

Macroeconomic Factors and Stock Returns

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Abstract

Macroeconomic variables and their effects on stock returns have been interested by scholars, investors and companies. This research aims to identify the effects of selected macroeconomic variables including inflation rate, exchange rate, interest rate, current account deficit and unemployment rate on stock returns of 45 companies from 11 different sectors. Autoregressive distributed lag method is employed for the data spanning from February, 2005 to May, 2012. The research provides the results of the empirical analyses and conclusion of the findings. It ends with the implications for practice and future research.

Keywords: Stock returns, Autoregressive distributed lag method, Macroeconomic variables

Introduction

The stock market and the overall economy are significantly related. The role of macroeconomic variables in asset pricing theories is accepted to be important. Fluctuations in macroeconomic variables affect business negatively by disturbing the trade smoothness. Estimation of future trends of macroeconomic variables can be helpful to see the leading direction of stock returns. Therefore, there have been many attempts empirically performed in order to identify the link between macroeconomic variables and stock market volatility.

Recently, Akbar et al. (2012) stated that it has been popular to study the relationship between macroeconomic growth and stock market performance. Stock markets are mainly affected by the surrounding economy and useful to predict future economic conditions (Fama, 1990; Binswanger, 2000). Every country and stock exchange market has unique determinants specific to itself. Therefore, for the same considered variables, they may have different responses.

Developed countries' financial markets are observed to be more explained compared to the other financial markets. Therefore, the research is needed in order to improve investment decisions by maximizing the expected value of stock returns in developing economies.

Istanbul Stock Exchange (ISE) Market is one of the developing markets in the world. It was founded on December 26, 1985 in order to ensure a secure and stable environment for the trade of securities and furthermore commenced to operate on January 3, 1986.

The fundamental goal of this study is to analyze the effects of domestic macroeconomic variables on stock market returns in Turkey.

This paper studies the latest data covering the period from February, 2005 to May, 2012. This study aims to improve the investors' understanding and evaluation of the relevant stock returns to the systematic influences of macroeconomic factors including inflation rate, exchange rate, interest rate, Current account deficit and unemployment rate. The derived information about the relationship between the macroeconomic variables and stock market performance can enable investors to make optimal decision in their global business investments. It is expected that the findings of this study would provide meaningful insights to the body of literature, policy makers as well as the practitioners. The results of this study are expected to support the theoretical framework of the determinants of stock market movement from the developing economies perspective.

During early nineties growth of emerging markets were remarkable. Therefore, both researchers and investors have considered studying emerging stock markets (Brockman & Chung, 2006). Since Turkey is one of the fastest growing emerging economies in the world the implications of this study becomes important.

This paper has five sections starting with introduction. In the second section, the relevant literature is provided. The third section introduces the research methodology. The fourth section presents the findings of the analyses. And the final part concludes the study with implications for practice and research.

Literature Review

Since it is important for financial analysts and policy makers, the relationship between macroeconomic variables and stock prices have been analysed by the researchers.

The literature reports that stock prices in the well-developed markets are influenced by the changes in macroeconomic information, but for the emerging markets the results are not inconclusive. For both the developed and emerging markets, the research is still required.

Sharpe (2002) got a negative relation between expected long-term earnings growth and expected inflation. Jones and Wilson (2006) observed that inflation adjustments can weakly estimate stock returns.

Marcellino (2004) considered real gdp and its components, personal and government consumption, investment and inventories, and imports and exports, consumer prices and the gdp deflator, unit labor cost and unemployment, short-term and longterm interest rates, and the real exchange rate and the trade balance as macroeconomic variables for the period 1970:1–1997:4 in his analysis by providing linear, time-varying, non-linear and pooled forecasts for aggregate EMU variables. Although linear specifications performed well on average, the good performance of non-linear models was observed.

Gunasekarager et al. (2004) considered money supply, treasury bill rate, CPI and exchange rates as macroeconomic variables and the Sri Lankan stock market and observed that all macroeconomic variables especially treasury bill rate had a significant influence on stock prices except the exchange rate. However, share price index could not found to have influence on macroeconomic variables except the Treasury bill rate.

Nishat and Shaheen (2004) took the data from 1973 to 2004 by employing unit root test, Augmented Dickey Fuller (ADF) test, vector error correction model (VECM) and Granger-causality by considering industrial production index, the consumer price index, money supply, and the value of an investment earning and the money market rate in order to determine the relationship. A significant relationship was observed among industrial production index, the consumer price index, money supply, and the value of an investment earning. Moreover, it was also discovered that industrial production is the largest positive and inflation is the largest negative factors of Pakistani stock prices. There was a reverse causality observed between industrial production and stock prices. Statistically, lag lengths connecting fluctuations in the stock market and transient in the real economy were considerable and comparatively short.

Liow (2004) considered five macroeconomic factors to see the time variation of Singapore real estate excess stock returns and observed that the expected risk premium on real estate stock varies by the time and conditional volatilities of these macroeconomic variables.

Rapach et al. (2005), through a large set of macrovariables, observed that stock returns can be predicted by macrovariables (especially by interest rates) on the data from 12 industrialized countries after the 1970s.

Erdem et al. (2005) used The Exponential Generalized Autoregressive Conditional Heteroscedasticity and model analyzed Price volatility spillovers in ISE indexes from January 1991 to January 2004 by considering exchange rate, interest rate, inflation, industrial production and M1 money supply. They observed unidirectional strong volatility spillover from inflation, interest rate to all stock price indexes. Moreover, there were spillovers from M1 money supply to financial index, and from exchange rate to both ISE-100 and industrial indexes. But there was no volatility spillover from industrial production to any index.

Patra and Poshakwale (2006) observed both short-term and long-term relationship between inflation, money supply and trading volumes but no relationship between exchange rate and stock prices in Athens stock exchange.

Chancharat (2007) worked on the Stock market volatility between January, 1988 and December, 2004 by using Auto regressive Conditional Heteroscedasticity (ARCH) model and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model on Thailand Stock Index and the indices of Argentina, Australia, Brazil, Germany, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Russia, Singapore, Taiwan, the United Kingdom and the United States. It was identified that macroeconomic variables (CPI, EX, IR, M2 and OP) of Thailand have influence on monthly stock market returns.

For macro variables including money supply (MS), consumer price index (CPI), industrial production (IP), exchange rate (EXR) and interest rate (IR), Rizwan and Khan (2007) employed descriptive statistics, ARCH approach, EGARCH approach, unit root test, Augmented Dickey Fuller (ADF), VAR model from July 2000 to June 2005. According to EGARCH model, stock returns significantly give response to money supply, and consumer price index. Moreover, Vector Auto Regressive (VAR) model could only explained money supply, and consumer price index. VAR also reported that the industrial production was positive but not significant. It was suggested that the negative signs of macroeconomic variables in Pakistan's stock market influence more stock prices than positive news.

Kandir (2008), on monthly data from July 1997 to June 2005 by using multiple regression model and Augmented Dickey Fuller (ADF) and Phillip Perron (PP) stationary tests, suggested negative impact of interest rates on stock returns, since interest rate was the best alternative investment opportunity. Furthermore, industrial production, money supply and oil prices don't show any significant influence on stock returns. But, the significant effect of exchange rate in Turkey Stock Market was identified.

Gay (2008) used Augmented Dickey-Fuller (ADF) test on exchange rate and oil price for Brazil, Russia, India, and China (BRIC) and the monthly data of stock market indices between 1999 and 2006. The relationship between exchange rate and oil price on the stock market index prices for the countries was not significant.

From June 1998 to June 2008, Hasan and Javed (2009) evaluated macroeconomic variables which include inflation, industrial production, oil prices, short term interest rate, exchange rates, foreign portfolio investment, money supply and equity prices by using cumulative sum (CUSUM) cumulative sum of squares (CUSUMSQ) tests, unit root by lag range multiplier (LM) test, Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test and VAR models, error correction model, autoregressive distributed lag (ARDL) test approach which captures industrial production. Oil prices and inflation are detected to be not significant but interest rate (IR), exchange rate and money supply are appeared to be significant in the long run. Furthermore, error correction model (ECM) captured the short term dynamics of prices effect on equity prices. Finally, foreign portfolio investments (FPI) appeared to be significant short influence in short term analysis and no long influence in long term analysis.

Abdul Rahman et al. (2009) reported that Malaysian stock market has stronger dynamic relations with reserves and industrial production index than money supply, interest rate, and exchange rate.

Sohail and Hussain (2009) found out that there are long-run and short-run relationship between macroeconomic variables and stock returns in Lahore stock exchange from December 2002 to June 2008. They also identified that inflation negatively influence stock returns while there are positive influence of money supply, industrial production and real effective exchange rate on stock prices.

According to Rjoub et al's (2009) analysis, there appeared a relationship between macroeconomic including variables interest rate, unanticipated inflation, risk premium, exchange rate, money supply, unemployment rate and Istanbul Stock Market (ISE) from January 2001 to September 2005 by using arbitrage pricing theory (APT) model, correlation among explanatory variables and portfolios regression. A significant pricing relationship between the stock return was identified. Moreover, macroeconomic variables are found to have a significant influence on the stock market returns in various portfolios. On the other hand, the results suggested that there should be other macroeconomic factors affecting stock market returns in Istanbul Stock Market (ISE) instead of the tested ones because of weak explanatory power of the selected variables.

Akay and Nargeleşkenler (2009) studied the relationship between monetary policy, interest rates and stock prices by applying Structural VAR (SVAR) model. While constructing the model, inflation rate and industrial production index are also considered. A contractionary monetary shock was observed to be influential on the interest rate in both long and short term. Consequently, it negatively affects stock prices.

Gençtürk (2009) studied the relations between stocks in Istanbul Stock Exchange (ISE) and macroeconomic variables by considering crisis periods and normal periods. Therefore, ISE-100 index is taken as the dependent variable; and treasury bond interest rates, consumer price index, money supply, industrial production index, dollar, gold prices are taken as independent variables.

Sayılgan and Süslü (2011) analyzed the influence of macroeconomic factors on stock returns in emerging market economies using panel data from 1996 to 2006. Stock returns are found to be significantly influenced by exchange rates, inflation rates and the S&P 500 Index while the returns are not influenced by interest rate, gross domestic product, money supply and oil prices.

Aktas (2011) studied the influence of 19 macroeconomic announcements on equity index options for the period from 1983 to 2002 in ISE and found out that balance of trade, consumer price index, producer price index, employment, housing starts, money supply and retail sales are strongly related with index option returns. She identified that seven macroeconomic announcement series (BOT, CPI, PPI, money supply, housing starts, employment and retail sales) show significant effects on the option returns and volatility.

Huang and Chen (2011) employed combined various research methods of time series, including VAR, Granger Causality Test, Impulse Response Function and Variance Decomposition in order to explore the interactions among stock returns, the term structure of interest rates and economic activities in Taiwan and found out that there were causality between stock returns and industrial production and between stock returns and the spread between long-term and short-term interest rates. Additionally, there was no causality or feedback observed in between the spread and industrial production, and industrial production could not answer to the spread

obviously in the long-term and short-term. Finally, it was observed that the term structure of interest rates is not influential on the economic activities in Taiwan.

Hosseini et al (2011) studied the relationships between stock market indices and four macroeconomics variables including crude oil price, money supply, industrial production and inflation rate in China and India for the period January 1999 to January 2009. The results provided that there are both long and short run linkages between macroeconomic variables and stock market index in both countries.

Macroeconomic factors suggested by the literature above are shown to be critical in predicting the variability of stock returns. The key macroeconomic factors in the prediction of the stock returns may be company size, dividend yield, price volatility of energy, interest rate risk, money supply, risk free rate, exchange rates, inflation and industrial production index. The review of the literature has presented that there are many studies which consider the micro and macro factors together, especially in Turkish stock market.

There may be other influencing factors such as the transmission of shocks and psychological effects (the consumer confidence index could be used) in the determination of stock price movements. They may include the changes in world oil prices, changes in interest rates and inflation rates.

There is no standardized set of macroeconomic variables, despite the clear relationship between stock market and economic activities. Selected macroeconomic variables in order to determine stock market slightly differ across studies. However, inflation rate, exchange rate, interest rate, and unemployment rate are the most popular significant factors in order to explain the stock market movement. This study also considers current account deficit among macroeconomic factors. This study differs from the previous studies by taking sectoral differences into consideration.

Research Methodology

Data

This research preferred interbank interest rates were as the proxy for interest rate. For exchange rates, dollar rates are considered. For inflation, consumer price index was chosen as the proxy. Current account deficit represents the difference between import and export.

The data are obtained from the websites of ISE, Turkish Central Bank and Turkish Statistical Institute for the period from the second month of 2005 to the fifth month of 2012. The study has employed ARDL approach in order to identify the effects of domestic macroeconomic determinants on the stock returns of 45 companies from 11 sectors. Considered sectors are Electric, Food, Communication, Wood Paper Printing, Chemistry, Metal-Main, Metal-Production, Stone, Textile, Commerce and Transportation.

Methodology

The autoregressive distributed lag (ARDL) approach in order to determine the relationships among the variables is preferred in this study for the analyses. The ARDL method can provide the robust long-run results while working on small sample sizes and it can be applied if the primary variables are entirely I (1) or I (0) or mutually integrated. The formula for ARDL technique is given as follows (Khan & Hye, 2010):

$$\begin{aligned} \Delta \text{Ln}(\text{SR})_t = & \psi_0 \\ & + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{SR})_{t-i} + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{InfR})_{t-i} + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{ER})_{t-i} \\ & + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{IntR})_{t-i} + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{UR})_{t-i} + \sum_{i=1}^n \psi_i \Delta \text{Ln}(\text{CAD})_{t-i} \\ & + \alpha_1 \Delta \text{Ln}(\text{SR})_{t-1} + \alpha_2 \Delta \text{Ln}(\text{InfR})_{t-1} + \alpha_3 \Delta \text{Ln}(\text{ER})_{t-1} + \alpha_3 \Delta \text{Ln}(\text{InfR})_{t-1} \\ & + \alpha_4 \Delta \text{Ln}(\text{IntR})_{t-1} + \alpha_5 \Delta \text{Ln}(\text{UR})_{t-1} + \alpha_6 \Delta \text{Ln}(\text{CAD})_{t-1} + \zeta_{t-1} \end{aligned}$$

Where SR, InfR, ER, IntR, UR, CAD denote stock returns, inflation rate, exchange rate, interest rate, unemployment rate and current account deficit respectively.

Before employing ARDL, all macroeconomic data has been tested for unit root in order to identify whether the data were stationary through level and 1st difference Akaike-Information Criterion and it was observed that the data consist of both stationary and non-stationary information. According to the results, the data are found to be proper for ARDL approach. Therefore, ARDL was applied through four lags. The results are presented in Table 1.

Results

The overall summary of ARDL results on sector basis are presented in table 1 and the detailed results for each sector are provided as appendices at the end of the paper. Macroeconomic factors are defined according to the previous studies. Total 45 companies which are the leaders of the 11 sectors are chosen among the companies operating in Turkish industry. Empirical findings imply that among the considered factors which are exchange rate, interest rate, unemployment, consumer price index and current account deficit, it has been observed that exchange rate and interest rate are highly significant determinants of the stock return movements of the companies from different sectors. It means that the changes in the exchange rate and interest rate impact the economy as a whole without distinction of the sector.

Summary Result Table

Sector	Company	Unemployment Rate	Consumer Price Index	Interest rate	Exchange Rate	Current Account Deficit
Electric	Akenr				Significant	
	Aksue				Significant	
	Ayen				Significant	
	Zoren				Significant	
Food	Aefes				Significant	
	Banvt				Significant	Significant
	Skplc				Significant	Significant
	Tatks				Significant	Significant
	Ulker			Significant	Significant	
Communication	Tcell				Significant	
Paper	Hurgz			Significant	Significant	
	Ipeke	Significant		Significant	Significant	
	Kartn			Significant		
	Kozaa			Significant	Significant	
Chemistry	Tire					Significant
	Aksa					Significant
	Aygaz			Significant	Significant	
	Petkm					Significant
	Trcas				Significant	
	Tuprs			Significant	Significant	
Metal-Main	Brsan				Significant	
	Cemts			Significant	Significant	
	Eregl				Significant	
	Izmdc					Significant
	Krdmd				Significant	
Metal-Product	Arclk		Significant	Significant	Significant	
	Toaso		Significant	Significant	Significant	Significant
	Tttrak	Significant	Significant	Significant	Significant	Significant
	Vestl			Significant	Significant	
Stone	Adana				Significant	
	Afyon				Significant	
	Anacm			Significant	Significant	
	Golts	Significant	Significant	Significant		
	Konya			Significant		
	Trkcm				Significant	
Textile	Altın				Significant	
	Bossa	Significant			Significant	
	Mndrs				Significant	
	Sktas				Significant	
	Yunsa			Significant		
Commerce	Boynr			Significant		Significant
	Doas					
	Kipa					
	Mgros					
	Sanko			Significant		

Table 1 Summary of the Results

Conclusion

This paper analyzes the impact of macroeconomic variables on the stock returns of the companies from different sectors. 45 companies from 11 sectors are chosen in order to identify the role of each macroeconomic factor on the stock returns. The overall results indicate that exchange rate and interest rate are the most significant factors in the stock price fluctuations of the companies. Stock returns of the companies in any industry are very sensitive to the changes in exchange rate and interest rate.

Our findings have beneficial implications for policy makers who are responsible to manage economy. Exchange rate and interest rate play crucial role to mitigate the hazardous affect of financial crises and also the economic recession. Moreover, portfolio investors can use exchange rate and interest rates movements to forecast stock returns of the companies.

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Appendices

Appendix 1 ARDL Results for Electric Sector

Sector		Electric							
Company		Akenr		Aksue		Ayen		Zoren	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	0,39797	3,47190					0,37210	3,92790
	X1(-2)	-0,22494	-1,95680					-0,31738	-3,23290
	X1(-3)							0,20063	2,01390
	X1(-4)							-0,34469	-3,66200
Unemployment Rate	X2	0,00569	2,06180	-0,00512	-2,57930	0,00123	1,04260	0,00422	1,55580
	X2(-1)	-0,00334	-1,37770					-0,00716	-1,68900
	X2(-2)							0,00540	2,23940
Consumer Price Index	X3	-0,00207	-1,61160	0,00365	2,24630	-0,01336	-1,67080	-0,00158	-1,67860
	X3(-1)					0,01315	1,60840		
Interest rate	X4	-0,00069	-0,12175	-0,00208	-0,57390	-0,00530	-2,12630	-0,00240	-0,57784
	X4(-1)			-0,00475	-0,83038	0,00486	1,87320		
	X4(-2)			0,00660	1,85300				
Exchange Rate	X5	-0,01662	-4,74490	-0,00940	-2,39040	-0,01346	-5,12820	-0,01473	-5,94510

	X5(-1)	0,01830	3,25020	0,01166	3,09240	0,01335	5,21520	0,01418	5,98530
	X5(-2)	-0,01151	-1,94410						
	X5(-3)	0,00962	2,53830						
Current Account Deficit	X6	0,00410	1,56030	-0,00375	-1,17300	-0,00068	-0,32331	0,00269	1,38980
	X6(-1)			0,00429	1,19320				
	X6(-2)			-0,00502	-1,61080				
Adj. R-square	0,37765		0,24542		0,40378		0,47707		
AIC	59,48150		53,29240		78,84680		83,46420		
SBC	46,31200		40,12290		69,26900		69,09760		
F-Statistic	5,85450		3,60190		8,73990		7,63500		
Prob(F-statistic)	0,00000		0,00100		0,00000		0,00000		
Durbin-Watson	1,91700		1,70570		1,92120		2,08420		

Appendix 2 ARDL Results for Food Sector

Sector		Food									
Company		Aefes		Banvt		Skplc		Tatks		Ulker	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	0,42084	3,99470			0,34885	3,26340	0,18721	2,05710		
Unemployment Rate	X2	0,00391	0,34857	-0,00239	-0,90413	0,00212	0,44180	0,00122	0,97657	0,00162	1,81610
	X2(-1)			0,00414	1,80400	0,00247	0,29270				
	X2(-2)					0,00122	0,14354				
	X2(-3)					-0,00724	-1,72710				
Consumer Price Index	X3	-0,00594	-0,58883	-0,00103	-0,83345	0,01195	0,82927	0,01121	1,50300	-0,00614	-0,97025
	X3(-1)					-0,02353	-1,08820	-0,01046	-1,39610	-67015	-0,68264
	X3(-2)					-0,00870	-0,39736			0,01107	1,75520
	X3(-3)					0,04862	2,24270				
	X3(-4)					-0,02442	-1,76777				
Interest rate	X4	-0,00632	-1,42240	-0,00929	-1,72890	0,00561	0,78540	0,00770	1,91740	0,00127	3,75250
Exchange Rate	X5	0,00937	0,90304	-0,01586	-5,17690	-0,00884	-2,00170	-0,01069	-4,21360	-0,01514	-5,91220
	X5(-1)			0,01700	5,62600	0,01231	2,91100	0,01269	5,12080	0,01263	3,66390
	X5(-2)									-0,0021	-0,620

										3	23
	X5(-3)									0,00380	1,82970
Current Account Deficit	X6	0,00212	0,10400	-0,00144	-0,58117	0,00535	1,31850	0,00165	0,78530	0,00193	2,20680
	X6(-1)					0,00012	0,02630	0,00142	0,60432		
	X6(-2)					-0,00180	-3,89700	-0,00841	-4,11980		
Adj. R-square	0,18067		0,35863		0,42306		0,49683		0,47545		
AIC	80,17730		63,52630		41,07430		86,44000		99,79290		
SBC	72,99400		55,14570		21,91870		74,46780		87,82060		
F-Statistic	4,52830		8,45550		4,91080		9,77690		9,05680		
Prob(F-statistic)	0,00000		0,00000		0,00000		0,00000		0,00000		
Durbin-Watson	1,93610		1,71930		1,99390		1,97730		1,93030		

Appendix 3 ARDL Results for Communication Sector

Sector		Communication	
Company		Tcell	
	Criteria	Coefficient	T-Statistics
RETURN	X1(-1)		
Unemployment Rate	X2	0,00200	0,95202
	X2(-1)	0,00103	0,31163
	X2(-2)	-0,00360	-1,92610
Consumer Price Index	X3	0,00193	0,25407
Interest rate	X4	-0,00145	-0,43453
Exchange Rate	X5	-0,00685	-3,37000
	X5(-1)	0,00776	2,35640
	X5(-2)	-0,00534	-1,61100
	X5(-3)	0,00501	2,44920
Current Account Deficit	X6	-0,00531	-0,34857
Adj. R-square		0,20088	
AIC		102,07590	
SBC		90,10370	
F-Statistic		3,23440	
Prob(F-statistic)		0,00200	
Durbin-Watson		1,74230	

Appendix 4 ARDL Results for Paper Sector

Sector		Paper									
Company		Hurgz		Ipeke		Kartn		Kozaa		Tire	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)			0,00960	0,08539			0,07240	0,60610		
	X1(-2)			-0,48849	-4,50610			-0,30817	-2,61310		
	X1(-3)			0,06949	0,65841			-0,01679	-0,15102		
	X1(-4)			-0,22455	-2,33500			-0,18729	-1,95880		
Unemployment Rate	X2	0,00164	1,45170	0,01332	2,83380	0,00135	0,93862	0,00999	2,07440	0,00434	1,34640
	X2(-1)			-0,01055	-1,28250			-0,01168	-1,58380	-0,00462	-1,61950
	X2(-2)			-0,00201	-0,23930			0,00796	1,88730		
	X2(-3)			0,00711	1,60660						
Consumer Price Index	X3	-0,00278	-2,75730	0,00807	0,57420	-0,00329	-0,25553	0,00527	0,38184	0,02522	2,13790
	X3(-1)			-0,04124	-1,98280			-0,04101	-1,92160	-0,04527	-2,37230
	X3(-2)			0,02238	1,72400			0,02543	1,90790	0,04161	2,17400
	X3(-3)									-0,02277	-1,87780
Interest rate	X4	-0,00199	-4,53240	-0,00394	-4,76190	-0,00128	-2,29790	-0,00309	-3,68110	0,00321	0,76818
	X4(-1)									-0,01181	-1,72290
	X4(-2)									0,01698	2,60480
	X4(-3)									-0,00700	-1,74420
Exchange Rate	X5	-0,01624	-5,86940	-0,01541	-3,42530	-0,00284	-0,84055	-0,01542	-3,31800	-0,00942	-2,07400
	X5(-1)	0,01322	2,88930	0,01567	2,17640	0,01012	1,93320	0,01833	2,48330	0,01330	1,71370
	X5(-2)	0,00492	1,02150	-0,01030	-1,40130	-0,00697	-2,05900	-0,00453	-0,59216	-0,01181	-1,48740
	X5(-3)	-0,00381	-0,82575	0,01940	3,71550			0,01114	2,00370	0,00122	0,16941
	X5(-4)	0,00585	2,11640							0,00648	1,54010
Current Account Deficit	X6	0,00306	0,01502	0,00699	2,04220	0,00432	0,16638	0,00644	1,78940	0,00294	0,99743
Adj. R-square		0,55790		0,50398		0,06173		0,44838		0,19273	
AIC		79,40520		39,82250		60,13230		37,80270		49,13700	
SBC		68,63020		19,46970		51,75240		18,64710		29,98140	
F-Statistic		13,61940		6,08020		1,87730		5,33520		2,27330	
Prob(F-statistic)		0,00000		0,00000		0,09600		0,00000		0,01200	
Durbin-Watson		1,76820		1,97250		2,08740		2,10240		2,14530	

Appendix 5 ARDL Results for Chemistry Sector

Sector		Chemistry									
Company		Aksa		Aygaz		Petkm		Trcas		Tuprs	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	0,17924	1,66900	0,22176	1,94920	0,20286	1,86050	-0,14395	-1,27770	-0,18701	-1,71100

	X1(-2)	-0,20820	-1,90910	-0,28503	-2,54030			-0,30391	-2,72050	-0,08523	-0,92222
	X1(-3)	-0,28779	-2,58750							0,25409	2,79190
Unemployment Rate	X2	0,00168	0,88901	0,00326	2,66840	0,00636	0,39814	-0,00069	-0,04128	0,00160	1,83920
Consumer Price Index	X3	0,00524	0,33840	-0,00281	-2,59470	0,01576	1,42280	-0,00135	-0,90187	0,01233	2,03730
	X3(-1)					-0,01680	-1,48430			-0,01425	-2,31070
Interest rate	X4	-0,00359	-0,09720	-0,00167	-3,26010	-0,00451	-0,74627	-0,00979	-1,49780	-0,00122	-3,56120
	X4(-1)	-0,00380	-0,61575								
	X4(-2)	0,01221	2,03340								
	X4(-3)	-0,01027	-2,76670								
Exchange Rate	X5	-0,00678	-1,63540	-0,01221	-4,32490	-0,00815	-2,32220	-0,01493	-3,71540	-0,00853	-4,22450
	X5(-1)	0,01575	2,29120	0,01461	3,05250	0,00932	2,70430	0,01255	1,85190	-0,00626	1,91580
	X5(-2)	-0,01700	-2,41990	-0,00863	-1,70540			-0,00400	-0,57855	0,00408	1,74940
	X5(-3)	0,01807	2,77070	0,00789	2,43600			0,00988	2,20130		
Current Account Deficit	X6	0,00779	2,49440	0,00337	1,54480	-0,00388	-0,13356	-0,00294	-0,97249	0,00155	0,97807
	X6(-1)	0,00116	0,31906								
	X6(-2)	-0,00990	-3,11520								
Adj. R-square	0,33442		0,36791		0,08996		0,28208		0,38457		
AIC	56,36360		75,28360		52,62760		47,24120		102,59590		
SBC	36,01080		63,31130		43,04980		35,26900		83,42650		
F-Statistic	3,18560		6,17380		2,12420		4,49260		5,99910		
Prob(F-statistic)	0,00000		0,00000		0,05100		0,00000		0,00000		
Durbin-Watson	2,18560		2,01770		1,94550		2,10140		1,88380		

Appendix 6 ARDL Results for Metal-Main Sector

Sector		Metal-Main									
Company		Brsan		Cemts		Eregl		Izmdc		Krdmd	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)							0,29311	2,97370		
Unemployment Rate	X2	0,00335	1,15640	0,00331	2,31960	0,00577	0,38576	0,00188	1,09910	0,00196	1,27440
	X2(-1)	-0,00498	-1,03760								
	X2(-2)	0,00539	1,98120								
Consumer Price Index	X3	-0,00219	-1,72750	0,01616	1,63350	-0,00180	-1,34010	0,01517	1,48940	-0,00106	-0,77284
	X3(-1)			-0,01888	-1,86800			0,00511	0,31750		
	X3(-2)							-0,03850	-2,41130		
	X3(-3)							0,01607	1,59910		
Interest rate	X4	-0,00113	-2,34380	-0,00164	-3,02750	-0,00575	-0,99527	-0,00627	-2,03330	-0,00769	-1,29650
	X4(-1)							0,00544	1,69290		
Exchange Rate	X5	-0,01248	-4,59670	-0,01160	-3,69150	-0,01252	-3,76820	-0,00449	-1,41250	-0,01626	-4,77030
	X5(-1)	0,01175	4,37140	0,01238	4,01410	0,01477	4,51740	0,00547	1,78450	0,01612	4,80400
Current	X6	0,00007	0,02602	0,00435	1,68590	0,00059	0,21923	0,00851	3,04990	0,00238	0,85683

Account Deficit	X6(-1)	0,00516	1,87680					0,00125	0,39039		
	X6(-2)							-0,00689	-2,47070		
Adj. R-square		0,26443		0,21566		0,18156		0,33359		0,21486	
AIC		72,55900		62,00720		57,06310		64,31820		54,97170	
SBC		61,78390		53,62660		49,87970		48,75430		47,78840	
F-Statistic		4,59490		4,66610		4,54950		4,33720		5,37860	
Prob(F-statistic)		0,00000		0,00000		0,00100		0,00000		0,00000	
Durbin-Watson		1,84820		1,69780		1,89500		1,99730		1,88120	

Appendix 7 ARDL Results for Metal-Product Sector

Sector		Metal-Product							
Company		Arclk		Toaso		Tttrak		Vestl	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	-0,08616	-0,75727	0,04111	0,40282			0,10571	1,23400
	X1(-2)	-0,23960	-2,32990	-0,27453	-2,71780			-0,15203	-1,84780
	X1(-3)	-0,11375	1,08770						
	X1(-4)	0,24744	2,92540						
Unemployment Rate	X2	0,00270	2,40840	0,00254	2,22340	0,00442	4,27970	0,00137	1,12910
Consumer Price Index	X3	-0,00330	-3,30360	-0,00338	-3,38070	-0,00394	-4,45190	-0,00100	-0,94703
Interest rate	X4	-0,00282	-4,99710	-0,00257	-5,83920	-0,00448	-2,01280	-0,00168	-4,11550
	X4(-1)					0,00660	1,86170		
	X4(-2)					-0,00449	-1,90570		
Exchange Rate	X5	-0,01358	-4,93950	-0,01552	-6,63690	-0,01240	-4,88580	-0,01564	-6,59520
	X5(-1)	0,01380	2,78090	0,01745	4,46950	0,00878	2,12940	0,01735	7,47120
	X5(-2)	-0,00398	-0,73196	-0,00723	-1,66430	-0,00449	-0,11481		
	X5(-3)	0,00188	0,36461	0,01006	3,29680	0,00620	2,62540		
	X5(-4)	0,00607	1,76160						
Current	X6	0,00142	0,6767	0,00168	0,8464	0,00608	3,4006	0,00296	1,4651

Account Deficit		4		4		0		0
X6(-1)			0,00392	1,73760			0,00101	0,43063
X6(-2)			-0,00555	-2,97170			-0,00472	-2,39540
Adj. R-square		0,53425	0,67787	0,56941		0,56789		
AIC		79,54010	93,19560	89,60090		88,44910		
SBC		63,97620	78,82890	77,62860		76,47690		
F-Statistic		8,64730	16,30420	12,75470		12,68220		
Prob(F-statistic)		0,00000	0,00000	0,00000		0,00000		
Durbin-Watson		2,00380	2,24990	1,98650		2,01120		

Appendix 8 ARDL Results for Stone Sector

Sector		Stone											
Company		Adana		Afyon		Anacm		Golts		Konya		Trkcm	
	Crit eria	Coeff icient	T- Stati stics	Coeff icient	T- Stati stics	Coeff icient	T- Stati stics	Coeff icient	T- Stati stics	Coeff icient	T- Stati stics	Coeff icient	T- Stati stics
RETURN	X1(-1)	0,15130	1,54180	0,29585	2,67860	0,10383	0,90382			0,27994	2,48410		
	X1(-2)	-0,15953	-1,68220	-0,11336	-1,01600	-0,24398	-2,11320			-0,45462	-4,08450		
	X1(-3)			0,32276	3,11040	-0,06785	-0,65384			0,16142	1,41800		
	X1(-4)			-0,33497	-3,32950	-0,23761	-2,40790			-0,27869	-2,54380		
Unempl oyment Rate	X2	0,00185	1,71070	0,00739	2,39360	0,00166	1,38210	0,00715	4,09610	0,00453	1,16400	0,00286	1,12310
	X2(-1)			-0,00489	-1,90850					0,00892	1,28240	-0,00684	-1,53040
	X2(-2)									-0,01736	-2,45990	0,01321	2,76820
	X2(-3)									0,00966	2,64280	-0,01042	-3,38130
Consum er Price Index	X3	-0,00270	-2,77000	0,00311	0,25521	-0,00197	-1,88240	-0,00596	-3,89790	0,01668	1,42600	-0,01274	-1,69360
	X3(-1)			-0,03101	-1,70400					-0,01066	-0,58977	0,01307	1,72270
	X3(-2)			0,02462	2,03020					-0,02308	-1,25070		
	X3(-3)									0,03785	2,13760		
	X3(-4)									-0,02450	-2,14550		

Interest rate	X4	-	-	-	-	-	-	-	-	-	-	0,001	0,56
		0,001	2,65	0,004	0,71	0,002	4,58	0,002	3,52	0,002	3,84	0,001	0,56
		13	040	29	346	10	820	08	160	77	690	36	712
	X4(-1)											-	-
												0,004	1,32
												98	020
	X4(-2)											0,007	1,85
												14	470
	X4(-3)											-	-
												0,005	2,13
												29	010
Exchange Rate	X5	-	-	-	-	-	-	-	-	-	-	-	-
		0,009	3,90	0,008	2,46	0,010	4,07	0,007	2,34	0,007	2,04	0,009	3,47
		34	740	92	260	13	350	90	000	42	720	67	010
	X5(-1)	0,012	5,11	0,010	2,96	0,014	3,59	0,009	2,83	0,012	2,26	0,014	3,44
	05	200	61	900	93	310	43	610	98	290	44	310	
	X5(-2)				-	-			-	-	-	-	
					0,008	1,83			0,004	1,27	0,008	2,01	
					26	260			85	560	37	190	
	X5(-3)				0,006	2,14					0,007	2,79	
					13	560					05	750	
Current Account Deficit	X6	0,000	0,42	0,003	1,21	0,004	2,30	0,001	0,48	0,005	2,03	0,003	1,29
		83	760	68	980	97	070	48	474	78	920	01	420
	X6(-1)					0,003	1,31	0,006	2,09			0,004	2,09
						34	660	49	640			73	530
	X6(-2)				-	-					-	-	
					0,002	1,08					0,003	1,43	
					61	000					54	550	
	X6(-3)				-	-					-	-	
					0,004	2,12					0,009	3,02	
					83	910					15	610	
Adj. R-square	0,35709		0,37299		0,46885		0,29500		0,35938		0,52273		
AIC	83,44980		53,38530		88,50490		55,36930		53,94480		91,21500		
SBC	73,87200		37,82140		70,54650		46,98870		32,39470		69,66500		
F-Statistic	7,34780		4,96580		6,04390		6,59100		3,64000		6,15420		
Prob(F-statistic)	0,00000		0,00000		0,00000		0,00000		0,00000		0,00000		
Durbin-Watson	1,90990		1,98570		1,94030		1,62750		1,97960		2,09780		

Appendix 9 ARDL Results for Textile Sector

Sector		Textile									
Company		Altın		Bossa		Mndrs		Sktaş		Yunsa	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	0,01740	0,15944			0,24079	2,12840	0,23380	1,81270		
	X1(-2)	-0,28571	-2,86460			-0,14118	-1,34670	-0,44211	-3,54650		
Unemployment Rate	X2	0,00449	2,68490	0,01520	3,33530	0,00145	0,97526	0,00875	1,78230	0,00321	0,28510
	X2(-1)			-0,02140	-2,86340			-0,00791	-0,89040		
	X2(-2)			0,01046	1,44070			0,01545	1,67760		
	X2(-3)			0,01381	1,79600			-0,01330	-2,81180		
	X2(-4)			-0,01455	-3,20880						
Consumer Price Index	X3	0,00554	0,53314	0,00494	0,42356	-0,00128	-1,05190	-0,02707	-1,74380	0,01084	1,40070
	X3(-1)	0,01908	1,16110	-0,02723	-1,52180			0,04649	1,88400	-0,01210	-1,53010
	X3(-2)	-0,02857	-1,73260	-0,00511	-0,29235			-0,05242	-2,22150		
	X3(-3)	0,02209	1,31920	0,02603	2,19780			0,03349	2,35290		
	X3(-4)	-0,02237	-2,06940								
Interest rate	X4	0,00271	0,85477	0,01046	2,65050	0,00132	0,39011	0,01062	2,12100	-0,00164	-3,85240
	X4(-)	-	-	-	-	-	-	-	-	-	-

	1)	0,0100 4	1,960 80	0,0080 9	1,398 30	0,0081 9	1,462 50	0,0121 6	2,377 90		
	X4(- 2)	0,0058 3	1,724 90	0,0048 5	0,858 90	- 0,0056 6	- 0,102 77				
	X4(- 3)			- 0,0018 5	- 0,325 05	0,0061 7	1,840 00				
	X4(- 4)			- 0,0065 6	- 1,756 00						
Exchange Rate	X5	- 0,0101 0	- 2,834 00	- 0,0117 6	- 3,066 40	- 0,0157 7	- 4,264 00	- 0,0170 2	- 3,180 80	- 0,0073 9	- 2,829 40
	X5(- 1)	0,0027 3	0,460 17	0,0112 4	3,007 20	0,0219 0	3,335 90	0,0116 2	1,352 40	0,0047 4	1,178 30
	X5(- 2)	- 0,0036 9	- 0,639 91			- 0,0153 4	- 2,211 40	- 0,0104 6	- 1,281 10	0,0056 0	2,164 60
	X5(- 3)	0,0118 7	3,198 30			0,0186 5	3,000 50	0,0205 9	2,628 70		
	X5(- 4)					- 0,0082 8	- 2,250 50	- 0,0065 4	- 1,370 40		
Current Account Deficit	X6	0,0034 3	1,147 40	0,0033 3	1,181 20	0,0018 6	0,771 43	0,0036 2	0,928 17	- 0,0004 6	- 0,228 28
	X6(- 1)	0,0052 3	1,720 70					0,0077 7	1,724 10		
	X6(- 2)							- 0,0094 6	- 1,928 80		
Adj. R-square		0,39278		0,13300		0,39519		0,38754		0,29946	
AIC		62,54700		53,82520		63,93530		38,98670		81,56660	
SBC		42,19420		33,47240		47,17470		15,04220		71,98880	
F-Statistic		4,23430		1,76700		5,02100		3,66420		5,88530	
Prob(F-statistic)		0,00000		0,05600		0,00000		0,00000		0,00000	
Durbin-Watson		2,17730		1,94540		1,97010		2,01400		1,91590	

Appendix 10 ARDL Results for Commerce Sector

Sector		Commerce									
Company		Boynr		Doas		Kipa		Mgros		Sanko	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)			0,17638	2,06380	0,32902	3,19810			-0,05988	-0,56738
	X1(-2)									0,00395	0,00368
	X1(-3)									-0,20283	-1,83410
	X1(-4)									-0,33261	-4,04410
Unemployment Rate	X2	-0,00375	-0,09928	0,00169	1,32180	-0,00289	-1,62410	-0,00358	-1,70060	0,00300	0,34703
	X2(-1)	-0,00257	-0,40703					0,00372	2,03540		
	X2(-2)	0,01209	1,88760								
	X2(-3)	-0,01889	-2,91630								
	X2(-4)	0,00557	1,71050								
Consumer Price Index	X3	0,00256	1,45070	-0,00171	-1,49910	-0,00378	-0,24420	-0,00050	-0,05096	0,00144	0,19235
Interest rate	X4	-0,00165	-3,08520	0,00132	2,62580	0,00105	1,81430	0,00242	0,56468	0,00154	4,72920
Current Account Deficit	X6	-0,00359	-0,11695	-0,00061	-0,26524	0,00120	0,40582	-0,00251	-1,26960	-0,00231	-1,50830
	X6(-1)	0,00599	1,98000			0,00207	0,62512			0,00401	2,16110
	X6(-2)	-	-			-	-			-	-

	2)	0,0099 9	3,049 00			0,0043 2	1,300 00			0,0005 1	0,289 69
	X6(- 3)	- 0,0055 0	- 1,369 50			- 0,0056 8	- 1,889 30			- 0,0038 3	- 2,546 10
Adj. R-square		0,54231		0,52019		0,38092		0,29926		0,58470	
AIC		66,94600		69,68590		58,43700		81,90180		115,43020	
SBC		48,98760		61,30530		47,66190		73,52620		96,27460	
F-Statistic		7,77060		15,45560		7,15290		6,69400		8,50950	
Prob(F-statistic)		0,00000		0,00000		0,00000		0,00000		0,00000	
Durbin-Watson		1,88700		2,01960		1,91910		1,73340		1,96960	

Appendix 11 ARDL Results for Transportation Sector

Sector		Transportation					
Company		Clebi		Thyao		Ucak	
	Criteria	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
RETURN	X1(-1)	0,23995	2,07940	-0,00174	-0,01577	0,06823	0,62181
	X1(-2)	-0,22014	-1,87360	-0,23392	-2,19620	-0,12634	-1,17510
	X1(-3)			-0,18997	-1,70410	0,08848	0,79906
	X1(-4)					-0,20780	-2,56780
Unemployment Rate	X2	0,00778	2,39030	0,00513	1,19010	0,00189	0,53263
	X2(-1)	-0,00371	-1,30400	-0,00936	-1,23210	-0,00431	-0,06818
	X2(-2)			0,01297	1,72680	0,00758	1,18630
	X2(-3)			-0,00791	-2,10390	-0,00774	-2,35940
Consumer Price Index	X3	-0,00384	-2,43400	-0,00170	-0,11290	-0,00148	-1,19730
Interest rate	X4	0,00668	1,73590	-0,00421	-0,64628	0,00318	0,94001
	X4(-1)	-0,01837	-2,86560			-0,00334	-0,63748
	X4(-2)	0,01842	2,86720			0,00395	0,79914
	X4(-3)	-0,00902	-2,23290			-0,00693	-2,15160
Exchange Rate	X5	-0,01481	-3,58800	-0,01324	-3,58260	-0,00951	-2,85640
	X5(-1)	0,02642	3,75400	0,01359	3,73360	0,01236	3,71940
	X5(-2)	-0,01846	-2,53740				
	X5(-3)	0,00988	2,27850				
Current Account Deficit	X6	0,00247	0,84373	-0,00171	-0,55307	-0,00027	-0,10776
Adj. R-square		0,29474		0,21819		0,35849	
AIC		50,26070		47,65560		61,49990	
SBC		33,49950		33,28890		42,34430	
F-Statistic		3,57180		3,02970		3,98040	
Prob(F-statistic)		0,00000		0,00200		0,00000	
Durbin-Watson		1,90450		2,02250		1,94210	