The effects of business cycle indicators on stock market indices of food industry in Iran

H. Mohammadi; L. Abolhasani; N. Shahnoushi; F. Shabanian

Ferdowsi University of Mashhad, Agricultural Economics, Iran

Corresponding author email: hoseinmohammadi@um.ac.ir

Abstract:

This paper investigates the effects of the business cycle indicators on stock market indices of food industry companies in Iran stock market. Using dynamic panel and Panel VAR methods for seasonal data of 2001-2015, the results show that the effect of GDP and agricultural value-added as indicators of business cycle on stock market indices of sales volume, price index, net profit and stock return are positive. The results of panel VAR models also show that the shocks entered by GDP and agricultural value added have a different effect on stock market indices of sales volume, price index, net profit and stock return. Due to the positive effects of the business cycles indicators on the stock market indices of food industry companies, it is recommended that policy-makers consider strategies to increase GDP and agriculture value-added.

JEL Codes: Q14, G11

#402

The effects of business cycle indicators on stock market indices of food industry

in Iran

Abstract

This paper investigates the effects of the business cycle indicators on stock market indices of food industry companies in Iran stock market. Using dynamic panel and Panel VAR methods for seasonal data of 2001-2015, the results show that the effect of GDP and agricultural value-added as indicators of business cycle on stock market indices of sales volume, price index, net profit and stock return are positive. The results of panel VAR models also show that the shocks entered by GDP and agricultural value added have a different effect on stock market indices of sales volume, price index, net profit and stock return. Due to the positive effects of the business cycles indicators on the stock market indices of food industry companies, it is recommended that policy-makers consider strategies to increase GDP and agriculture value-added.

Key words: Business cycles, Stock market, Food industries, Sales volume, Price index, Net profit, Stock return.

Introduction

One of the major challenges for economic growth in developing countries is lack of sufficient capital and inefficient use of available resources. With efficient use of capital resources and more efficiency of stock markets in developing countries, the capital input allocation mechanism would be more effective and the possibility of economic growth is provided (Durnev et al. 2004). Capital market indices in any economy are like thermometers that show the performance of the economy and immediately reflect the effects of policy-

makers' decisions on the country's economy even before its implementation. The relationship between indices of stock market and business cycles can even predict the occurrence of boom and recession.

In the field of business cycles, the efforts of economists have been focused on two main subjects. One is identification of factors affecting the emergence of boom and recession cycles in the economy and identifying the duration and scope of business cycles and the other is analyzing the effects of business cycles on the important economic and financial variables. The results of investigating business cycles show that the business cycle indices have a serial correlation (Takatoshi, 2001). In addition, the duration of a complete cycle is different in each country and it depends on several variables and conditions.

According to Lucas (2003), the first step in designing the economic stabilization policies is recognition and understanding of the business cycles. Business cycles can exist in any country, however, different in severity and extent. In fact, fluctuations and changes in macroeconomic variables and its affecting variables can form such cycles and increased fluctuations of important economic variables would cause to instable economic and political environment that can reduce investment and economic growth. It is natural that the more intense the business cycles and economic fluctuations are, the more will be instability in the economy and economic agents including households and firms who cannot have a clear picture of the future. Hence, economists have long been trying to discover the structure of the fluctuations and with executive instructions are trying to reduce it. Moreover, the analysis of the effects of business cycles on the important economic and financial variables also has been one of the research priorities.

Several studies conducted by Randi et al. (2011), He et al. (2009), Zhao and Hsu (2008) and Ho et al. (2009), showed that different variables such as GDP, investment, labor force, productivity of total factors, and industrial products can be considered as indices

representing business cycles. On the other hand, the stock market as a very important tool of capital market plays a leading role in the economic growth by pricing, reducing risk, mobilizing resources, and optimal allocation of capital (Amiri et al. 2009). With increasing trend to economic liberalization and privatization in developing countries, the capital market has been proposed as one of the key factors in economic development (Shamsuddin and Hillier, 2004). Today, in most countries the capital market affects to the economic return and productivity through affecting processes of financing and investment in all sectors of the economy. Through concentration and efficient allocation of capital, the stock market plays a key role in increasing production and achieving economic and social development objectives.

One of the important sectors in the stock market of Iran is the group related to food and beverage industries (except sugar lump). The total number of companies active in the Iranian stock market in 2015 has been around 315 companies, of which 20 companies are in the food and beverage group except for sugar lump. The value and volume of transactions in this group of industries affected by economic and financial variables such that the price index in this group in 2013 has been 2947 units and has plummeted to 2481 units in 2014. The severe increase or decrease in the indices of such group of industries is due to internal or external factors, and the business cycles can have a significant role in this process.

The aim of this study was to investigate the influence of important indicators of business cycles as well as a series of economic and financial variables on the important indices of the stock market in the food industry group in Iran. In other words, how was the effect of economic boom or recession on the stock market performance indices of the food industry group in Iran stock market? To answer this question, the effect of important indicators of business cycles, including GDP and agriculture value-added, as independent variables was considered on the main stock market indices, including sales volume, price index, net profit and stock returns as dependent variable. By using dynamic panel and panel

VAR methods, the effect of business cycle indicators on dependent variables in 2001-2015 were analyzed.

Literature review

Different studies were conducted regarding to the effects of business cycle indices on economic and financial variables. Gubler and Hertweck (2013), using the SVAR model explained that commodity prices shocks as well as investment shocks in particular technologies are among important and driving forces of macroeconomic fluctuations. Breitung and Eickmeier (2015) showed that there is a significant asymmetry in the total business cycles in America and the fluctuations in the recession period is more compared to the boom period. Trabelsi (2017) indicated that political uncertainty generates unstable financial markets and more significant stock market cycles. Nitschka (2013) showed that business cycle dynamics in British and German are Granger cause of stock returns and explain more than 20% of time variation in one-year ahead stock market returns. Zhu and Zhu (2014) showed that the index for the primary business cycles in Europe can well predict the stock returns. Fritsch et al. (2013) showed that the formation of new business during the recession period is higher than during the boom. Chatterjee (2016) showed that liquidity in the stock market has little effect in showing the recession in America.

Vu (2015) stated that the international stock market fluctuations prove a significant predictability for future production growth in Germany and the UK. Qinglu (2005) showed that accounting variables such as sales and growth of fixed assets are fully associated with the business cycles, and these variables are more sensitive to recession than economic boom. Choudhry et al. (2016) investigated the relationship between stock market volatility and the business cycle. Their results showed that there is a bidirectional causal relationship between stock market volatility and the business cycle.

4

Giorgioni et al. (2014) found that there is a significant negative relationship between lack of liquidity in the stock market and GDP growth for the UK. Smimou and Khallouli (2015) considered the relationship between stock market liquidity and business cycles in Euro zone countries. Their results showed that with liquidity growth in the stock market, economic growth in these countries would be affected.

As mentioned, in various studies different indicators such as GDP, value-added of economic sectors, investment, development expenditures, liquidity, and so on were considered to show business cycles in different countries, and the effect of these indicators on economic and financial variables have been studied. Since there are not enough studies that consider the effect of business cycle indicators on the stock market indices of food industries, it is necessary to conduct more quantitative research in this field. In fact, the business cycles or the boom and recession conditions can strongly affect the economic and financial performance of food companies operating in the stock market. If we could identify the exact effect of these cycles on the variables representing the financial performance of a company, then effective preventative measures can be used for utilizing the opportunities and avoiding the threats. In the present study, by focusing on the food industry groups in Iran, the effect of the business cycles indicators on four important indices of stock market was investigated. Iran economy has been faced with several cycles of boom and recession due to the excessive dependence on revenues from crude oil exports over the past decades. These periods of boom and recession had a considerable effect on all markets including financial and stock markets, and identifying these effects can have a significant role in the proper design of economic policy.

Materials and Methods

In this study, the quarterly data of 18 companies in the group of food industry in Iran stock market in 2001-2015 was considered and the panel data approach was used for

5

analyzing data and estimating the models. Using the Chow test, common constant (CC) model was compared to the fixed effect (FE) model and by Hausman test random effect (RE) model was compared to the fixed effect model (Baltagi, 2005). In the case of selecting panel approach, Arellano and Bond dynamic panel model was applied due to the dynamic nature of the stock market. Linear dynamic panel model can be shown as follows:

$$y_{it} = \sum_{j=1}^{p} \rho_j y_{it-j} + X_{it}'\beta + \delta_i + \varepsilon_{it}$$

(1)

In this model, when the lag of dependent variable is appeared on the right side of the equation, then estimates of the OLS approach won't be compatible and the two-stage least square (2SLS) methods of Anderson and Hsiao or Generalized Method of Moments (GMM) of Arellano and Bond (1991) should be applied. Estimation of 2SLS method due to problems caused by the selection of tools may lead to larger variances for the coefficients and hence these estimates might not be statistically significant. Therefore, GMM method of Arellano and Bond is suggested to solve this problem. In this study, Generalized Method of Moments is used to estimate the dynamic panel model. Because in the dynamic panel model the lag of the dependent variable is correlated with the residuals, the first-order difference of the model was used. The first-order difference of this model is as follows:

$$\Delta y_{it} = \sum_{j=1}^{p} \rho_j \Delta y_{it-j} + \Delta X_{it}'\beta + \Delta \varepsilon_{it}$$

(2)

Efficient GMM estimation of this equation in its regular mode uses a number of different tools including the lag of the dependent and exogenous (predetermined) variables in each course. To investigate the validity of the instrument matrices, the statistics proposed by Arellano and Bond (1991), Blundell and Bond (1998) and Arellano and Bover (1995) were used. This test is known as Sargan test that measures the total validity of the tools used. The Sargan statistic have Chi-square distribution with degrees of freedom equal to the number of

restrictions and the null hypothesis indicates the lack of correlation of tools with residual components. Arellano and Bond also proposed a test for the first and second order autocorrelation between residuals. According to this test, under the null hypothesis, there is no first order autocorrelation and the alternative hypothesis suggests a positive correlation between the residuals.

Moreover, panel VAR model was used to investigate the effect of economic and financial shocks on the main indicators of stock market of food industries in Iran. The main difference between VAR and panel VAR models is using the type of data. In the VAR models, the time series data, and in panel VAR model, panel data utilized. In this study, in order to investigate the effect of business cycle shocks on the stock market indices of food industry, the panel VAR method is used. Panel VAR models were first applied by Holtz et al. (1988) and the overall structure of this model is as follows:

$$(3) \qquad Y_{it} = Y_{i,t-1}A_1 + Y_{i,t-2}A_2 + ... + Y_{i,t-p}A_p + X_{i,t}B + U_{i,t} + e_{it}$$

In this model, Y_{it} is a (k×1) vector of dependent variables, X_{it} is a (1×1) vector of auxiliary variables, U_{it} and e_{it} are (k×1) vectors of cross section and error term variables. $A_1, A_2, ..., A_p$ are (k×k) and B is a (k×1) vectors of parameters of the model that should be estimated. Cross section identifier is i and time identifier is t. For identifying and measuring the excising cycles, The Hodrick–Prescott (1980) filter (also known as Hodrick–Prescott decomposition) was used. The Hodrick–Prescott filter is a mathematical tool used in macroeconomics, especially in real business cycle theory, to remove the cyclical component of a time series from raw data.

Data and Information

The data of the variables used is quarterly during 2001-2015 and gathered through documents of sample companies and referring to financial statements, journal of stock

market, and the website of the Tehran Stock Exchange Company as well as using comprehensive statistical software of Tadbir Pardaz and Rahavard Novin Pardaz company. Macroeconomic data are collected from the Central Bank of Iran website and OPEC website.

Sales volume, price index, net profit, and stock market return are the main performance indices of the stock market. In recent years, these items have considered a lot as the important indices for performance evaluation Chang (2009), Gay (2008), Agrawalla (2008) and Hosseini et al. (2011). For this reason, and due to their importance, we considered the four variables of sales volume, price index, net profit, and stock return indices as the dependent variables in four equations, separately. Independent variables are also considered as combination of economic variables (exchange rate, oil prices, inflation rate and interest rate) and financial variables (ROA, debt leverage ratio, firm size, transaction volume and P/E ratio) according to their importance. It should be noted that ROA and debt leverage ratio are obtained from the following relations:

$$ROA = \frac{Net\ Income}{Total\ Assets} \qquad\qquad Debt\ Leverage = \frac{Total\ Liabilities}{Total\ Equity}$$

In addition, to measure the size of companies the company assets is used and due to large numbers, their logarithm calculated.

Results and Discussion

At first, important indicators of business cycles including GDP and agriculture value-added are obtained using HP filter. GDP is the most comprehensive measure of the level of economic activity, and its fluctuations have a special role in business cycles. Over the past four decades, GDP trends in Iran has been faced many ups and downs. Some internal and external factors such as oil shocks, revolution in 1979 and wars with Iraq had a significant role in the fluctuations of GDP. Furthermore, agriculture is one of the largest economic

sectors in Iran. This sector is considered as one of the pillars of the Iran's economy in terms of production, employment, export and so on. The development of this sector could affect GDP and so it can be concluded that the agriculture value-added plays an important role in bringing up the business cycles. For this purpose, the agricultural value-added is the second index used for indicating business cycles in this study.

In Table (1) descriptive statistics of the study variables presented. In this Table, GDP and agriculture value added are business cycle indicators that along with other explanatory variables are expected to affect sales volume, price index, net profit and index of stock returns as dependent variables.

Table 1. Descriptive statistics of the study variables

Variable	Min	Max	Mean	SD
Sale Volume ($)	110047	260966392	15205376	27882743
Price index	258.06	2967.9	731.79	747.5
Net profit ($)	969	81675675	1515393	5068595
Index of stock returns	-87.2	181.82	9.74	35.42
Return of assets	0.001	0.59	0.088	0.087
Size of company (Percent)	3.46	7.07	5.42	0.6
Trading volume (share)	110492	2842965	417455.6	281005.7
Oil price ($ per barrel)	17.2	116.9	66.42	32.06
P/E	3.92	36.69	13.17	5.29
Debt leverage	0.04	8.74	0.71	0.38
Inflation rate	7.2	43	17.87	8.16
Exchange rate	7994	35432	1395.9	8976.9
Interest rate	9	23	14	4.9
GDP (Million Dollars)	4302	88349	29308	22943
Agriculture value added (Million Dollars)	490	14923	2842	3266

Before estimating the empirical models, conditional tests about data and model were done. At first, using Levin, Lin and Chu tests, the stationary property of the datasets were considered. The results are reported in Table 2.

Table 2. The results of stationary states of variables

Variable	T Stat.	P-value	Stationary	Variable	T Stat.	P-value	Stationary
Sale Volume	-2.67	0.004	I(0)	P/E	-3.7	0.0001	I(0)
Price index	-4.2	0.00	I(0)	Debt leverage	-3.6	0.0001	I(0)
Net profit	-4.76	0.00	I(0)	Inflation rate	-11.2	0.000	I(0)
Index of stock returns	-15.5	0.00	I(0)	Exchange rate	-1.95	0.035	I(0)
Return of assets	-7.3	0.00	I(0)	Interest rate	-1.86	0.049	I(0)
Size of company	-2.99	0.001	I(0)	GDP	-4.4	0.045	I(0)
Trading volume	-11.2	0.00	I(0)	Agriculture value added	-5.06	0.042	I(0)
Oil price	-3.6	0.0001	I(0)				

According to the results of this test, all variables are stationary at their levels and thus the spurious regression problem cannot be a concern. The null hypothesis is that each individual time series contains a unit root and the alternative hypothesis is that each time series is stationary.

Tables 3 and 4, show the results of the relevant tests and the results of dynamic panel data model when the dependent variable is sales volume. The results show that fixed effect model is good at explaining the dependent variable and the Sargan and Arellano-Bond test confirmed the choice of instrumental variables and the lack of second-order autocorrelation.

Table 3. The results of some tests when sales volume is dependent variable

Test type	When GDP is indicator of business cycle		When agriculture value added is indicator of business cycle	
	T stat.	P-value	T stat.	P-value
Chow test	62.57	0.000	62.5	0.000
Hausman test	16.9	0.017	24.2	0.001
Sargan test	134.4	0.18	107	0.15
AR(1)	-1.16	0.2	-1.1	0.25
AR(2)	0.36	0.71	-1.1	0.27

Table 4. The results of dynamic panel model when sales volume is dependent variable

Independent variables	When GDP is indicator of business cycle			When agriculture value added is indicator of business cycle		
	Coefficient	Z stat.	P-value	Coefficient	Z stat.	P-value
Sales with first lag	0.097*	2.86	0.003	0.299*	9.21	0.000
Sales with second lag	0.058	1.61	0.11	0.12	0.82	0.412
Return of assets	1896444*	7.07	0.000	2332512*	8.53	0.000
Size of company	132825*	2.05	0.04	196276*	3.23	0.001
Trading volume	0.06	0.83	0.4	0.11*	2.07	0.04
Oil price	10921.6*	2.94	0.003	50342*	2.09	0.03
P/E	-18118.8*	-3.2	0.001	-18028.2*	-3.3	0.001
Debt leverage	-36594.5	-0.71	0.477	-30346.7	-0.59	0.55
Inflation rate	17234.6**	1.77	0.07	14325**	1.9	0.05
Interest rate	79421.9*	2.4	0.014	11331.02*	5.1	0.000
Exchange rate	-16.6	-1.04	0.29	-87.2*	-2.3	0.02
Business cycle indicator	0.4**	1.86	0.064	0.086*	2.56	0.01
R-Squared or R^2	0.72			0.73		

*significance at 5%, ** significance at 10%

As seen in Table 4, the first lag of sales volume has a significant positive effect on sales in both models. Return on assets, size of company, trading volume, oil prices, inflation rate and interest rate also have a positive effects on sales volume. On the other hand, P/E has negative effects on sales volume.

Moreover, the business cycle indicators have a positive and significant effect on the sales volume. If GDP increases by 1 percent, the sales volume of food industry companies in the stock market of Iran increases by 0.4 percent and if agriculture value added increases by 1 percent, the sales volume increases by 0.086 percent. This results show that the effect of GDP is more than agriculture value added on sales volume. During the boom and by increasing in GDP, production in all sectors such as food industry increases and it is expected that the sales volume of these companies increase. In the case of recession and decline in GDP, production

and sales in the food industry reduce. Changes in production and sales are more when GDP changed compared to changes in agricultural value added.

In Tables 5 and 6, the results of relevant tests and dynamic panel data model ,when dependent variable is price index, are reported. The results of table (5) indicate that the fixed effect model can be accepted. On the other hand, Sargan test showed that the null hypothesis can't be rejected. The results of Arellano- Bond test did not show first and second order autocorrelation in the model.

Table 5. The results of some tests when price index is dependent variable

Test type	When GDP is indicator of business cycle		When agriculture value added is indicator of business cycle	
	T stat.	P-value	T stat.	P-value
Chow test	229.6	0.000	174.7	0.000
Hausman test	72.7	0.000	23.9	0.001
Sargan test	103.7	0.16	106.7	0.14
AR(1)	-1.6	0.09	-1.7	0.11
AR(2)	-1.07	0.28	0.37	0.7

Having estimated the model as dynamic panel, the results showed that the relationship between the price index and its first lag is positive and significant, while the effect of the second lag is not significant in spite of having a negative effect.

In this model, ROA, oil price and inflation rate have positive and significant effect on price index of food companies in the stock market while the effect of other variables such as business cycle indicators are not found significant although their relation is positive.

Table 6. The results of dynamic panel model when price index is dependent variable

Independent variables	When GDP is indicator of business cycle			When agriculture value added is indicator of business cycle		
	Coefficient	Z stat.	P-value	Coefficient	Z stat.	P-value
First lag of price	0.61*	18	0.000	0.60*	13.6	0.000
Second lag of price	-0.47	1.53	0.12	-0.48	-1.48	0.14
Return of assets	13.7*	4.9	0.000	11.6*	3.4	0.000
Size of company	19.6	0.3	0.76	17.6	0.28	0.77
Trading volume	0.27	0.48	0.63	0.24	0.46	0.63
Oil price	4.1**	1.75	0.08	5.3**	1.7	0.08
P/E	-4.88	-0.85	0.39	-4.7	-0.83	0.4
Debt leverage	-70.1	-1.3	0.19	-69.3	-0.13	0.55
Inflation rate	1.3**	1.7	0.09	5.9**	1.87	0.06
Interest rate	-32.1	-0.94	0.35	-45.5	-1.25	0.19
Exchange rate	12.3	1.16	0.24	9.16	0.96	0.33
Business cycle index	3.12	1.09	0.28	5.4	1.16	0.25
R-Squared or R^2	0.87			0.83		

*significance at 5%, ** significance at 10%

As the results of Table 7 show, when dependent variable is net profit, the fixed effect model is preferred to the common constant and random effect models. Sargan test also indicates the correct choice of instrumental variables and Arellano-Bond test indicates a lack of second order autocorrelation.

Table 7. The results of some tests when net profit is dependent variable

Test type	When GDP is indicator of business cycle		When agriculture value added is indicator of business cycle	
	T stat.	P-value	T stat.	P-value
Chow test	29.05	0.000	29.2	0.000
Hausman test	22.6	0.002	31.9	0.000
Sargan test	148.3	0.16	142.7	0.18
AR(1)	0.93	0.29	1.7	0.09
AR(2)	0.85	0.1	1.1	0.28

In the Table 8, the net profit is considered as the dependent variable and the effects of financial and economic variables ,except for ROA, are investigated. Considering that ROA has a direct relationship with the net profit, its effect was not considered in this model.

Table 8. The results of dynamic panel model when net profit is dependent variable

Independent variables	When GDP is indicator of business cycle			When agriculture value added is indicator of business cycle		
	Coefficient	Z stat.	P-value	Coefficient	Z stat.	P-value
First lag of profit	0.62*	18.8	0.000	0.63*	19.9	0.000
Second lag of profit	0.002	0.07	0.94	0.014	0.43	0.66
Size of company	5480	0.63	0.53	1111	0.9	0.27
Trading volume	0.025**	1.85	0.06	0.45**	1.83	0.06
Oil price	36.1	0.15	0.88	418.2*	2.24	0.025
P/E	-1061.9	-1.1	0.26	-1844.6**	-1.87	0.06
Debt leverage	-11251.2	-1.2	0.23	-12137.8	-1.36	0.17
Inflation rate	1640.6*	2.6	0.01	1999.2	0.77	0.44
Interest rate	-1681.6	0.62	0.54	-823.4	-0.21	0.84
Exchange rate	1.9	1.47	0.14	5.7	0.18	0.85
Business cycle index	0.029	1.35	0.177	0.097	1.36	0.18
R-Squared or R^2	0.65			0.45		

*significance at 5%, ** significance at 10%

As results show, the amount of profits has a significant and positive relationship with its first lag. The P/E index has a negative effect on the net profit index and the relationship between oil prices, trading volume, and inflation rate with net profit index is positive and significant. The results of Table 8 indicate that business cycle indices have not any significant effect on net profit of companies although its effect is positive. In the other words, net profit of the firms correspond to other internal variables such as profits of the previous period and trading volume and fluctuations in the economy has not any significant effect on the net profit.

In the Table (9), the results of Chow, Hausman, Sargan and Arellano-Bond tests are reported for the model that its dependent variable is stock return.

Table 9. The results of some tests when stock returns is dependent variable

Test type	When GDP is indicator of business cycle		When agriculture value added is indicator of business cycle	
	T stat.	P-value	T stat.	P-value
Chow test	62.9	0.000	62.5	0.000
Hausman test	16.2	0.028	24.3	0.001
Sargan test	128.3	0.195	104.2	0.16
AR(1)	-2.36	0.018	-1.72	0.086
AR(2)	1.4	0.18	-1.06	0.29

Finally, in the Table (10) the results of dynamic panel model when stock market return is dependent variable are reported.

Table 10. The results of dynamic panel model when stock market return is dependent variable

Independent variables	When GDP is indicator of business cycle			When agriculture value added is indicator of business cycle		
	Coefficient	Z stat.	P-value	Coefficient	Z stat.	P-value
First lag of stock return	0.38*	11.5	0.000	0.34*	10.3	0.000
Second lag of stock return	0.1*	2.9	0.004	0.17*	2.4	0.016
Return of assets	43395*	6.5	0.000	57403*	7.34	0.000
Size of company	2411**	1.7	0.09	3098*	2.2	0.028
Trading volume	0.001	0.63	0.53	0.001	0.49	0.64
Oil price	-58.5	-1.5	0.13	-68.3*	-2.21	0.027
P/E	-424.4**	-2.7	0.007	-506.6*	-3.1	0.002
Debt leverage	-823.2	-0.54	0.58	-912	-0.62	0.54
Inflation rate	151.1	1.47	0.15	115.4	0.69	0.5
Interest rate	-194.7	-0.44	0.66	-128.2*	-1.97	0.049
Exchange rate	-0.4**	-1.9	0.055	-0.59*	-2.3	0.02
Business cycle index	0.013*	3.8	0.000	0.04*	3.2	0.003
R-Squared or R^2	0.64			0.63		

*significance at 5%, ** significance at 10%

The results show that the effect of the first and second lags of the stock returns on dependent variable is positive and significant. Furthermore, ROA and company size have positive and significant effect on stock returns. The effects of P/E, oil prices, interest rate, and exchange rate on stock return are negative and significant. Finally, the effect of business cycle indicators on stock returns is positive and significant, and during the boom can increase stock returns by 0.013 and 0.04, respectively.

In the Table (11), the directions and significances of the relationships between independent variables and business cycle indicators on all four dependent variables are summarized.

Table 11. Summary of the effect of independent variables on all dependent variables

Dep. Variable Explanatory Variable	Sales Volume	Price Index	Net Profit	Stock Return
First lag of dependent variable	+*	+*	+*	+*
Second lag of dependent variable	-	-	+	+*
Return of assets	+*	+*		+*
Size of company	+*	+	+	+*
Trading volume	+	+	+**	+
Oil price	+*	+**	+**	-*
P/E	-*	-	-**	-*
Debt leverage	-	-	-	-
Inflation rate	+**	+**	+*	+
Interest rate	+*	-	-	-*
Exchange rate	-	+	+	-*
GDP	+**	+	+	+*
Agriculture value added	+*	+	+	+*

*significance at 5%, ** significance at 10%

The results of Table 11 show important deductions as follows:

(1) The effect of first lag of dependent variable is positive and significant in all models and this fact indicates that in the stock market, important performance indices directly depend on their previous condition.

(2) The effect of ROA on sales volume, price index, and stock market return is positive and significant in all estimated models. This results is similar to Purnamasari, 2016.

(3) Size of company and trading volume have a positive effect on performance indices of stock market and this fact show the scale effect. Gul and Javed (2009) also reached similar results.

(4) P/E has a negative effect on sales volume, net profit, price index and stock return. Wu (2014) discussed that The P/E ratio plays a pivotal role in investment decisions and it have been used by managers to form investment strategies. The P/E ratio is used to estimate the cost of equity capital (Easton, 2004). Prior literature has examined how the P/E ratio can be used to explain stock prices (Schreiner & Spremann, 2007), and to predict future earnings (Wu, 2013). Previous studies show that an investment strategy that longs low P/E stocks and shorts high P/E stocks yields significant positive returns. Wu (2014) results also showed that the P/E ratio has a U-shaped relation with ROE and Firms with higher forward P/E ratios achieve lower ROE in the subsequent years.

(5) Macroeconomic factors such as inflation rate, interest rate, oil prices and exchange rate, have different effect on stock market indices. Inflation rate has a positive effect on sales volume, net profit and price index while interest rate has a negative effect on price index, net profit, and stock return. There are a plenty of studies on how the macroeconomic variables can affect stock market indices. For example, Barakat et al. (2016) showed that the effects of macroeconomic variables vary from one market to another and from one period to another. Fama (1981) stated that there is a positive correlation between common stock returns and real economic variables such as capital expenditures, industrial production, GDP, inflation and

interest rates. Mukherjee and Naka (1995) also found a significant relation between exchange rate, money supply, inflation and industrial production and stock prices. Tangjitprom (2012) concluded that although the studies examining the causal relation between stock market indices and macroeconomic variables deduce different results, most of these studies agreed that there are significant relationships between macroeconomic variables and stock market indices. These different results are due to different market regulations, investors, country location and other factors. Therefore, although macroeconomic variables affect stock market indices, it is hard to generalize the results from a specific study to all economies because the same variables may have different impact in different economies.

Talla (2013) argued that inflation could affect stock market either positively or negatively. He showed that unexpected and expected inflation determines the direction of the relationship between stock market and inflation. Vejzagic and Zarafat (2013) also found that changes in exchange rates would have an impact on the firm's competitiveness, leading to changes in the firm's profits and equity, which in return will lead to price adjustments in the stock market. Uddin and Alam (2007) used interest on deposit as a proxy for interest rate. They argued that theoretically interest rate has a negative relationship with stock prices. When the rates on deposits in the bank increase, investors will redirect their money from the capital market to the banks and this will lead to a decrease in the demand of shares. On the other hand, when interest on deposit increases, lending rate also increases, which will have a negative impact on investment in the economy and hence the stock prices. Our results also show that interest rates have a negative effect on price index, net profit, and stock return index and when this rate increases, investors take their financial assets out of the market and continue activities at other markets. This results are similar to studies conducted by Russell (2009), Alsharkas (2004), and Alam., et al. (2009).

(6) The results showed that oil price has a positive and significant effect on price index in stock market, which is consistent with other studies of Narayan and Narayan (2010), Fang (2010), Gil-Alana and Yahya (2014).

(7) Business cycle indicators, GDP and agriculture value added, have positive effect on sales volume, price index, net profit and stock market return. Therefore, stock market indices have a positive correlation with business cycles and in the boom; they would increase while in decline they would decrease. Smith (1990) studied the stock market behavior in the United States and detected that the stock market changes through the different phases of the economic cycles as it declines shortly before a recession begins and rises shortly before a recession ends.

Panel VAR results

The results of impulse response functions on sales reported in Figure 1, when the index of business cycle is GDP and value-added of agriculture. As Figure 1 shows, the shock entered by the GDP has a negative effect on the sales volume at the first period but its effect changed during the time. Therefore, the effect of GDP shocks on sales volume would be positive from the second quarter and after one year (fourth quarter) its positive effect is considerable. When business cycle index is agriculture value-added, the response of sales is similar but with lower severity.

In fact, this results show that the response of the sales volume of food companies to the business cycle shocks resulted by GDP and value-added of agricultural sector is positive, and during the boom the sale's rate may increase. During economic boom, purchasing power of consumer increases and as a result, the sales volume of companies would increase, too.

Figure 1: Response of sale volume to GDP and agriculture value added
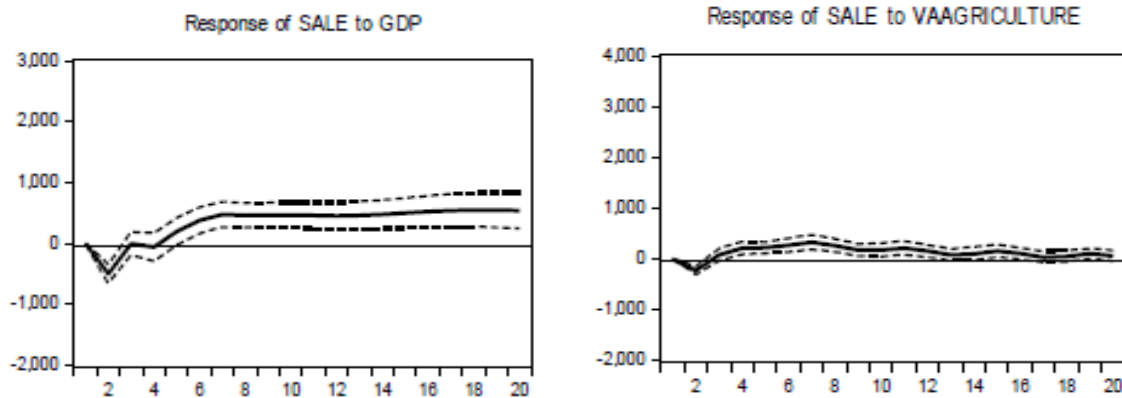
Results of impulse response functions of price index to the shocks of the business cycle indicators showed in Figure 2. The results show that the response of price index to GDP shocks is increasingly positive. In other words, during the economic boom the price index of food companies in stock market would increase constantly perhaps due to the increasing demand in this market. This is an important result because policy makers in developing countries such as Iran seek to control prices as a major macroeconomic policy.

Figure 2: Response of price index to GDP and agriculture value added
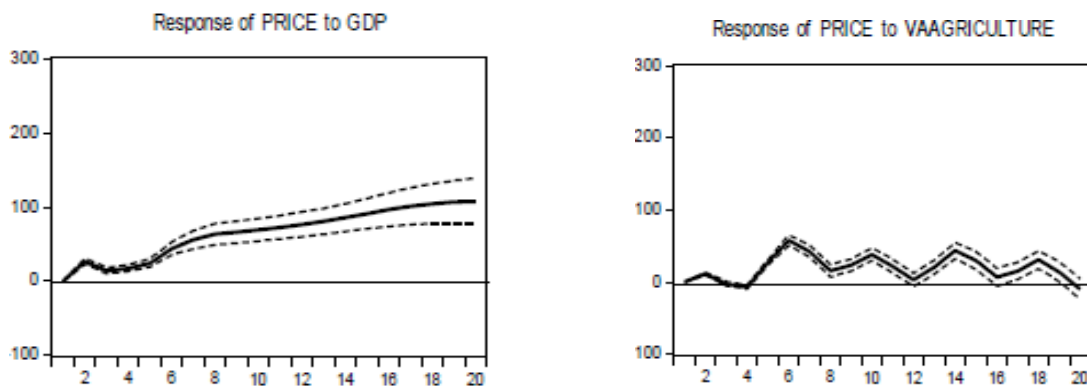
The response of price index to agricultural value added shows a cyclical trend and this is perhaps due to the cobweb effect of agricultural products on the price index of food companies in stock market.

In Figure 3, the results of impulse response functions of net income to GDP and agriculture value added shocks illustrated. The results show that the impact of GDP shocks

on net profit has been positive in the first period and then this effect disappears. In other words, in economic expansion condition, net profit of companies increases in the first period but it converges to its long run path in the subsequent periods. If the impact is examined by agricultural value-added, then its effects on net profit would have increasing and decreasing trend. Perhaps sinusoidal effects achieved is due to increasing agriculture value-added in the spring and summer and decreasing in autumn and winter.

Figure 3: Response of net income to GDP and agriculture value added shocks
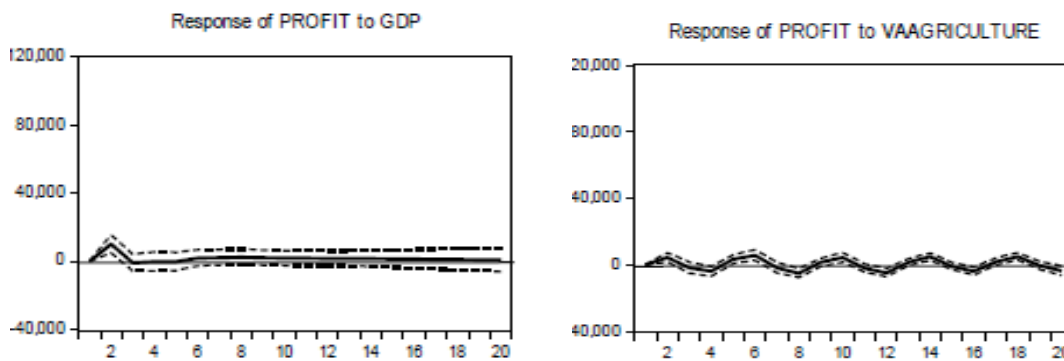
In Figure 4 the results of impulse response functions of stock returns by GDP and agricultural value added shocks are reported. Figure 4 shows that a shock to GDP has mainly one period effect on the stock returns as its effect on net profit. However, the effect of agricultural value added on stock market return is cyclical.

Figure 4: Response of return of equity to GDP and agriculture value added shocks
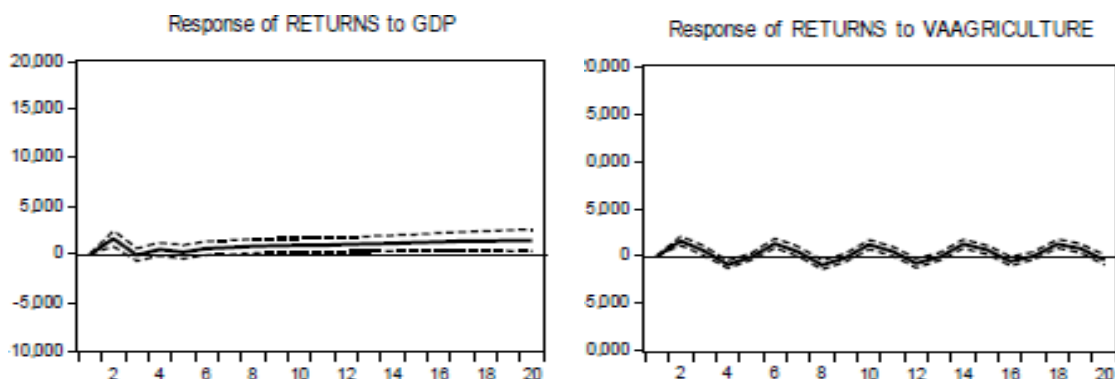
Conclusions

In designing the economic policies, recognizing and understanding the effects of business cycles on economic and financial indices is important. A business cycle is divided into an expansion (boom) phase and a recession (contraction) phase. The former is the period from a trough to a peak and the latter is the period from a peak to a trough. The effects of these cycles spread to different sectors of economics such as capital markets and especially the stock market. Given the importance of this issue, in the current research the effects of business cycle indicators on performance indices of the stock market in Iran food industry companies investigated during 2001-2015 by dynamic panel and panel VAR approaches.

The results of dynamic panel models show that the effect of the first lag of dependent variable is positive and significant in all models. Furthermore, the effect of ROA, size of company and trading volume on sales volume, price index, and stock market return is positive and P/E has a negative effect on sales volume, net profit, price index and stock return. Moreover, macroeconomic factors such as inflation rate, interest rate, oil prices and exchange rate, have different effect on stock market indices. Inflation rate has a positive effect on sales volume, net profit and price index while interest rate has a negative effect on price index, net profit, and stock return and when this rate increases, investors take their financial assets out of the market and continue activities at other markets. The results also showed that oil price has a positive effect on price index, sales volume, and net profit but it has negative effect on stock returns. Finally, business cycle indicators, GDP and agriculture value added, have positive effect on sales volume, price index, net profit and stock market return. Therefore, the stock market indices such as sales volume, price index, net profit and stock return have positive relationship with economic conditions of boom or recession.

The results of panel VAR models show that the shocks entered by GDP and agricultural value added have a different effect on stock market indices of sales volume, price

index, net profit and stock return. The results show that the response of the sales volume of food companies to the business cycle shocks resulted by GDP and value-added of agricultural sector is positive, and during the boom the sales volume increased. Furthermore, the response of price index to GDP shocks is positive and increasingly but the response of price index to agricultural value added shows a cyclical trend.

In economic expansion condition, net profit of companies increases in the first following period but it converges to its long run path in subsequent periods. If agricultural value-added is used as a proxy for economic expansion condition, its effects on net profit would have fluctuating trend. Finally, a shock to GDP has mainly one period effect on the stock returns as its effect on net profit, however, the effect of agricultural value added on stock market return is cyclical.

Since interest rate have a negative effect on stock market indices of food industry, it is recommended that by lowering interest rate, the incentives for increasing investment on other markets such as stock market increases because reduction in the interest rate of banks can lead to more investments into the stock market. Due to the positive effect of agricultural value-added on sales volume, net profit, price index and stock returns, it is recommended that policy-makers primarily consider enhancing value-added in agricultural sector by different policies. In addition, due to the positive effect of GDP as an indicative of the business cycles on stock market index of food industry, the authorities should follow policies to increase the GDP such as improving the business environment, attracting foreign investment and pay more attention to the export of goods.

References

Agrawalla., R. K. (2008), Share Prices and Macroeconomic Variables in India: An Approach to Investigate the Relationship Between Stock Markets and Economic Growth, Journal of Management Research, 8(3):136-146.

Alam., M. & Salah Uddin., G.(2009), Relationship Between Interest Rate and Developing Countries, International Journal of Business and Management, 3:43-51.

Alsharkas., A. (2004), The Dynamic Relationships between Macroeconomic factors and the Jordanian Stock market, International journal of applied econometrics and quantitative studies, 1(1): 97-114.

Amiri., A. & Amiri., M. (2009), The Investigating and Explanation of Local Model of Effective Internal Factors on Stock Price Index in Tehran Stock Exchange with Fuzzy Approach, Journal of Applied Science, (in Persian with English abstract).

Arellano, M. & Bond, S. (1991), Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, Review of Economic Studies, 58.

Arellano., M. & Bover., O. (1995), Another Look At The Instrumental Variable Estimation of Error-Components Models. Journal of Econometrics, 68(1): 29-51.

Baltagi., B. H. (2005), Econometric Analysis of Panel Data, John Wiley & Sons.

Barakat, M. R., Elgassar, S. H., Hanafy, K. (2016). Impact of Macroeconomic Variables on Stock Markets: Evidence from Emerging Markets, International Journal of Economics and Finance; 8(1):195-207.

Blundell., R. & Bond., S.(1998), Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. Journal of Econometrics, 87(2): 115-143.

Breitung., J. & Eickmeier., S. (2015), Analyzing Business Cycle asymmetries in a Muiti-Level factor Model, Economics Letters, 127: 31-34.

Chang., K. (2009), Do macroeconomic variables have regime-dependent effects on stock return dynamics? Evidence from the markov regime switching model, Economic Modeling, 26(6): 1283-1299.

Chatterjee., U. H. (2016), Do Stock Market Trading Activities Forecast Recession? Economic Modeling, Vol(59): 370-386.

Durnev, A., Li, K., Morck, R., Yeung, B. (2004). Capital markets and capital allocation: Implications for economies in transition, Economics of transition, 12(4); 593-634 DOI: 10.1111/j.0967-0750.2004.00196.x

Choudhry, T., Papadimitriou, F. I., Shabi, S. (2016). Stock market volatility and business cycle: Evidence from linear and nonlinear causality tests, Journal of Banking & Finance, Volume 66: 89-101.

Easton, P.D. (2004). PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital. The Accounting Review: January 2004, 79(1): 73-95.

doi: http://dx.doi.org/10.2308/accr.2004.79.1.73.

Fama, E. (1981). Stock returns, real activity, inflation and money. American Economic Review, 71(4), 545-565.

Fang., C. R. (2010), The Impact of Oil Price Shocks on the Three BRIC Countries' Stock Price, Department of Economics, National Cheng-Chi University, Taiwan, 1-27.

Fritsch., M. Kritikos., K. & Pijnenburg., K. (2013), Business Cycles, Unemployment and Entrepreneurial Entry: Evidence from Germany, Disscussion Paper No: 7852.

Gay., R. (2008), Effect of Macroeconomic Variables on Stock Market Returns for Four Emerging Economies: Brazil, Russia, India and China, International Business & Economics Research Journal, 7(3): 42-56.

Gil-Alana., L. A. & Yaya., O. S. (2014), The relationship between oil prices and the Nigerian stock market, An analysis based on fractional integration and co-integration, Energy Economics 46: 328-333.

Giorgioni., F. Ch. Kostakis., G. & Milas., C. (2014), On Stock Market illiquidity and Real-time GDP Growth, Journal of International Money and Finance, 44: 210-229.

Gul, F and Javed, T. (2009). Relationship Between Trading Volume And Stock Exchange Performance: A Case From Karachi Stock Exchange, 8 (8): 13-20.

Gubler., M. & Hertweck., M. S. (2013), Commodity price shocks and Business Cycle: Structural evidence for the U.S., Journal of International Money and Finance, 37: 324-352.

He., Q. Chong., T. T. & Shi., K. (2009), What Account for Chinese Business Cycle? Journal of China Economic Review, 20: 650-661.

Ho., K. Y. Tsui., A. K. & Zhang., Z. (2009), Volatility Dynamics of the us Business Cycle: A Multivariate Asymmetric GARCH Approach, Mathematics and Computers in Simulation, 79: 2856–2868.

Hodrick., R. J. & Prescott., E. C. (1980). Post-war U.S. Business Cycles: an Empirical Investigation, Pittsburg: Carnegie-Mellon University, Discussion Paper, No. 451.

Holtz., E. Newey., W. & Rosen., H. S. (1988), Estimating Vector Autoregression with Panel Data, Econometrica, 56: 1371-1395.

Hosseini., M. Zamiri., A. & Lai., Y. W. (2011), The Role of Macroeconomic Variables on Stock Market Index in China and India, International Journal of Economics and Finance, 3(6): 233-243.

Lucas, R. E. (2003), macroeconomic priorities, American Economic Review, 93(1): 1-14.

Mukherjee, T., & Naka, A. (1995). Dynamic relation between macroeconomic variables and the Japanese stock market: An application of a Vector Error Correction model. Journal of Financial Research, 18(2), 223-237. http://dx.doi.org/10.1111/j.1475-6803.1995.tb00563.x

Narayan., P. K. & Narayan., S. (2010), Modeling the impact of oil prices on Vietnam's stock prices, Applied Energy, 87: 356–361.

Nitschka, T. (2013). The impact of (global) business cycle risk on the German and British stock markets: Evidence from the first age of globalization, Review of Financial Economics, 22(3): 118-124

Purnamasari, D. (2016). The Effect of Changes in Return on Assets, Return on Equity, and Economic Value Added to the Stock Price Changes and Its Impact on Earnings Per Share, Research Journal of Finance and Accounting, 6(6):80-89.

Qinglu., J. (2005), Business Cycle, Accounting Behavior and Earnings Management, Unpublished PhD Dissertation, Hong Kong University of Science and Technology.

Randi., N. Johannes., A. S. & Bernt., A. Q. (2011), Stock Market Liquidity and Business Cycle, Forthcoming, Journal of Finance. 66(1): 139-176.

Russell., O. C. Somoye, A. I. R. & Oseni, J. E. (2009). Determinant of Equity Prices in the Stock Markets, International Research Journal of Finance and Economics, 30: 177-189.

Schreiner, A., & Spremann, K. (2007). Multiples and their valuation accuracy in European equity markets. (Working paper). University of St. Gallen. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=957352

Shamsuddin., A.F., & Hillier., J. R. (2004), Fundamental determinants of the Australian price-earnings multiple. Pacific-Basin Finance Journal 12, 569- 576.

Smimou., K. & Khallouli., W. (2015), Does Euro Affect the Dynamic Relation between Stock Market Liquidity and Business Cycle? Emerging Markets Review, 25: 125-153.

Smith G. (1990). Investments, Illinois & London: Glenview. Summers LH (1981). Inflation, the stock market, and owner occupied housing. American Economic Review, 71, 423-430

Takatoshi, I. (2001). The Japanese Economy, Volume 10, The MIT Press.

Talla, J. (2013). Impact of macroeconomic variables on the stock market prices of the Stockholm stock exchange (OMXS30). JÖ NKÖ PING UNIVERSITY: Sweden. Master of Science Thesis

Tangjitprom, N. (2012). The review of macroeconomic factors and stock returns. International Business Research, 5(8), 107-115. http://dx.doi.org/10.5539/ibr.v5n8p107

Trabelsi Mnif, A. (2017). Political uncertainty and behavior of Tunisian stock market cycles: structural unobserved components time series models, Research in International Business and Finance, 39: 206-214.

Zhao, M. & Hsu., M. (2009), China's Real Business Cycles and Fiscal Policies between (1954, 2004), Productivity and Policy Changes. https://ideas.repec.org/p/pra/mprapa/21283.html

Zhu., Y. & Zhu., X. (2014), European Business Cycles and Stock Return Predictability, Finance Research Letters, 11(4): 446-453.

Uddin, M., & Alam, M. (2007). The impacts of interest rate on stock market: Empirical evidence from Dhaka stock exchange. South Asian Journal of Management and Sciences, 1(2), 123-132.

Vejzagic, M., & Zarafat, H. (2013). Relationship between macroeconomic variables and stock market index: Coinegration evidence from FTSE BURSA MALAYSIA HIJRAH SHARIAH INDEX. Asian Journal of Management Sciences & Education, 2(4), 94-108.

Vu, N. T. (2015), Stock Market Volatility and International Business Cycle Dynamics: Evidence from OECD Economies, Journal of International Money and Finance, 50: 1-15.

Wu, WT. (2014). The P/E Ratio and Profitability, Journal of Business & Economics Research, 12(1), 67-76.

Wu, WT. (2013). The forward E/P ratio and earnings growth. (Working paper). University of Massachusetts Boston. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1014177.