Stock Market and Social Mood: Evidence from Korea

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<Abstract>

This study provides empirical evidence on the existence of a mood effect in Korea Stock Market. Given the assumptions that changes in the Consumer Expectation Index and the numbers of suicides proxy for the social mood, I find that the aggregate stock market moves with the changes of investor sentiment, on average. The relation between the KOSPI and mood variables representing for investor sentiment is economically and statistically significant. For example, a 10% increase of the CEI relative to the previous month leads to a 14.7% rise of the KOSPI. The magnitude of the mood effect is even larger on the small cap stocks, especially in the KOSDAQ market. The contemporaneous changes in the KOSPI affected by the changes of investor sentiment are mostly reversed in the next month, suggesting that the mood effect is short-lived and seems to be unrelated to the fundamental information.

Keywords: Investor Sentiment, Mood Effect, Consumer Expectation Index, Market Index, Behavioral Finance

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I. Introduction

Would the changes in social mood explain asset returns in the stock market? This paper investigates the relation between the changes in social mood and aggregate stock market behavior in Korea. Following the social mood literature, I propose two different kinds of variables, consumer sentiment indexes and the number of suicides (or accidents[1]) to measure the social mood in Korea. Then, this paper assumes that those two variables may capture the fluctuations in social mood. The variables seem to be very different in nature, but there exists a commonality – reflecting the mood of consumers or a society in general.

In the literature examining the role of investor sentiment on the stock market, consumer sentiment indexes such as the Michigan Consumer Sentiment Index have been argued as a statistically significant factor in explaining excess returns of assets in U.S. stock market (Qiu and Welch 2006). In other words, the consumer sentiment indexes would be a proper proxy to measure investor sentiment which may also be related to the changes of social mood.

Similarly, the Bank of Korea conducts a survey to ask households their expectations of future consumption and reports six monthly individual Consumer Survey Indexes (CSIs) such as current living conditions, anticipations of future living conditions, anticipations of future household income and expenditure, evaluations of current economy, and expectations of future economy. By weighting those CSIs, the National Statistical Office of Korea constructs the Consumer Expectation Index (hereafter CEI) and releases the monthly CEIs

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[1] In this paper, accidents are defined as deaths caused by unintentional injuries from the mortality statistics.

through the Korean Statistical Information Service (KOSIS).

The CEI mainly aims to measure the future economic prospect thought by potential consumers, so it is often used to forecast a business cycle. That is, the CEI is a leading indicator for a business cycle since the current expenditure proxying for consumption depends on expected lifetime income, and consumption is considered as an important factor to explain the fluctuations of the economy.

Interestingly, since most of the survey questions ask respondents their subjective opinions on the current and future economic conditions, the answers are likely to reflect the instant feelings of respondents and thus social mood. In this sense, even though the CEI can be useful to forecast the future economic conditions, the CEI may also be a suitable proxy for investor sentiment.

In addition, I assume that changes in the number of suicides would reflect the social mood which also affects investor sentiment. Previous literature documents that asset prices are associated with especially *negative* sentiment measured by seasonal affective disorder (i.e., SAD) related to depression (Kamstra, Kramer, and Levy 2003), loss in international soccer games (Edmans et al. 2007), and the rate of daily hospital admission (Engelberg and Parsons 2013). Therefore, following the literature, I propose the number of suicides or accidents as a proper proxy for *negative* investor sentiment.

With those two measures, this study provides empirical evidence on the existence of a mood effect in Korea Stock Market. The fluctuations of investor sentiment, or social mood, induce the changes of aggregate market indexes, on average. For example, a 10% increase of the CEI relative to the previous month leads to a 14.7% rise of the KOSPI. Simultaneously, if the number of total suicides increases by 10%, the KOSPI would fall to about 1% in a month. However, these results would

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not explained by the changes of household expenditures and trading volumes.

The mood effect measured by the number of suicides is economically weak in terms of magnitudes, but the coefficients from various regressions are statistically significant. The magnitude of the mood effect is even lager on the *small cap* stocks, especially in the KOSDAQ market. These results are consistent with the empirical results from the U.S. market. Baker and Wurgler (2006) document that small cap stocks and growth stocks are more likely to move with investor sentiment than other types of stocks.

The mood effect associated with the CEI is reversed in the next month, suggesting that the behavioral influences by investor sentiment on asset prices seem to be short-lived and unrelated to the fundamental information.

With Korean data, Kim and Goo (2008) and Kim and Oh (2009) examine the relation among three variables such as consumption, consumer sentiment and stock prices. Even though their measure is different from the ones examined in this paper, they find that only positive investor sentiment is associated with daily stock returns. Ok and Kim (2012) also investigate the connection between consumer sentiment index and KOSPI returns. Contrary to the findings of Kim and Oh (2009), they document that when negative information about investor sentiment is released, investors are more likely to overreact to the information.

This study does not separate the negative and positive investor sentiments. Rather, I try to incorporate aggregate changes of the social mood as an important determinant of asset prices regardless of their direction.

II. Descriptions of Data

In this paper, two different kinds of investor sentiment measures are examined to capture the changes in social mood of Korea, the Consumer Expectation Index (CEI)[2] and the number of suicides[3].　Both are provided by the Korean Statistical Information Service (KOSIS) on a monthly basis.

The CEI is an averaged index of three consumer survey indexes (CSIs) − expectations of the business cycle, expectations of the household financial condition, and expectations of the household expenditure − which are originally surveyed by the Bank of Korea.　Since the CEI is available after December 1998, the sample period examined in this paper is from January 1999 to May 2014.

Similar to the Consumer Sentiment Index from the University of Michigan in the U.S., the CEI gauges the level of economic optimism or pessimism perceived by potential consumers in Korea.　Then, the CEI is expected to be closely related to the household expenditure, or consumption in the near future.　Therefore, it would be possible that the CEI reflects both near economic conditions of consumers and their instant feelings on the economy.　In other words, the CEI might be correlated with the stock market mainly because of the economic or rational considerations of respondents.　With the CEI measure, it would be difficult to completely distinguish between the economic decisions and the mood-driven decisions on the stock market.

To compensate for the weakness of the CEI as a measure of capturing current

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[2]

http://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1C8008&conn_path=I2
[3]　I also examine the number of deaths caused by unintentional injuries or accidents. The unintentional injuries include suicides in terms of causes of deaths.

social mood to reflect investor sentiment, I also examine the changes in the number of suicides or accidents.   In the literature identifying the mood effect on the stock market, several factors such as seasonal affective disorder (SAD) and morning sunshine have been suggested as a proxy to measure the degree of depression in a society (Kamstra, Kramer, and Levy 2003; Hirshleifer and Shumway 2003). Suicidal thoughts can be related with the SAD, especially for women.   Then, the short-term change of sunshine or SAD may be associated with the number of suicides (i.e., the degree of depression) in a society.

To make the CEI series stationary, I use the log difference of the CEI, which is similar to the log return.   For all analyses in this paper, the log difference of the CEI is,

$$\text{Ld\_CEI} = ln\left(\frac{\text{CEI}(t)}{\text{CEI}(t-1)}\right) \times 100,$$

where month t.

The number of suicides is counted based on the pre-classified causes of deaths by the KOSIS.   The log difference of suicides is defined as follows:

$$\text{Ld\_Suicide} = ln\left(\frac{\text{\# of deaths, suicide(t)}}{\text{\# of deaths, suicide(t-1)}}\right) \times 100.$$

Similarly, the log difference of death by unintentional injuries including suicides (i.e., Ld_Accident) including suicides is calculated as

$$\text{Ld\_Accident} = ln\left(\frac{\text{\# of deaths, unintentional injuries(t)}}{\text{\# of deaths, unintentional injuries(t-1)}}\right) \times 100.$$

The deaths by unintentional injuries are examined because accidents occur

unexpectedly without any preparation, so their negative impact on people's feelings would be highly severe and continue for a while. The summarized monthly statistics about the causes of deaths are available from January 1999 to December 2012 on the KOSIS website.

The monthly index returns using KOSPI and KOSDAQ at time *t* are obtained from FnGuide. The calculation is as follows:

$$\text{Index Returns} = \left(\frac{Index(t)}{Index(t-1)} - 1 \right) \times 100.$$

The indexes consisting of small cap stocks are based on the smallest KOSPI (KOSDAQ) firms among *three* market equity-based portfolios; and they are also obtained from FnGuide.

III. Empirical Results

1. An overview of investor sentiment over the sample period.

[Insert Figure 1 here]

Figure 1 exhibits historical changes of the main variables − the log difference of the CEI, household expenditure related to consumption, and log returns of the KOSPI − over the sample period. The real consumption and stock returns look highly volatile compared with the changes of the expectation in consumption. During the 2008 financial crisis, Korea experiences a severe drop in consumption as well as asset prices. Interestingly, the expectation of future consumption (i.e., the CEI) appears to fall twice during the year 2008, but is immediately recovered next

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year and even comes to the highest level over the sample period.

The last two graphs show historical patterns of the log difference of the total and female suicide rates until December 2012. Overall, both suicide rates move similarly although the changes of female suicide rates looks more sensitive (i.e., volatile) than the changes of total suicide rates.

Socio-economic factors of suicide differ among males and females (Qin, Agerbo, and Mortensen 2000; Neumayer 2003; Andres, Collings, and Qin 2010). Neumayer (2003) analyzed male and female suicides, respectively, and argues that "females seem to be somewhat less sensitive toward economic factors than males" (p. 323). Interestingly, the average temperature as a climatic factor is not significant in the male sample, but exhibit significant results on the female sample. He concludes that such an occurrence appears to be because females are more emotional and experience depression more often than men.

Women are about twice as likely as men to experience depression (Nolen-Hoeksema 1987). In general, women are more likely than men to be depressed for emotional reasons; thus, the female suicide rates would be less affected by economic recessions and would be better to measure social mood than total suicide rates. In that sense, female suicide rates may be a good proxy for investor feelings which are associated with social moods.

[Insert Figure 2 here]

Figure 2 presents seasonal graphs denoting mean levels by month of each variable. Since the U.S. stock market has been argued to show an anomaly related to the seasonality such as the January effect (Chaudhury 1994), the graphs examine

whether there is any evident seasonal pattern on the main variables.

Both the log differences of the CEI and household consumption do not show any clear seasonal patterns. Also, it seems that the January Effect does not exist in Korea Stock Market, but the KOSPI returns are generally higher in November than other months. As for the suicide rates, the changes of suicide rates seem to have a clear seasonal pattern − high in Spring and low in Winter, suggesting that people in Korea are more likely to be depressed in Spring.

2. Investor Sentiment and the Korea Stock Market

[Insert Table 1 here]

Table 1 shows descriptive statistics on the main variables. Since the mortality statistics are available only until the end of 2012, the total numbers about the causes of deaths are smaller than the numbers of observations on the market-related variables. The negative values of the log-differenced variables imply downward changes relative to the values of the previous month.

[Insert Table 2 here]

Table 2 presents correlations among the main variables. The lagged variables are included since the mood effect on the aggregate stock market may continue for several months. When the mood effect becomes weak, the returns on the market index would be adjusted to a long-term equilibrium.

As expected, the log difference of the CEI and log returns of KOSPI is positively

correlated reporting a value of 0.172, suggesting that the stock market and the expectation of future consumption moves contemporaneously in the same direction. However, the correlation between the stock market and the real consumption (i.e., household expenditure) is weak reporting a value of 0.067, implying that investors in the stock market are more likely to react to their obscure belief on the future economy rather than to the current economic condition. Or, it could perhaps be argued that if the CEI represents for the mood of society and investors, the mood effect which might be little related to the economic condition would exist in the stock market.

The log-differenced number of suicides proxying for social mood is also strongly associated with the change of asset prices in the stock market. The correlation between KOSPI and Ld_Suicide (Ld_Suicide_Female) is -0.184 (-0.218). Interestingly, the correlation between Ld_CEI and Ld_Suicide is quite high reporting a value of 0.218, suggesting that a social mood-induced relationship might exist among these three main variables, KOSPI, Ld_CEI, and Ld_Suicide.

[Insert Table 3 here]

Table 3 exhibits the main results by OLS regressions with the log returns of KOSPI as a dependent variable. The t-statistics are adjusted by the Newey-West heteroskedasticity and autocorrelation consistent (HAC) standard errors (Newey and West 1987).

For all regressions, the consumer expectation (CEI) proxying for investor sentiment is statistically and economically meaningful to explain the log returns of KOSPI. For example, in Equation (i), the coefficient of Ld_CEI (i.e., 1.47)

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implies that a 10% increase of the CEI relative to the previous month leads to a 14.7% rise of the KOSPI.   However, the mood effect associated with the CEI is reversed in the next month because the coefficient of a one-month lagged variable, Ld_CEI(-1), is a statistically and economically significant negative value (i.e., -.1.58).   The next month reversal is robust regardless of the inclusion of other variables. Therefore, I may conclude that the mood effect on the stock market would be short-lived and disappear within a month.

In Equation (iii), the log-differenced number of total suicides (i.e., Ld_Suicide) shows a statistically significant negative coefficient as a value of -0.10, implying that if the number of total suicides increases by 10%, the KOSPI would fall to about 1% in a month.   Even though the magnitude is relatively small compared to the coefficient of the CEI variables, the negative mood effect by the number of suicides on the log returns of KOSPI is statistically significant.   The log-differenced number of female suicides and accidents also presents similar results in terms of magnitudes and statistical significance.

In summary, the regression results suggest that the mood effect measured with the CEI and the number of suicides exists in the stock market.   The mood effect seems to be unrelated to real consumption because the household expenditure (Ld_Expenditure) proxying for real consumption is not statistically significant. Given the assumption that the changes of consumer expectation and suicides reflect for social mood, I provide evidence that social mood or investor sentiment would be important in understanding the behavior of asset prices in the stock market.

[Insert Table 4 here]

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Table 4 reports the regression results on other dependent variables. Previous empirical studies examining the U.S. stock market data document that small cap stocks and growth stocks are more likely to move with investor sentiment than other stocks (Lee, Shleifer and Thaler 1991, Baker and Wurgler 2006). In general, those stocks are difficult to arbitrage, and their valuations are highly subjective.

Therefore, I predict that the mood effect would be stronger on the *small cap* stocks in the KOSPI and KOSDAQ markets than the *large cap* stocks. In addition, I expect that KOSDAQ would be more sensitive to the change of social mood than KOSPI since the KOSDAQ market is considered to include more growth and young stocks than the KOSPI market.

Consistent with this prediction, the mood-related variable, Ld_CEI, from Equation (i) of Table 4 shows a larger regression coefficient on the log returns of small KOSPI stocks (i.e., 1.59) than the coefficient of Ld_CEI from Equation (iii) of Table 3 (i.e., 1.41). Moreover, the regression results on the log returns of KOSDAQ and small KOSDAQ stocks exhibit even larger coefficients of Ld_CEI as 1.92 and 1.93, respectively, in Equation (iii) and (v) of Table 4.

The one-month lagged variable, Ld_CEI(-1) also presents a consistent result with the predictions. The regression coefficients of Ld_CEI(-1) in Equation (i), (iii), and (v) of Table 4 is -1.40, -1.92 and -1.93, respectively, while the value of coefficient in Ld_CEI(-1) in Equation (iii) of Table 3 is -1.31. That is, the negative coefficients mean that the mood effect is mostly revered in both KOSPI and KOSDAQ markets in the next month.

The magnitudes of coefficients would be interpreted that the KOSDAQ market is

likely to moves more actively with the social mood than the KOSPI market. Furthermore, the small cap stocks in Korea Stock Market are particularly vulnerable to the social mood, or investor sentiment, which is a similar finding from the study with the U.S. stock market.

As for the number of suicides and accidents that I expect as another proxy for the social mood, only Equation (iii) and (iv) report economically and statistically significant coefficients for Ld_Suicide and Ld_Accident. The regression coefficients (i.e., -0.16 and -0.23) of Ld_Suicide and Ld_Accident in Equation (iii) and (iv) of Table 4 is much less than the values (i.e., -0.10 and -0.13) from Equation (iii) and (iv) of Table 3. This indicates that the KOSDAQ market is more volatile on the change of the social mood than the KOSPI market.

To sum up, most of the regression results are consistent with the initial predictions given the assumption that the CEI and Ld_Suicide represents for the social mood. The mood effect exists in Korean Stock Market, and the KOSDAQ market is more likely to be subject to the stock mood than the KOSPI market, especially for small cap stocks.

3. Investor Sentiment and trading volumes

In Table 5, I investigate the effects of investor sentiment on trading activities. To measure the trading activities, I use trading shares provided by FnGuide. Since the mood variables are available monthly, the trading activities are measured with the previous 20-days averaged trading shares between time t and t-1.

$$ln\left(\frac{Avg\{\text{trading shares}\}[d-20:d](\text{t})}{Avg\{\text{trading shares}\}[d-20:d](\text{t}-1)}]\right) \times 100,$$

where trading day d and month t.

Previous literature documents the information advantage of foreign investors among three investor groups such as individuals, institutions, and foreigners in the Korean capital market (Oh 2008; Chung 2012; Kong and Park 2012; Kwark and Jun 2013), so foreign invstors are more likely to trade on information than individual investors. Individual investors are often considered as a naïve investor group in previous literature. Then, the trading activities by individual investors would be more associated with social mood than other two groups of investors. Therefore, I investigate the trading volumes by different market participants such as individuals, institutions, and foreigners. The trading volume by a different investor group is measured as follows:

$$ln\left(\frac{Avg\{\text{Buying(d)}+\text{Selling(d)}\}[d-20:d](\text{t})}{Avg\{\text{Buying(d)}+\text{Selling(d)}\}[d-20:d](\text{t}-1)}]\right) \times 100.$$

[Insert Table 5 here]

Panel A of Table 5 exhibits whether there exist the contemporaneous and lagged mood effects related to trading activities in the KOSPI and KOSDAQ markets. Overall, Ld_CEI representing for social mood does not present any contemporaneous relationship with the KOSPI and KOSDAQ volumes. However, Equation (i) and (iii) show that there would be negative lagged effects on KOSPI (KOSDAQ) volumes about two or four months later. As for the trading activities on small firms of KOSPI in Equation (ii) also dot not show any statistically significant relationship with mood variables. Only trading activities on small

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firms of KOSDAQ in Equation (iv) presents a positive contemporaneous effect and negative lagged effects by Ld_CEI about three month later.

In Panel B, regardless of types of dependent variables such as trading volumes by individuals, institutions, and foreign investors, variables proxying for mood (i.e., Ld_CEI and Ld_Suicide) are not also statistically significant in explaining the contemporaneous variation of trading volumes in Korea Stock Market. Especially, trading activities by foreign investors who are considered as most informed traders do not have any contemporaneous and lagged relationship with the mood variables. On the other hand, in Equation (i) and (ii), Ld_CEI proxing for social mood is statistically significant in explaining the lagged variations of trading activities by individual investors who are considers as a naïve investor group in two or three months.

Therefore, the mood effect on asset prices seems not to be mediated through the trading volumes, or market activities. I may consider other processes (e.g. misattribution of relevant information) which are not associated with the trading volumes to explain the mood effect. This conjecture would be investigated in future work.

4. Robustness Check

As a robustness check, I examine the possibility of autocorrelation in monthly market returns. Then, in Panel A of Table 6, I include lagged market returns as independent variables. The lagged returns are not statistically significant in all equations implying that there would be little possibility of autocorrelation in

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monthly market returns.

Panel B of Table 6 presents the results of the pairwise Granger Causality test as to whether the social mood has any lead-lag effect on the market returns.   The Granger Causality test is useful to see a lead-lag relationship between various variables, but it does not appropriate for providing any causality between variables, or a contemporaneous relationship.

The Granger (1969) approach to the question of whether *one variable x* causes *another variable y* is to see how much of *y* at time *t* can be explained by the lagged values of *y* and then to see whether adding past values of *x* can improve the explanation. The equation is as follows. If we consider two lags, for all possible pairs of (*x, y*) series,

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \varepsilon_t$$
$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \beta_1 y_{t-1} + \beta_2 y_{t-2} + u_t.$$

Then, the reported F-statistics are for the joint hypothesis, $\beta_1 = \beta_2 = 0$, in each equation.   With a time lag of 4, the Granger Causality test shows that the lagged market returns are statistically significant to explain the variation of social mood. As the opposite direction, the lagged variations of social mood are also statistically significant to explain the returns of small firms in the KOSPI and KOSDAQ markets.

IV. Conclusions

This study provides empirical evidence on the existence of a mood effect in

Korea Stock Market. Given the assumptions that changes in the CEI and the numbers of suicides proxy for the social mood, I find that the aggregate stock market moves with the changes of investor sentiment, on average. The relation between the KOSPI and mood variables representing for investor sentiment is economically and statistically significant. The magnitude of the mood effect is even larger on the small cap stocks, especially in the KOSDAQ market.

The contemporaneous changes in the KOSPI affected by the changes of investor sentiment are mostly reversed in the next month, suggesting that the mood effect is short-lived and seems to be unrelated to the fundamental information. Investors may overreact to the changes in social mood, so the aggregate market index would be adjusted within two months.

Even though numerous studies have identified the relation between investor sentiment and asset pricing, the empirical results may be insufficient to clearly prove the existence of a mood effect since the investor sentiment, in fact, is unobservable and hard to be measured.

I note that it is highly challenging to find a perfect proxy for investor sentiment. However, this study proposes a novel proxy (i.e., the number of suicides) supported by the literature of behavioral finance and social psychology and finds a strong relation between the aggregate stock market returns and investor sentiment.

Despite of its limitation as an imperfect proxy, this paper, at least, provides evidence that an irrational aspect in financial markets would influence equity prices. Indeed, investors as a human may be too optimistic or too pessimistic according to social mood, so their investment decision could not be always rational.

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Table 1 Descriptive Statistics

Variables	N	Mean	Median	Max	Min	Std. Dev.
KOSPI	186	1.1720	1.4650	23.4400	-23.1300	7.8025
KOSPI_SMALL	172	0.7734	1.3950	22.9900	-29.2000	8.0600
KOSDAQ	186	0.5872	0.5550	60.4400	-34.5800	11.9332
KOSDAQ_SMALL	160	0.5455	-0.0950	33.8500	-32.9800	9.0536
Ld_HouseholdExpenditure	184	0.0457	0.0460	9.0133	-8.2926	2.4412
Ld_CEI	185	0.1784	0.1605	2.4144	-3.0096	0.8630
Ld_Suicide	169	0.2193	-2.0081	57.5789	-33.0800	13.5149
Ld_Suicide_Male	169	0.1900	-1.9910	53.5125	-30.3976	13.2137
Ld_Suicide_Female	169	0.2853	-2.2990	77.4026	-52.5130	17.3187
Ld_Accident	169	-0.1299	-0.6374	38.6891	-23.3259	9.4633
Ld_Accident_Male	169	-0.1323	-0.8200	34.9780	-20.7165	9.5037
Ld_Accident_Female	169	-0.1239	-1.1976	53.9395	-36.0529	11.8201

Variables	Definition of Variables	Sources
KOSPI	Monthly returns of KOSPI	FnGuide
KOSPI_SMALL	Monthly returns of an index consisting of the smallest KOSPI firms based on 3 market equity-based portfolios	FnGuide
KOSDAQ	Monthly returns of KOSDAQ	FnGuide
KOSDAQ_SMALL	Monthly returns of an index consisting of the smallest KOSDAQ firms based on 3 market equity-based portfolios	FnGuide
Ld_HouseholdExpenditure	Log differences of household expenditure proxying for consumption	KOSIS
Ld_CEI	Log differences of the Consumer Expectation Index	KOSIS
Ld_Suicide	Log differences of the total suicides	KOSIS
Ld_Suicide_Male	Log differences of the male suicides	KOSIS
Ld_Suicide_Female(FM)	Log differences of the female suicides	KOSIS
Ld_Accident	Log differences of the total deaths by unintentional injuries	KOSIS
Ld_Accident_Male	Log differences of the male deaths by unintentional injuries	KOSIS
Ld_Accident_Female(FM)	Log differences of the female deaths by unintentional injuries	KOSIS

Table 2 Correlations

Variables	1	2	3	4	5	6	7
1. KOSPI	**1.000**						
2. Ld_HouseholdExpenditure	**0.067**	1.000					
3. Ld_CEI	**0.172**	0.206	1.000				
4. Ld_CEI (-1)	**0.038**	0.321	0.730	1.000			
5. Ld_CEI (-2)	**0.060**	0.270	0.349	0.731	1.000		
6. Ld_CEI (-3)	**0.055**	0.155	0.033	0.352	0.733	1.000	
7. Ld_CEI (-4)	**-0.064**	0.000	-0.070	0.037	0.356	0.735	1.000
8. Ld_CEI (-5)	**-0.089**	-0.016	-0.120	-0.064	0.044	0.361	0.737
9. Ld_CEI (-6)	**-0.075**	-0.027	-0.203	-0.115	-0.058	0.051	0.364
10. Ld_Suicide	**-0.184**	0.086	0.218	0.219	0.056	-0.148	-0.129
11. Ld_Suicide (-1)	**-0.081**	0.078	0.105	0.216	0.212	0.048	-0.155
12. Ld_Suicide (-2)	**0.062**	0.040	-0.062	0.111	0.223	0.219	0.053
13. Ld_Suicide_Male	**-0.136**	0.066	0.212	0.203	0.063	-0.130	-0.128
14. Ld_Suicide_Female	**-0.218**	0.100	0.192	0.210	0.045	-0.137	-0.110
15. Ld_Accident	**-0.178**	0.093	0.135	0.197	0.109	-0.054	-0.041
16. Ld_Accident_Male	**-0.159**	0.090	0.125	0.197	0.129	-0.013	-0.031
17. Ld_Accident_Female	**-0.167**	0.080	0.120	0.158	0.060	-0.107	-0.050

	8	9	10	11	12	13	14	15	16	17
1										
2										
3										
4										
5										
6										
7										
8	1.000									
9	0.737	1.000								
10	-0.184	-0.122	1.000							
11	-0.141	-0.196	0.164	1.000						
12	-0.152	-0.139	-0.102	0.151	1.000					
13	-0.197	-0.121	0.948	0.156	-0.042	1.000				
14	-0.134	-0.108	0.874	0.167	-0.166	0.677	1.000			
15	-0.104	-0.062	0.844	0.193	0.067	0.795	0.748	1.000		
16	-0.117	-0.078	0.788	0.227	0.124	0.805	0.610	0.954	1.000	
17	-0.061	-0.020	0.751	0.101	-0.033	0.606	0.811	0.864	0.674	1.000

Table 3 Effects of Investor Sentiment on Log Returns of KOSPI

Least Squares; Newey-West HAC Standard Errors & Covariance (lag truncation=4)

Dependent Variable: Log returns of KOSPI; Sample (adjusted): 1999M08 2014M05

(i)				(ii)			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.74	1.44	0.15	C	0.85	1.66	0.10
Ld_CEI	1.47	3.89	0.00	Ld_CEI	1.37	3.91	0.00
Ld_CEI(-1)	-1.58	-3.22	0.00	Ld_CEI(-1)	-1.44	-3.00	0.00
Ld_CEI(-2)	0.33	0.53	0.60	Ld_CEI(-2)	0.32	0.49	0.62
Ld_CEI(-3)	1.24	1.68	0.09	Ld_CEI(-3)	1.05	1.50	0.13
Ld_CEI(-4)	-1.12	-2.28	0.02	Ld_CEI(-4)	-0.86	-2.59	0.01
Ld_CEI(-5)	-0.04	-0.11	0.91	Ld_Expenditure	0.35	0.52	0.61
Ld_CEI(-6)	0.29	1.15	0.25				

(iii)				(iv)			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.95	1.74	0.08	C	0.90	1.63	0.10
Ld_CEI	1.41	3.85	0.00	Ld_CEI	1.36	3.75	0.00
Ld_CEI(-1)	-1.31	-2.60	0.01	Ld_CEI(-1)	-1.32	-2.66	0.01
Ld_CEI(-2)	0.30	0.43	0.67	Ld_CEI(-2)	0.33	0.48	0.63
Ld_CEI(-3)	0.91	1.29	0.20	Ld_CEI(-3)	0.94	1.36	0.18
Ld_CEI(-4)	-0.83	-2.50	0.01	Ld_CEI(-4)	-0.81	-2.48	0.01
Ld_Expenditure	0.64	0.86	0.39	Ld_Expenditure	0.64	0.84	0.40
Ld_Suicide	-0.10	-2.31	0.02	Ld_Accident	-0.13	-2.17	0.03

(v)				(vi)			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.95	1.76	0.08	C	0.91	1.66	0.10
Ld_CEI	1.38	3.85	0.00	Ld_CEI	1.37	3.92	0.00
Ld_CEI(-1)	-1.26	-2.45	0.02	Ld_CEI(-1)	-1.35	-2.69	0.01
Ld_CEI(-2)	0.27	0.37	0.71	Ld_CEI(-2)	0.32	0.45	0.65
Ld_CEI(-3)	0.91	1.25	0.21	Ld_CEI(-3)	0.93	1.30	0.19
Ld_CEI(-4)	-0.81	-2.46	0.02	Ld_CEI(-4)	-0.80	-2.48	0.01
Ld_Expenditure	0.68	0.91	0.36	Ld_Expenditure	0.64	0.84	0.40
Ld_Suicide_FM	-0.09	-2.15	0.03	Ld_Accident_FM	-0.09	-1.65	0.10

Table 4 Effects of Investor Sentiment on Various Market Returns

Least Squares; Newey-West HAC Standard Errors & Covariance (lag truncation=4)

Dependent Variable: KOSPI_SMALL; Sample (adjusted): 2000M02 2012M12

	(i)				(ii)		
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.75	0.02	0.26	C	0.70	1.05	0.30
Ld_CEI	1.59	3.75	0.00	Ld_CEI	1.54	4.58	0.00
Ld_CEI(-1)	-1.40	-1.47	0.03	Ld_CEI(-1)	-1.38	-2.17	0.03
Ld_CEI(-2)	0.04	-0.37	0.95	Ld_CEI(-2)	0.09	0.13	0.90
Ld_CEI(-3)	1.30	1.56	0.06	Ld_CEI(-3)	1.28	1.94	0.05
Ld_CEI(-4)	-1.30	-2.93	0.00	Ld_CEI(-4)	-1.26	-3.41	0.00
Ld_Expenditure	0.00	0.56	1.00	Ld_Expenditure	-0.02	-0.02	0.98
Ld_Suicide	-0.09	-2.23	0.11	Ld_Accident	-0.15	-1.79	0.08

Dependent Variable: KOSDAQ; Sample (adjusted): 1999M06 2012M12

	(iii)				(iv)		
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.01	0.02	0.99	C	-0.07	-0.09	0.93
Ld_CEI	1.92	3.75	0.00	Ld_CEI	1.83	3.57	0.00
Ld_CEI(-1)	-1.34	-1.47	0.14	Ld_CEI(-1)	-1.33	-1.46	0.15
Ld_CEI(-2)	-0.50	-0.37	0.71	Ld_CEI(-2)	-0.45	-0.34	0.74
Ld_CEI(-3)	1.86	1.56	0.12	Ld_CEI(-3)	1.86	1.58	0.12
Ld_CEI(-4)	-1.63	-2.93	0.00	Ld_CEI(-4)	-1.59	-2.89	0.00
Ld_Expenditure	0.73	0.56	0.57	Ld_Expenditure	0.74	0.56	0.57
Ld_Suicide	-0.16	-2.23	0.03	Ld_Accident	-0.23	-2.04	0.04

Dependent Variable: KOSDAQ_SMALL; Sample (adjusted): 2001M02 2012M12

	(v)				(vi)		
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.45	0.58	0.56	C	0.42	0.54	0.59
Ld_CEI	1.93	4.05	0.00	Ld_CEI	1.89	4.03	0.00
Ld_CEI(-1)	-2.29	-2.63	0.01	Ld_CEI(-1)	-2.30	-2.63	0.01
Ld_CEI(-2)	0.98	1.47	0.14	Ld_CEI(-2)	0.96	1.43	0.15
Ld_CEI(-3)	1.24	2.06	0.04	Ld_CEI(-3)	1.32	2.17	0.03
Ld_CEI(-4)	-1.49	-4.12	0.00	Ld_CEI(-4)	-1.50	-4.23	0.00
Ld_Expenditure	-0.15	-0.18	0.85	Ld_Expenditure	-0.21	-0.27	0.79
Ld_Suicide	-0.08	-1.45	0.15	Ld_Accident	-0.09	-1.07	0.29

Table 5 Effects of Investor Sentiment on Trading Volume

In Panel A, the KOSPI (KOSDAQ) volume is defined as log differences of the KOSPI (KOSDAQ) 20-days averaged trading volume between month *t* and *t-1*. Small firms are classified as the smallest firms based on 3 market equity-based portfolios. In Panel B, the trading volume including buying and selling of each market participants is as follows:

$$ ln \left(\frac{Avg\{Buying(d)+Selling(d)\}[d-20:d](t)}{Avg\{Buying(d)+Selling(d)\}[d-20:d](t-1)}] \right) \times 100, $$

where trading day *d* and month *t*. All trading volume data are obtained from FnGuide.

Panel A: Trading volume of the whole market							
Least Squares; Newey-West HAC Standard Errors & Covariance (lag truncation=4)							
(i)				(ii)			
KOSPI Volume				KOSPI Volume (Small Firms)			
Sample (adjusted): 1999M06 2012M12				Sample (adjusted): 2000M02 2012M12			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	-0.35	-0.29	0.77	C	0.75	0.47	0.64
Ld_CEI	-0.32	-0.33	0.74	Ld_CEI	1.21	0.98	0.33
Ld_CEI(-1)	0.56	0.33	0.74	Ld_CEI(-1)	-0.42	-0.24	0.81
Ld_CEI(-2)	-2.64	-1.88	0.06	Ld_CEI(-2)	-2.62	-1.52	0.13
Ld_CEI(-3)	3.00	2.19	0.03	Ld_CEI(-3)	2.44	1.40	0.16
Ld_CEI(-4)	-2.10	-2.18	0.03	Ld_CEI(-4)	-1.57	-1.29	0.20
Ld_Expenditure	4.27	1.97	0.05	Ld_Expenditure	5.16	2.08	0.04
Ld_Suicide	0.01	0.05	0.96	Ld_Suicide	-0.10	-0.63	0.53
(iii)				(iv)			
KOSDAQ Volume				KOSDAQ Volume (Small Firms)			
Sample (adjusted): 1999M06 2012M12				Sample (adjusted): 2001M02 2012M12			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	2.00	1.29	0.20	C	1.37	0.96	0.34
Ld_CEI	0.82	0.99	0.33	Ld_CEI	2.00	1.68	0.09
Ld_CEI(-1)	-2.43	-1.47	0.14	Ld_CEI(-1)	-2.10	-1.14	0.26
Ld_CEI(-2)	0.97	0.61	0.54	Ld_CEI(-2)	1.26	0.70	0.49
Ld_CEI(-3)	1.67	1.36	0.18	Ld_CEI(-3)	2.63	1.80	0.07
Ld_CEI(-4)	-2.17	-1.99	0.05	Ld_CEI(-4)	-3.54	-3.61	0.00
Ld_Expenditure	2.53	0.95	0.34	Ld_Expenditure	-3.12	-1.41	0.16
Ld_Suicide	-0.23	-1.53	0.13	Ld_Suicide	-0.09	-0.75	0.45

Panel B: Trading volume (buying and selling) by different market participants
Least Squares; Newey-West HAC Standard Errors & Covariance (lag truncation=4);
Sample (adjusted): 2000M02 2012M12

(i)

KOSPI Volume (Individual Investors)

Variables	Coeff.	T-stat	P-val
C	-0.39	-0.28	0.78
Ld_CEI	-0.54	-0.53	0.60
Ld_CEI(-1)	0.76	0.43	0.67
Ld_CEI(-2)	-3.13	-2.11	0.04
Ld_CEI(-3)	3.51	2.54	0.01
Ld_CEI(-4)	-2.49	-2.51	0.01
Ld_Expenditure	5.32	2.03	0.04
Ld_Suicide	0.03	0.27	0.79

(ii)

KOSDAQ Volume (Individual Investors)

Variables	Coeff.	T-stat	P-val
C	0.71	0.57	0.57
Ld_CEI	0.86	1.04	0.30
Ld_CEI(-1)	-2.80	-1.64	0.10
Ld_CEI(-2)	1.11	0.70	0.48
Ld_CEI(-3)	2.21	1.93	0.06
Ld_CEI(-4)	-3.16	-3.70	0.00
Ld_Expenditure	-0.34	-0.20	0.84
Ld_Suicide	-0.15	-1.26	0.21

(iii)

KOSPI Volume (Institutional Investors)

Variables	Coeff.	T-stat	P-val
C	-0.47	-0.46	0.65
Ld_CEI	1.03	1.21	0.23
Ld_CEI(-1)	-2.07	-1.43	0.16
Ld_CEI(-2)	-1.67	-1.19	0.24
Ld_CEI(-3)	3.66	2.68	0.01
Ld_CEI(-4)	-2.63	-3.35	0.00
Ld_Expenditure	2.81	1.76	0.08
Ld_Suicide	0.01	0.10	0.92

(iv)

KOSDAQ Volume (Institutional Investors)

Variables	Coeff.	T-stat	P-val
C	0.23	0.19	0.85
Ld_CEI	2.60	2.46	0.01
Ld_CEI(-1)	-4.37	-2.31	0.02
Ld_CEI(-2)	-0.64	-0.39	0.70
Ld_CEI(-3)	4.33	3.06	0.00
Ld_CEI(-4)	-3.82	-3.37	0.00
Ld_Expenditure	0.12	0.05	0.96
Ld_Suicide	-0.09	-0.65	0.52

(v)

KOSPI Volume (Foreign Investors)

Variables	Coeff.	T-stat	P-val
C	0.46	0.46	0.65
Ld_CEI	1.38	1.46	0.15
Ld_CEI(-1)	-0.71	-0.45	0.66
Ld_CEI(-2)	-1.25	-0.75	0.45
Ld_CEI(-3)	1.05	0.59	0.55
Ld_CEI(-4)	-0.10	-0.10	0.92
Ld_Expenditure	3.43	1.93	0.06
Ld_Suicide	0.11	0.85	0.39

(vi)

KOSDAQ Volume (Foreign Investors)

Variables	Coeff.	T-stat	P-val
C	1.03	0.61	0.54
Ld_CEI	0.05	0.05	0.96
Ld_CEI(-1)	-2.80	-1.31	0.19
Ld_CEI(-2)	-0.12	-0.04	0.97
Ld_CEI(-3)	4.11	1.69	0.09
Ld_CEI(-4)	-2.83	-2.24	0.03
Ld_Expenditure	3.18	1.55	0.12
Ld_Suicide	0.20	1.12	0.26

Table 6 Robustness Check

Panel A Effects of lagged market returns (i.e., autocorrelation)

Least Squares; Newey-West HAC Standard Errors & Covariance (lag truncation=4)

| (i)				(ii)			
Dependent Variable: KOSPI				Dependent Variable: KOSPI_SMALL			
Sample (adjusted): 1999M06 2012M12				Sample (adjusted): 2000M04 2012M12			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	1.05	1.88	0.06	C	0.65	0.99	0.33
KOSPI(-1)	-0.03	-0.55	0.58	KOSPI_SMALL(-1)	0.03	0.37	0.71
KOSPI(-2)	-0.06	-0.69	0.49	KOSPI_SMALL(-2)	0.02	0.28	0.78
Ld_CEI	1.54	3.93	0.00	Ld_CEI	1.54	4.32	0.00
Ld_CEI(-1)	-1.30	-2.54	0.01	Ld_CEI(-1)	-1.41	-2.19	0.03
Ld_CEI(-2)	0.28	0.39	0.69	Ld_CEI(-2)	0.06	0.09	0.93
Ld_CEI(-3)	0.92	1.27	0.21	Ld_CEI(-3)	1.29	1.84	0.07
Ld_CEI(-4)	-0.79	-2.24	0.03	Ld_CEI(-4)	-1.30	-3.36	0.00
Ld_Expenditure	0.65	0.87	0.39	Ld_Expenditure	-0.04	-0.06	0.96
Ld_Suicide	-0.10	-2.26	0.03	Ld_Suicide	-0.09	-1.59	0.11
(iii)				(iv)			
Dependent Variable: KOSDAQ				Dependent Variable: KOSDAQ_SMALL			
Sample (adjusted): 1999M06 2012M12				Sample (adjusted): 2001M04 2012M12			
Variables	Coeff.	T-stat	P-val	Variables	Coeff.	T-stat	P-val
C	0.04	0.05	0.96	C	0.41	0.55	0.58
KOSDAQ(-1)	-0.10	-0.92	0.36	KOSDAQ_SMALL(-1)	0.08	0.87	0.39
KOSDAQ(-2)	-0.03	-0.28	0.78	KOSDAQ_SMALL(-2)	0.01	0.14	0.89
Ld_CEI	2.16	3.43	0.00	Ld_CEI	1.74	2.96	0.00
Ld_CEI(-1)	-1.37	-1.54	0.13	Ld_CEI(-1)	-2.22	-2.50	0.01
Ld_CEI(-2)	-0.56	-0.42	0.68	Ld_CEI(-2)	1.00	1.50	0.14
Ld_CEI(-3)	1.90	1.63	0.10	Ld_CEI(-3)	1.32	2.00	0.05
Ld_CEI(-4)	-1.60	-3.04	0.00	Ld_CEI(-4)	-1.62	-4.09	0.00
Ld_Expenditure	0.80	0.60	0.55	Ld_Expenditure	-0.19	-0.24	0.81
Ld_Suicide	-0.15	-2.25	0.03	Ld_Suicide	-0.09	-1.38	0.17

Panel B: Pairwise Granger Causality Tests

Sample: 1998M12 2014M05

Lags: 4

Null Hypothesis:	Obs	F-Stat.	Prob.
Ld_CEI does not Granger Cause KOSPI	180.00	1.24	0.30
KOSPI does not Granger Cause Ld_CEI		8.35	0.00
Ld_CEI does not Granger Cause KOSPI_SMALL	168.00	2.25	0.07
KOSPI_SMALL does not Granger Cause Ld_CEI		6.35	0.00
Ld_CEI does not Granger Cause KOSDAQ	180.00	1.77	0.14
KOSDAQ does not Granger Cause Ld_CEI		7.07	0.00
Ld_CEI does not Granger Cause KOSDAQ_SMALL	156.00	3.03	0.02
KOSDAQ_SMALL does not Granger Cause Ld_CEI		6.85	0.00

**Figure 1 Historical Changes of the Consumer Expectation Index,
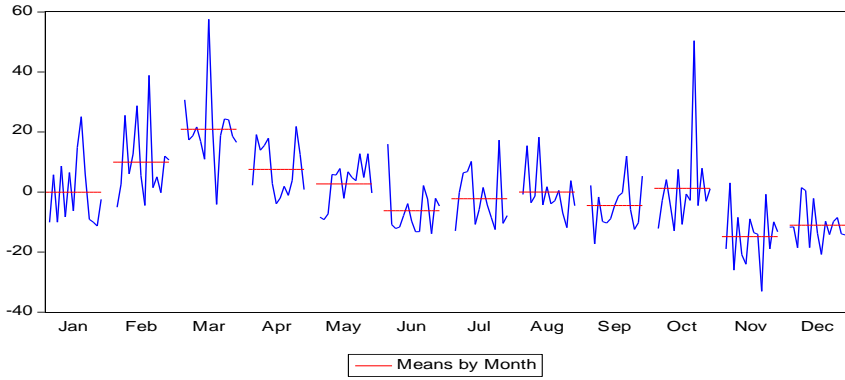Household Expenditure and KOSPI**

LD_CEI

Ld_HouseholdExpenditure

Log returns of KOSPI

Ld_Suicide
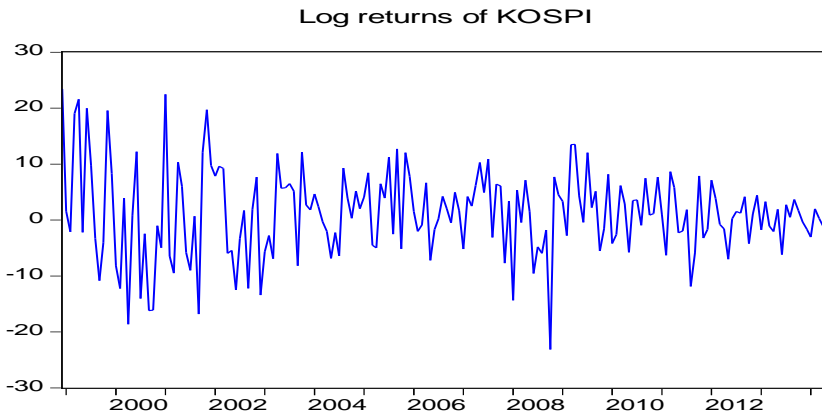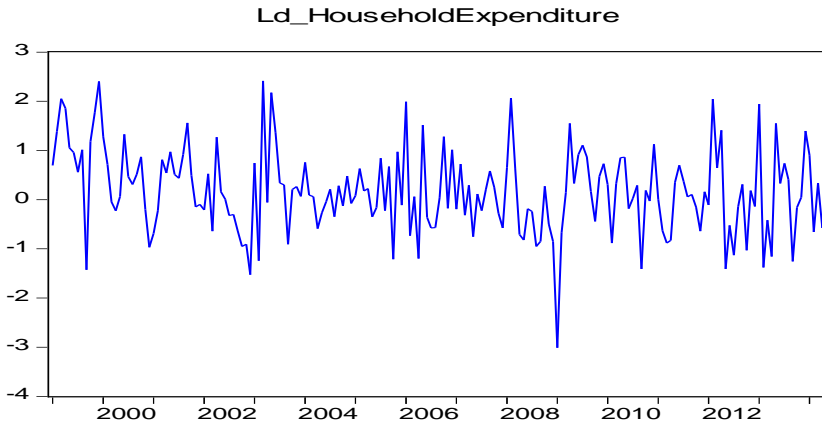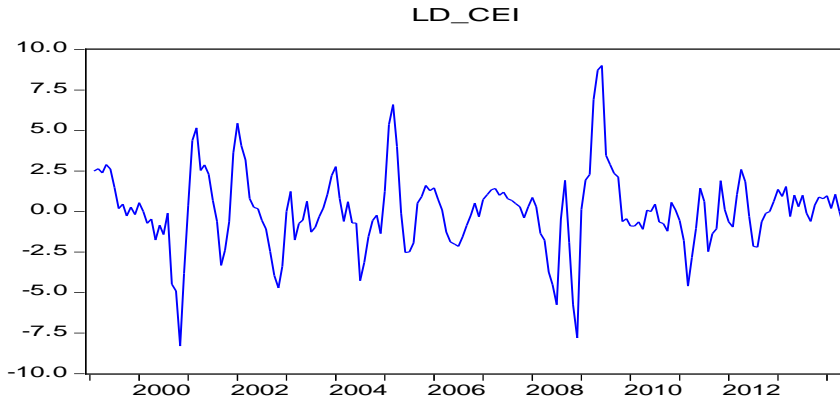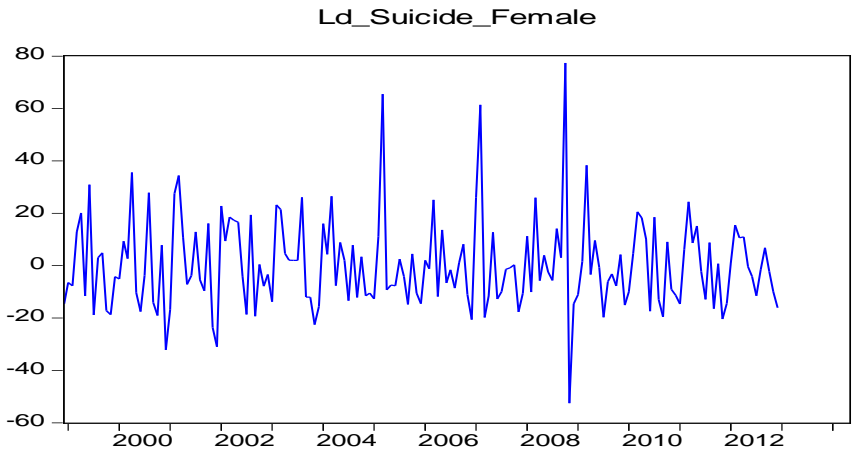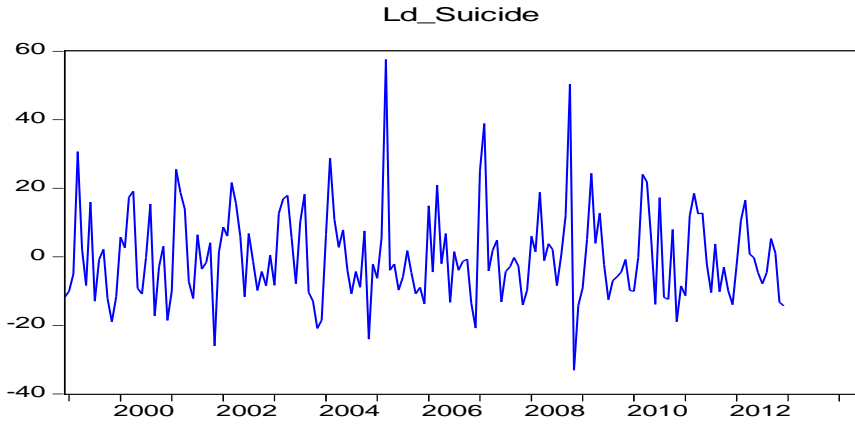
Ld_Suicide_Female

**Figure 2 Seasonal Changes of the Consumer Expectation Index,
Household Expenditure and KOSPI**

LD_CEI by Month

Ld_HouseholdExpenditure by Month

Log returns of KOSPI by Month
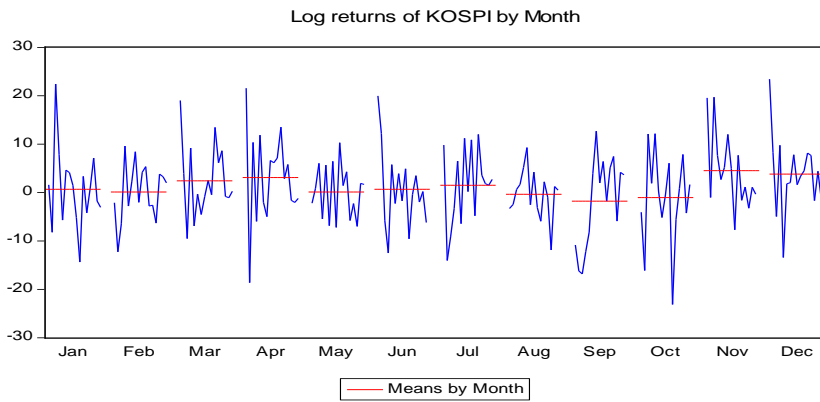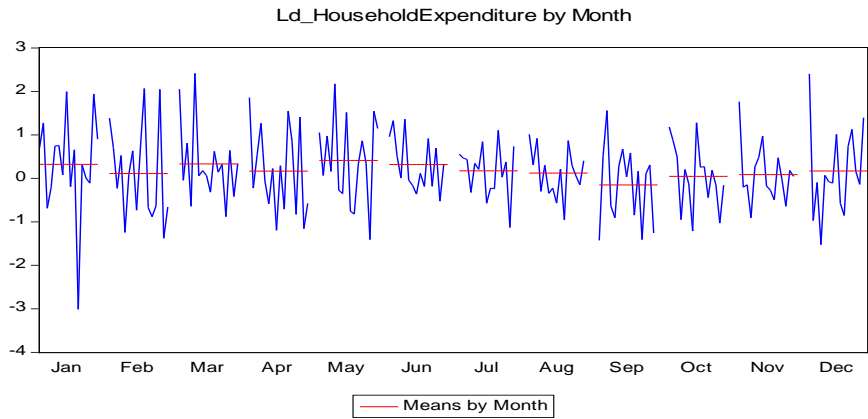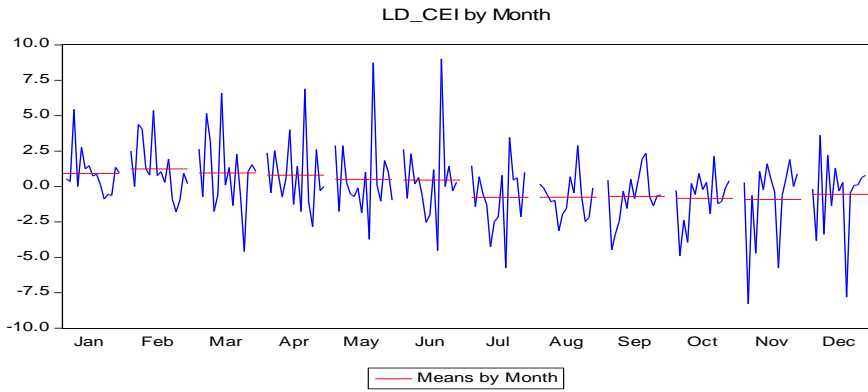
Ld_SUICIDE_TOTAL by Month

Means by Month

Ld_Suicide_Female by Month

Means by Month