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How did the 2007-2008 Financial Crisis Influence Turkish Firms*

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Abstract. This paper investigates whether 2007-2008 global financial crisis hadan effecton Turkish firms. For this purpose, we investigated the firm-specific factors affecting the stock returns of firms in the BIST-XU100 in the 2004-2009 periods. The period was divided into two sub-samples, namely pre-crisisand during-crisis periods. Moreover, the effects of firm size, market-to-book ratio (MB), and price-to-earnings (PE) ratio on stock return were examined using feasible generalized least-squares (FGLS) and panel-corrected standard errors (PCSE) models. In the literature, the US subprime mortgage crisis meltdown and spillover effects were studied on different countries and different stock markets. In this study, not only crisis effects but also effects of firm-specific factors were considered. Integration levels of the series were investigated by panel unit root tests. The models were used for both sub-samples, and the results of the two models werecompared. The results showed that. Size and MB variables were significant in all the periods and had positive effects on the stock return of the firms, and the global financial crisis hada significant but weak effect on Turkish firms.
Keywords. Financial Crisis, Stock Market, FGLS, PCSE.
JEL.C23, G01, G20.

1. Introduction

In 2007, US financial markets endured destructive lossescaused by the financial crisis.It was named as the worst financial crisis since the Great Depression. The decline of US housing prices and the collapse of mortgage market caused a global financial crisis in August, 2007. In other words, the US subprime crisis was started by subprime borrowers'defaults in the mortgage markets. The crisis started as a credit crisis, and then it turned into liquidity crisis. Moreover, the crisis affected financial markets and real economy all over the world and became global.

The crisis inducedlarge drops in asset prices and the market values of large portfolios covering highly rated asset-backed securities. The subprime crisis resulted in an important credit contraction for financial institutions and companiesholding huge portfolio with mortgage-backed securities. The collapse of The Bear Stearns' hedge funds in June-July 2007 was accepted as the starting point of the crisis. During this year, AIG, Fannie Mae, Freddie Mac, Lehman Brothers, IndyMac Bank, Merrill Lynch, Wachovia, Washington Mutual, and many others were attempted to be rescued from the collapse.

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National markets became more inter-connected with one another with direct trade flows and capital flows in the previousfew decades (Forbes & Chinn, 2004). The cross-border market linkages increased the transmission probability of the shocks internationally. The crisis caused large spillover effects from the United States to other countries having trade relationships with and existing capital flows to the USA. As a result of the crisis, there was a widespread interest in spillover effects from the United States to other countries.

The crisis caused heavy losses or even bankruptcy among financial institutions and firms having large portfolio with mortgage-backed securities. Thus, researchers started to be interested in the effects of the crisis on the stock market. Prabha, Barth & Kim (2009) indicated that the degree of interdependence and spillover effects were the highest after the U.S. subprime mortgage meltdown began in the summer of 2007, and even after the collapse of Lehman Brothers in September 2008. Dooley & Huttchison (2009) similarly found evidence that there were transmission effects of subprime crisis to other emerging stock markets, and emerging markets responded very strongly to the deteriorating situation in the US.This was consistent with the evidence provided by Longstaff (2010) regarding the strong contagion across markets from the credit crisis. Singhania & Anchalia (2013) investigated the impact of the 2008 subprime crisis on the Asian stock market and they found that the crisis affected the Asian financial markets,and Japan, China, and India were affected positively by the subprime crisis.There were many other studies in the literature about the effects of the crisis on other countries' stock markets, such as, Al-Rjoub & Azzam (2012) on the Jordanian stock exchange, Cheong et al. (2012) on the US, Malay, and Indonesian stock markets, Thao & Daly (2012) on the Southeast Asian stock markets, and Horta et al. (2008) on the Canada, Japan, Italy, France and the UK stock markets.

Many other researchers focused on the Turkish stock market (BIST). Celikkol et al. (2010) studied the impact of Lehman Brothers' bankruptcy on the volatility structure of the BIST-XU100. They observed that the crisis peaked in the BIST-XU100, and volatility was higher in the period after the bankruptcy of Lehman Brothers wasannounced. Cagil & Okur (2010) investigated the impact of the 2008 financial crisis on BIST and they revealed that the unconditional volatility of BIST increased between 2007 and 2010. Gammoudi & Cherif (2014) found that the effect of the crisis was negative on BIST. Sekmen & Hatipoglu (2015) indicated that the subprime crisis induced a notable increase in volatility, and changed the relationship between risk and expected return on BIST.

Other studies focused on the effects of the crisis on stock exchange; however, Gueyie (2013) analyzedthe impact of the crisis on Canadian banks' stock returns, and Vithessonthi &Tongurai (2015) examined the impacts of subprime crisis on the performance of firms. In the same way, the current study analyzed the behaviors of Turkish firms in terms of the stock return, rather than the stock market, considering the subprime crisis spreading from the USA. In this sense, we analyzed how the stock return of Turkish firms listed in BIST- XU100 changed and which factors stimulated this change between 2004 and 2010. The examination of this variation across firms allowed us to determine the extent of the effects the subprime crisis had on the Turkish firms. To this end, we usedthree factors used by Fama & French (1992), namely firm size (log of assets), MB, and PE.

The rest of the study was organized as follows: Section 2 presented some previous research studies and their outcomes related with stock returns. Section 3 included an empirical application and its results. Section 4 concluded the study.

2. Literature review

Examining the effects of the firm-specific factors on stock returns formed the basis of many studies. In the 1960s, the Capital Asset Pricing Model (CAPM), which was a single-factor model, was developed by Treynor (1961;1962), Sharpe (1964), and Lintner (1965). The model stated that expected returns on stocks were positively related to market beta, and market betawas the only risk factor to explain the variation of the expected return. On the other hand, Ross (1976) developed the Arbitrage Pricing Theory (APT), which was a multi-factor model. The theory arguedthat the expected return on stocks was driven by macro factors along with company-specific factors. The theory was taken as a basis in the multi-factor models to be developed in further studies.

With the widespread use of single-factor and multi-factor models, several variables related with firms were discussed in different studies. Basu (1977; 1983) showed that stocks with high earnings/price ratios earned significantly higher returns than stocks with low earnings/price ratios. Banz (1981), Roll (1981), and Keim (1983) found that there was a negative relationship between average return and firm size. In other words, smaller firms had higher adjusted returns risk on average than larger firms. Basu (1983) stated that the common stock of small firms earned higher returns than the common stock of large firms. Rosenberg et al. (1985) provided that stocks with high book-to-market equity had significantly higher returns than stocks with low book-to-market equity. Bhandari (1988) documented a positive relationship between average return and the ratio of debt-to-equity. Chan et al. (1991) revealed that there was a significant relationship between earning yields, size, book-to-market ratio, cash flow yield, and expected returns in the Japanese market. Moreover, the book-to-market ratio and cash flow yield hadthe most significant positive impact on expected returns. Bhardwaj & Brooks (1993) found that the size effect was actually reversed,and large firms were found to outperform small firms on a risk-adjusted basis.

The major studies about multi-factor models werecarried out by Fama and French. They tried to find the factors describing the change in stock return. Fama & French (1992) confirmed that size, earning-price, debt-to-equity ratios, and book-to-market ratios added to the explanation of the expected stock return provided by market beta. Their main result was that size and book-to-market equity captured the cross-sectional variation in average stock returns associated with size, earning-price, book-to-market equity, and leverage. They found that the relation between beta and average return was weak. Fama & French (1993) developed a three-factor model, in which the factors were the market return in excess of the risk-free rate, the difference between the returns on small and large capitalization portfolios, and the difference between the returns on high and low book-to-market portfolios. They provided evidence that expected stock return could be explained by the excess market return, a size factor, and a book-to-market equity factor. Fama & French (1995) showed that high book-to-market equity firms tended to be earning less than lowbook-to-market equity firms, and small stocks tended to be earning less than large stocks. Fama & French (1998) found that value stocks (high book-to-market ratio) had higher returns than growth stocks (low book-to-market ratio), and the average returns on global portfolios of high book-to-market stocks werehigher than low book-to-market stocks.

There are examples from other countries in the related literature concerning the factors influencing stock returns. The relationship between expected stock returns and market beta, book-to-market equity, and size was investigated (Chui & Wei, 1998) with the result that average stock return and market beta had a weak relationship. Moreover, the book-to-market equity could explain the cross-sectional

variation of expected stock returns in Hong Kong, Korea, and Malaysia, and the size effect was significant in all markets except Taiwan. Lau et al. (2002) examined the relationship between stock returns with beta, size, the earnings-to-price ratio, the cash flow-to-price ratio, the book-to-market equity ratio, and sales growth. They found thatthere was a significant positive relationship between beta and stock returns, and a negative relationship between stock returns and size during months with positivemarket excess returns. For Singapore, they also documented a negative relationship between returns and sales growth. For Malaysia, they found a positive relationship between returns and the E/P ratio. Some other studies wereon other countries' stock markets, such as, Lam (2002) on Hong Kong, Maroney & Protopapadakis (2002) on several countries, Drew et al. (2003) on China, Drew & Veeraraghavan (2003) on several countries, and Novak & Petr (2010) on Sweden.

There weremany studies about BIST in terms of the contributory factors to stock returns. Akdeniz et al. (2000) indicated that book-to-market ratio and firm size explained stock returns, whereas no significant earning-price ratio effect was encountered. Yalciner & Boztosun (2005) indicated a positive relationship between firm size and stock return, and an insignificant effect of market-to-book ratio on stock return. Canbas et al. (2007) found that common stocks of small BIST firms earned higher monthly returns than the common stocks of large firms, high book-to-market firms produced a higher return than the low book-to-market firms, and the portfolio with the lowest earnings-to-price ratio earned the highest rate of return. Canbas & Arioglu (2009) introduced that book-to-market ratio had a positive relationship with stock returns, and firm size and average monthly returns of the common stocks hada negative relationship.

Some studies were conducted in order to examine the effects of firm-specific factors on stock returns before and after the crisis periods. Tong & Wei (2008) developed a methodology to study whether or how the financial sector crisis could spill over to the real economy. For this purpose, they investigated the relationship between stock returns and demand sensitivity, financial constraint, size, market-to-book ratio, beta, and momentum. They found that a tightened liquidity squeeze seemed to be economically more important than reduced consumer confidence or spending in explaining cross-firm differences in stock price decline. In the same way, Tong & Wei (2009) studied the relationship between stock return and demand sensitivity, financial dependence, size, market-to-book ratio, beta and momentum in the crisis period. They provided evidence that stock price performance was worse for firms with larger ex ante sensitivity to shocks to external finance, particularly in countries with rapid pre-crisis credit expansion.

3. Empirical application

In this paper, we studied the effects of the 2007-2008 financial crisis on the Turkish firms in the BIST-XU100. For that purpose, we examined the effects of firm-specific factors, namely firm size, calculated as a log of total asset, market-to-book ratio, and price-to-earnings ratio on stock return (percentage change in stock price) between January 2004 and December 2009 using the monthly data. The model was as follows:

$$STC_{ij} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 MB_{it} + \beta_3 PE_{it} + \varepsilon_{it} \quad (1)$$

Where j was index for firm, t was index for time period (month), STC was stock return, SIZE was firm size, MBwas market-to-book ratio, and PE wasprice-to-earnings ratio.

After the firm data were collected, we eliminated the firms with missing data and the firms which had outliers in the variables, especially on the stock return variable. The final sample consisted of 35 firms (listed in Appendix), which gave the total of 2520 observations.

The main challenge in this section was defining the pre-crisis and the during-crisis periods. In the literature, there were different definitions. The global subprime crisis period was defined by Tong & Wei (2009) as July 31, 2007-March 31, 2008. Kesimli & Günay (2011) considered 2004-2007 as a pre-crisis era and 2008-2009 as the crisis era for Turkey. The results of the study carried out by Iskenderoglu & Karakozak (2013) showed that the effect of the crisis started in 2008 and gradually finished in the last quarter of 2009 in BIST. Dwyer & Tkac (2009) divided the crisis period into three phases, namely prelude, from early 2007 or before to August 9, 2007, main act, from August 9, 2007 to September 16, 2008, and climax, from September 16, 2008 to sometime early in 2009. Rawdanowicz (2010) stated that the initial impact of the crisis on Turkey took place in the period between the beginning of 2008 and mid–2009 by measuring GDP. Furthermore, it was stated that the Central Bank of the Republic of Turkey (CBRT) cut down the main policy interest rate from October 2008 to November 2009, which was the highest in the OECD and among the other emerging markets. Comert & Colak (2014) asserted that the 2008 crisis hit the Turkish economy in the third quarter of 2008 and it affected until the last quarter of 2009. Erkens et al. (2012) investigated the crisis, which was named as the 2007-2008 financial crisis in their study, and used the first quarter of 2007 to the third quarter of 2008 as the crisis period. Ivashina & Scharfsteinhowing (2010) argued that syndicated lending started to fall in mid-2007 and it continued increasingly through the fourth quarter of 2008. It was clear that there was no consensus about the period of the crisis; however, it was not controversial that the crisis occurred between 2007 and 2009.

The present study considers the full sample period aspre-crisis period (January 2003-May 2007) and during-crisis period (June 2007- December 2009). Figure 1 showed the stock return against time for 35 firms for the full period. The data werevery volatile, ranging from -5 to 5.

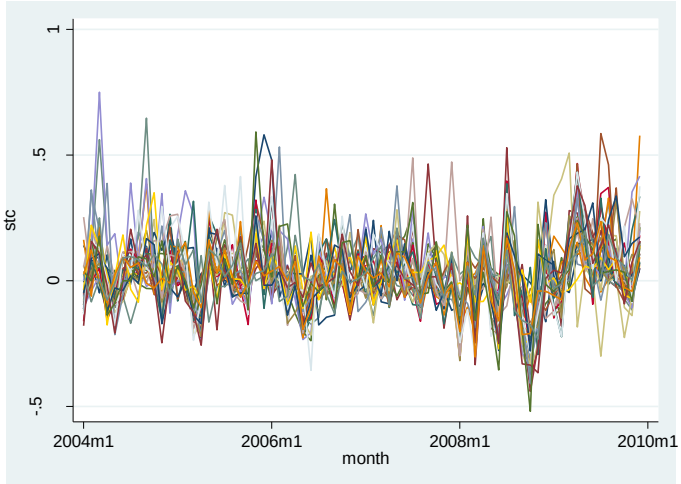

Figure 1.*STC by firms*

Table 1 showsthe descriptive statistics of the variables for the full sample and two sub-samples. If the mean and median values weretaken into consideration, approximately close values among the three sampleswould be observed. However,

the ranges and standard deviations of the variables differentiated from each other.The biggest change was seen in the STC variable. Mean stock returns decreased in the crisis period in Table 2. We could say that the stock return of the firms decreased in the crisis period from 0.0303 to 0.0163, which was a decrease by about 46%. Except the STC variable, there were no important changes in the values of the variables.

Table 1. *Descriptive Statistics*

Full Sample (2004:01-2009:12)				
Stats	STC	SIZE	BVM	PE
Mean	0.0245	21.3804	1.2955	7.4846
Median	0.0173	21.1047	1.12	8.53
Sd	.1336	1.8696	0.7813	33.7710
Range	1.2687	8.4563	4.83	856.19
Min	-0.5187	17.1261	0.17	-417.25
Max	0.7500	25.5824	5	438.94
Sub Sample 1: Pre-Crisis (2004:01-2007:06)				
Mean	0.0303	21.2017	1.3933	8.0800
Median	0.0199	21.0243	1.21	9.62
Sd	0.1165	1.8299	0.7759	31.1751
Range	1.1052	8.0567	4.76	633.74
Min	-0.3552	17.1261	0.24	-417.25
Max	0.7500	25.1828	5	216.49
Sub Sample 2: Crisis (2007:06-2009:12)				
Mean	0.0163	21.630	1.1585	6.6510
Median	0.0118	21.3421	0.99	7.275
Sd	0.1540	1.8964	0.7684	37.1008
Range	1.1048	7.947	4.4	782.41
Min	-0.5187	17.6349	0.17	-343.47
Max	0.5862	25.5824	4.57	438.94

Table 2 shows the correlation coefficient of the variables. The STC variable had a significant correlation with MB in the full sample, MB and PE in the pre-crisis period, and MB in the during-crisis period at 1% significance level. There was a significant correlation of the size variable with the MB and PE variables at 1% and 5% significance levels, respectively, in the full sample period, and at 1% and 10% significance levels, respectively, in the pre-crisis period and only has a significant correlation with MB variable in the crises period at 1% significance level. The MB variable had a significant correlation only with PE at 1% significance level in all periods. The relationships between significant variables were generally considered to be low. The highest correlation was between size and MB variables in the pre-crisis period with 42% and the second highest was between the same variables again for the full-sample period with 29%. All significant correlation coefficients were positive and had the highest values before crisis and the lowest values in the crisis period. It was considered that the variables had a positive relationship and their relationship was greater than the crisis period, and this relationship decreased in the crisis. We could say that MB and Size variables were the variables which had highest relationship among these variables.

Table 2.*Correlation Matrix*

Full Sample (2004:01-2009:12)				
	STC	**Size**	**MB**	**PE**
STC	1.000			
p				
SIZE	-0.0085	10.000		
p	0.6701			

MB	0.1038***	0.2941***	10.000	
p	0.0000	0.0000		
PE	0.0178	0.0443**	0.1363***	1.000
p	0.3714	0.0262	0.0000	
Sub Sample 1: Pre-Crisis (2004:01-2007:06)				
STC	1.000			
SIZE				
	-0.0274	1.000		
MB	0.2931			
	0.1076***	0.4255***	1.000	
PE	0.0000	0.0000		
	0.0063***	0.0448*	0.165***	1.000
Sub Sample 2: Crisis (2007:06-2009:12)				
STC	1.000			
SIZE				
	0.0227	1.000		
MB	0.4634			
	0.0885***	0.1677***	1.000	
PE	0.0041	0.0000		
	0.0261	0.0496	0.0994***	1.000

Before the model was applied, unit root tests must be carried out. In time series econometrics, before the model wasestimated, the order of the integration level of the variables was tested first (Ugurlu, 2009). It was assumed that all units were stationary with the same autoregressive coefficient across units (the homogeneous alternative hypothesis). The variables in the model had to be at same integration level in the time series analysis. In the panel data methodology, this assumption was tested, too. Various panel unit root tests weredeveloped and used by researchers.

After Levin & Lin (1992; 1993) presented the panel unit root test, the use of panel data unit root tests become very popular among empirical researchers (Maddala & Wu, 1999). We used IPS, Fisher-Perron, and Fisher Dickey Fuller tests.

Im, Pesaran & Shin (1997; 2003) developed a unit root test, denoted as IPS, that the null hypothesis was the presence of unit roots. IPS began by specifying a separate ADF regression for each cross-section with individual effects and no time trend. It should be noted that the IPS test was for testing the significance of the results from N independent tests of a hypothesis.

Maddala & Wu (1999) proposed the use of the Fisher's test (Fisher (p_λ) Test) which was based on combining the p-values of the test-statistic for a unit root in each cross-sectional unit (Hoang & Mcnow, mimeo). The Fisher's test, dating back to Fisher (1932), did not require a balanced panel as in the case of the IPS test. Also, one could use different lag lengths in the individual ADF regression. Another advantage of the Fisher test was that it could also be carried out for any unit root test derived. (Maddala & Wu, 1999).

Table 3 shows the result of panel unit root tests. It was concluded that the hypothesis of a unit root was rejected for all variables by all IPS, Fisher-Perron, and Fisher-ADF testsat 1% significance level. Majority of the test results indicatedthat all variables were stationary in a level, thus we could construct the model with the level values of the variables.

Table 3. *Panel Unit Root Test Results: Full Sample*

Variable		STC	SIZE	MB	PE
Im-Pesaran-Shin[1]					
WithoutTrend		-30.2266***	2.2440	-2.3834***	-9.0588***
With Trend		-30.4079***	-4.4123***	-4.0817***	-10.5056***
Fisher-Perron Test					
Without Trend	Inverse χ^2	1757.4978***	54.2847	92.6732**	258.1255***
	Inverse normal	-39.1962***	1.972	-2.9412***	-10.3468***
	Inverse legit	-82.123***	2.0548	-2.7313***	-11.5708***
	Modified inv. χ^2Pm	142.6196***	-1.3282	1.9162***	15.8995***
With Trend	Inverse χ^2	1543.6969***	67.9284	68.1018	196.878***
	Inverse normal	-36.4053***	0.2713	-0.4038	-7.9507***
	Inverse legit	-72.1327***	0.3065	-0.4175	-8.4341***
	Modified inv. χ^2Pm	124.5501***	-0.1751	-0.1604	10.7231***
Fisher- ADF Test					
Without Trend	Inverse χ^2	379.7047***	41.0842	82.3454	166.0046***
	Inverse normal	-14.9549***	2.9923	-2.3651***	-5.7017***
	Inverse legit	-17.6674***	3.1387	-2.1708**	-5.8117***
	Modified inv. χ^2Pm	26.1748***	-2.4438	1.0434	8.1139***
With Trend	Inverse χ^2	267.3598***	55.5568	62.9379	120.4714***
	Inverse normal	-11.2433***	1.1009	-0.0552	-3.3999***
	Inverse legit	-12.2444***	1.1651	-0.1709	-3.2122***
	Modified inv. χ^2Pm	16.6799***	-1.2207	-0.5969	4.2656***

Note: 1: Z-t-tilde-bar statistics are used. *,**,*** show 10%, 5% and 1% significance, respectively. In Fisher type 3 lags option is selected.

Unit root tests results showed that except MB and size variables, all variables were stationary at 1% significance level in all tests. PE and MB variables did not have the same result for all tests. MBwas stationary based on the IPS, Fisher ADF, and Fisher Perron tests using the model without trend, and size was stationary only for the IPS tests using the model with trend. We determined the variables of the model by considering Fama & French (1992).

First, the Fixed Effect Model (FEM) and Random Effect (REM) model for both full sample and two sub-samples with level series were estimated. Although FEM assumed that the impact of variables varies over time, REM considered that the variation across entities was assumed to be random and uncorrelated with the predictor or independent variables included in the model (Green, 2008). To decide which was interpreted,the Hausman Test was used. The Hausmantest (Hausman, 1978) assumed that if the null hypothesis was of no misspecification, then there must exist a consistent and fully efficient estimator of the proposed econometric specification. However, when the goodness of fit results of estimations were considered for these models, some of them had problems such as serial correlation and heteroscedasticity and very low R squared. Ugurlu & Bayar (2014) used feasible generalized least-squares (FGLS) and panel-corrected standard errors (PCSE) to overcome these problems. FGLS was proposed by Parks (1967) and PCSE was recommended by Beck & Katz (1995) instead of FGLS because of its small standard errors. Reed & Webb (2010) investigated the properties of the PCSE estimator and FGLS estimator, and they concluded that PCSE generally provided improvement over FGLS when it came to estimating standard errors. Also, they claimed that PCSE provided a way of obtaining better performance on standard error estimation at no cost to efficiency, which was only generally true

when the number of time periods was close to the number of groups. To overcome these problems, feasible generalized least-squares (FGLS) and panel-corrected standard errors (PCSE) models by using differenceddata were used in the current study.

Table 4 showsthe estimation results. The significance of the coefficients showed no variation among full and sub-sample periods. All models were statistically significant at 1% significance level and the explanation ratio was nearly 0.30 in all the periods. Size and MB variables were significant in all the periods, and hada positive effect on the stock return of the firms. Because the price to earnings ratio was not significant,it was concluded that this variable had no effect on stock return in the selected term. The results showed that the magnitude of the variables on the STC increased in the during-crisis period.

Table 4. *Estimation Results (Dependent Variable: DSTC)*

	Full Sample		Sub-Sample1		Sub-Sample2	
	PCSE	FGLS	PCSE	FGLS	PCSE	FGLS
Variables	Coefficient		Coefficient		Coefficient	
DSize	0.2572*** (0.07473)	0.2572*** (0.0496)	0.1898*** (0.10831)	0.1898*** (0.0676)	0.3382*** (0.1150)	0.3382 *** (0.0787)
DMB	0.4886*** (0.0311)	0.4886*** (0.0150)	0.4834*** (0.0360)	0.4834*** (0.0187)	0.5052*** (0.0561)	0.5052*** (0.0251)
DPE	0.00002 (0.00013)	0.00003 (0.0001)	0.00003 (0.0001)	0.00003 (0.0002)	-0.00003 (0.0002)	-0.00003 (0.0002)
Constant	-0.0019 (0.01049)	-0.0019 (0.0031)	-0.00974 (0.0111)	-0.0097 (0.0038)	0.0079 (0.0200)	0.0080 (0.0055)
R-squared	0.2986	-	0.3172	-	0.2862	-
Observation	2485	2485	1435	1435	1015	1015
Log likelihood	-	1173,767	-	844.4613	-	347.608
Wald chi sq.	248.33***	407.01***	181.22***		84.84***	407.01***

Notes: *,**,*** show 10%, 5% and 1% significance respectively. D represents difference of the series. () parenthesis shows standard errors of the coefficient.

Table 5. *Expected Sing and Estimated Sing of Coefficients*

	Expected Sign	Full Sample	Sub-sample1	Sub-sample2
SIZE	-	+	+	+
MB	-	+	+	+

The expected signsin the previous studies and the estimated sign of the coefficients were given in Table 5. Our findings were not parallel with the expectations. The relationship between size and stock return was expected to be negative because the potential of the future returns on small firms are greater than that of bigger firms. Banz (1981), Roll (1981), Basu (1983) and Keim (1983) stated that the common stock of small firms earned higher returns than the common stock of large firms.On the contrary, both Bhardwaj & Brooks (1993), and Yalciner & Boztosun (2005) found that the size effect was actually reversed, and large firms were found to outperform small firms on a risk-adjusted basis. Our result wasin parallel with the results of the studies by Bhardwaj & Brooks (1993) and Yalciner & Boztosun (2005). This result showed that Turkish investors were risk averse and they chose big firmsfor investment.

Rosenberg et al. (1985) Chan et al. (1991) provided that stocks with high book-to market equity had significantly higher returns than stocks with low book-to-market equity. However, the result of our analysis conflictedwith other studies and showed that high market-to-book equity hadhigh return than low market-to-book equity. This result could be explained by high return expectation ofinvestors on high market-to-book equity (growth stock). In other words, the result impliedthat the characteristics of Turkish stock market and investors weredifferent from the developed markets in terms of their nature.

4. Conclusion

In 2007, US financial markets endured destructive losses caused by financial crisis. The decline of US housing prices and the collapse of mortgage market caused a global financial crisis in August 2007. The crisis induced large drops in asset prices and the market values of large portfolios covering highly rated asset-backed securities. The subprime crisis resulted in an important credit contraction for financial institutions and companies holding huge portfolio with mortgage-backed securities. The cross-border market linkages increased the transmission probability of the shocks internationally. The crisis caused large spillover effects from the United States to other countries having trade relationships with and existing capital flows to the USA. The crisis caused heavy losses or even bankruptcy among financial institutions and firms having large portfolio with mortgage-backed securities. Thus, researchers were interested in the effects of the credit crisis on the other stock markets. This study intended to analyze the behavior of Turkish firms in terms of the stock return, rather than the stock market.

This paper investigated the 2007-2008 financial crisis to find out whether it had effects on Turkish firms. To investigate this, monthly data from January 2004-December 2009 wereused, and the data period coveredboth pre-crisis and during-crisis periods. To represent Turkish firms, BIST-XU100 wasselected in the model. After many arrangements on the data, we had35 Turkish firms from the XU100. The variables used were stock return as a dependent variable and firm size, market-to-book ratio, and price-to-earnings ratio variables as independents. The models were estimated for three different samples. First, we used the full sample, then the full sample period was divided into two sub-samples, as pre-crisis and crisis periods, then the models were estimated and interpreted for both subsamples. We had two main findings which showed us the effect of independent variables on stock return and differentiation of the effects of the sample and sub-samples against each other.

All models were statistically significant at 1% significance level, and explanation ratio was nearly 30% in all periods. Size and MB variables were significant in all periods, and hada positive effect on the stock return of the firms. Price-to-earnings ratio was not significant, andthis means that the variable had no significant effect in the model. The results showed that the magnitude of the variables on the STC increased in the crisis period.However, the relationship between size and stock return, and market-to-book ratio and stock return were found to be positive. It was interpreted that the main reasons for these results wereTurkish investors were risk averse and choose big firms and the characteristics of the Turkish stock market and investors weredifferent from developed markets.

As a result, size and MB variables were significant in all periods and had positive effects on the stock return of the firms, and the global financial crisis had a significant but weak effect on Turkish firms.

Notes

*This paper is extended and revised version of the "The Effects of the 2007-2008 Financial Crisis on Turkish Firms" which was presented in the 10th Eurasian Business and Economics Society Conference, May 23-25, 2013, Istanbul, Turkey.

Appendix

List of Firms

Firm	No	Firm	No	Firm	No	Firm	No	Firm	No
AEFES	1	ASUZU	8	GARAN	15	KRDMD	22	TCELL	29
AKBNK	2	AYGAZ	9	GOLTS	16	METRO	23	TEBNK	30
AKENR	3	BRSAN	10	IHLAS	17	MGROS	24	THYAO	31
AKSA	4	ECILC	11	ISCTR	18	OTKAR	25	TOASO	32
ALKIM	5	ECZYT	12	ISGYO	19	SAHOL	26	TRCAS	33
ARCLK	6	EGGUB	13	IZMDC	20	SASA	27	TRKCM	34
ASELS	7	FROTO	14	KCHOL	21	SISE	28	TUPRS	35

References

Akdeniz, L., Altay, A., & Aydoğan, K. (2000). Cross section of expected stock returns in ISE. *Russian & East European Finance and Trade*, 36, 6–26.

Al-Rjoub, S. A., & Azzam, H. (2012). Financial crises, stock returns and volatility in an emerging stock market: The case of Jordan. *Journal of Economic Studies*, 39(2), 178-211. doi. 10.1108/01443581211222653

Banz, R.W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, 9, 3-18. doi. 10.1016/0304-405X(81)90018-0

Basu, S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis, *Journal of Finance*, 32, 663-682. doi. 10.1111/j.1540-6261.1977.tb01979.x

Basu,S., (1983). The relationship between earnings' yield, market value and return for NYSE common stocks. *Journal of Financial Economics*, 12, 129-156. doi. 10.1016/0304-405X(83)90031-4

Beck, N., & Katz, J.N. (1995). What to do (and not to do) with times-series cross-section data in comparative politics. *American Political Science Review*, 89(3), 634-647. doi. 10.5455/ey.35413

Bhandari, L.C. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance*, 43(2), 507-528. doi. 10.2307/2328473

Bhardwaj, R. & Brooks, L. (1993). Dual betas from bull and bear markets: Reversal of the size effect. *Journal of Financial Research*, 16, 269–83. doi. 10.1111/j.1475-6803.1993.tb00147.x

Cagıl, G., & Okur, M. (2010). Küresel krizinin İMKB hisse senedi piyasası üzerindeki etkilerinin GARCH modelleri ile analizi. *Marmara Üniversitesi İİBF Dergisi,* 28(1), 573-585.

Canbas, S., Kandır, S.Y., & Erismis, A. (2007). Hisse senedi verimini etkileyen bazı şirket özelliklerinin İMKB şirketlerinde test edilmesi, *Finans Politik ve Ekonomik Yorumlar Dergisi*, 44 (512), 15-27.

Canbas, S., & Arıoglu, E., (2009). Factors affecting the cross-section of common stock returns: An applied analysis at ISE. *Ç.Ü. Sosyal Bilimler Enstitüsü Dergisi*, 18(1), 79–94.

Chan, K.C.L., Hamao, Y., & Lakonishok, J. (1991). Fundamentals and stock returns in Japan. *The Journal of Finance*, 46(5), 1739-1764. doi. 10.1111/j.1540-6261.1991.tb04642.x

Celikkol, H., Akkoc, S., & Akarim, Y.D. (2010). The Impact of bankruptcy of Lehman Brothers on the volatility structure of ISE-100 price index. *Journal of Money, Investment and Banking*, 18, 5-12

Cheong, C.W., Lai, N.S., Yusof, N.A.M., Ying, K.C., & Fosee, L. (2012). The impact of subprime mortgage crisis to long-run and short-run volatility components of Indonesian and Malaysian equity Markets. *Journal of Interdisciplinary Mathematics*, 15, 2-3. doi. 10.1080/09720502.2012.10700796

Chui, A.C.W. & Wei, J.K.C., (1998). Book-to-market, firm size, and the turn-of-the-year effect: Evidence from Pacific-basin emerging market. *Pacific-Basin Finance Journal*, 6, 275-293.

Cömert, H., & Çolak S., (2014). The Impacts of the Global Crisis on the Turkish Economy and Policy Responses.*ERC Working Papers in Economics*,14-17.

Dooley, M., & Hutchison, M. (2009). Transmission of the U.S. subprime crisis to emerging markets: Evidence on the decoupling-recoupling hypothesis. *Journal of International Money and Finance*, 28(8), 1331-1349. doi. 10.1016/j.jimonfin.2009.08.004

Drew, M.E., Naughton, T., & Veeraraghavan M. (2003). Firm size, book-to-market equity and security returns: Evidence from the Shanghai stock exchange. *Australian Journal of Management*, 28, 119–139. doi. 10.1177/031289620302800201

Drew, M.E., & Veeraraghavan M. (2003). Beta, firm size, book-to-market equity and stock returns. *Journal of the Asia Pacific Economy*, *Journal of the Asia Pacific Economy*, 8(3), 354-379.

Dwyer, G.P., & Tkac P. (2009). The financial crisis of 2008 in fixed income markets. *Federal Reserve Bank of Atlanta Working Paper Series*, Working Paper 2009-20.

Erkens, D.H., Hung M., & Matos, P. (2012). Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance*, 18, 1-55. doi. 10.1016/j.jcorpfin.2012.01.005

Fama, E.F., & French, K.R., (1992). The cross-section of expected stock returns. *The Journal of Finance*, 47(2), 427-465. doi. 10.1111/j.1540-6261.1992.tb04398.x

Fama, E.F., & French, K.R., (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3-56. doi. 10.1016/0304-405X(93)90023-5

Fama, E.F., & French, K.R. (1995). Size and book-to-market factors in earnings and returns. *The Journal of Finance*, 50(1), 131-155. doi. 10.1111/j.1540-6261.1995.tb05169.x

Fama, E.F., & French, K.R. (1998). Value versus growth: The international evidence. *The Journal of Finance*, 53(6), 1975-1999. doi. 10.1111/0022-1082.00080

Fisher, R.A. (1932), *Statistical Methods for Research Workers*.Oliver & Boyd, 4th ed. Edinburgh.

Forbes, K.J. & Chinn, M.D. (2004). A decomposition of global linkages in financial markets over time, *The Review of Economics and Statistics*, 86(3), 705-722. doi. 10.1162/0034653041811743

Gammoudi, M., & Cherif, M. (2014). The global financial crisis and financial contagion in MENA stock markets. *International Invention Journal of Arts and Social Science*, 1(2),26-40.

Gueyie, J.P. (2013).The impact of the subprime crisis on Canadian banks' stock returns. *Frontiers in Finance and Economics*,10(2), 103-128.

Hausman, J.A., (1978). Specification tests in econometrics. *Econometrica*, 46, 1251–1271.

Horta, P., Mendes, C., & Vieira, I. (2008). Contagion effects of the US subprime crisis on developed countries. *CEFAGE-UE Working Paper*, 2008-08.

Hoang, N.T., & Mcnown, R. F. (2006). *Panel Data Unit Roots Tests Using Various Estimation*, University of Colorado, Working Papers, une-20100422-233124.

Im, K.S., Pesaran, M.H., & Shin, Y. (1997). *Testing for Unit Roots in Heterogeneous Panels*, Department of Applied Economics, University of Cambridge. Mimeo

Im, K.S., Pesaran, M.H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels, *Journal of Econometrics*, 115, 53-74. doi. 10.1016/S0304-4076(03)00092-7

Iskenderoğlu, O., & Karakozak, O. (2013). 2008 Küresel finansal krizinin finansal oranlar üzerine etkisi: BIST'de işlem gören imalat sanayi işletmeleri üzerine bir uygulama. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 28(2), 99-129.

Ivashina, V., &, Scharfstein D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97(3), 319–338. doi. 10.1016/j.jfineco.2009.12.001

Keim, D., (1983). Size related anomalies and stock return seasonality: further empirical evidence. *Journal of Financial Economics*, 12(1),13-32. doi. 10.1016/0304-405X(83)90025-9

Kesimli, I.G., & Gunay S.K. (2011). The impact of the global economic crisis on working capital of real sector in Turkey. *Business and Economic Horizons*, 4(1), 52-68. doi. 10.15208/beh.2011.5

Lam, K.S.K., (2002). The relationship between size, book-to-market equity ratio, earnin-price ratio, and return for the Hong Kong stock market. *Global Finance Journal*, 13(2), 163-179. doi. 10.1016/S1044-0283(02)00049-2

Lau, S.T., Lee, C.T., & McInish, T.H. (2002). Stock returns and beta, firms' size, E/P, CF/P, book-to-market, and sales growth: Evidence from Singapore and Malaysia. *Journal of Multinational Financial Management*, 12, 207–222. doi. 10.1016/S1042-444X(01)00051-2

Levin, A. & Lin, C.F. (1992). Unit root test in panel data: Asymptotic and finite sample properties, *University of California at San Diego, Discussion Paper*, No. 92-93.

Levin, A. & Lin, C.F. (1993). Unit root test in panel data: New results. *University of California at San Diego*, Discussion Paper, No. 93-56

Lintner, J., (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, *The Review of Economics and Statistics*, 47(1), 13-37.

Longstaff, F.A., (2010). The subprime credit crisis and contagion in financial markets, *Journal of Financial Economics*, 97(3), 436-450. doi. 10.1016/j.jfineco.2010.01.002

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests, with panel data and a new simple test, *Oxford Bulletin of Economics and Statistics*, 61(S1), 631-652. doi. 10.1111/1468-0084.0610s1631

Maroney, N., & Protopapadakis, A., (2002). The book-to-market and size effects in a general asset pricing model: Evidence from seven national markets. *European Finance Review*, 6, 189–221.
Novak, J. & Petr, D., (2010). CAPM Beta, size, book-to-market, and momentum in realized stock returns, *Czech Journal of Economics and Finance*, 60(5), 447-460.
Parks, R., (1967). Efficient estimation of a system of regression equations when disturbances are both serially and contemporaneously correlated, *Journal of the American Statistical Association*, 62(318), 500–509. doi. 10.1080/01621459.1967.10482923
Prabha, A.P.A., Barth, J.R., & Kim, H. (2009). *Spillover Effects from the U.S. Financial Crisis: Some Time-Series Evidence from National Stock Returns, September, (Forthcoming: The Financial and Economic Crisis: An International Perspective).* Benton Grup, Editor Edward Elgar Publishing
Rawdanowicz, Ł., (2010). The 2008-09 crisis in Turkey: Performance, policy responses and challenges for sustaining the recovery. *OECD Economics Department Working Papers*, No. 819, OECD Publishing. doi. 10.1787/5km36j7d320s-en
Reed, W.R. & Webb, R., (2010). The PCSE estimator is good-just not as good as you think. *UC Research Repository*, http://hdl.handle.net/10092/5470
Roll, R., (1981). A possible explanation of the small firm effect. *The Journal of Finance*, 36(4), 879-888. doi. 10.1111/j.1540-6261.1981.tb04890.x
Ross, A.S.,(1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, 13(3), 341-360. doi. 10.1016/0022-0531(76)90046-6
Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive evidence of market inefficiency. *Journal of Portfolio Management*,1, 9-17.
Sekmen, T., & Hatipoğlu, M., (2015). Effect of the subprime crisis on return and volatility of the Turkish stock market. *Journal of Economics and Behavioral Studies*, 7(3), 23-29.
Sharpe, W.F., (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425-442. doi. 10.1111/j.1540-6261.1964.tb02865.x
Singhania, M. & Anchalia, J., (2013). Volatility in Asian stock markets and global financial crisis. *Journal of Advances in Management Research*, 10(3), 333-351. doi. 10.1108/JAMR-01-2013-0010
Thao, T.P., & Daly, K., (2012). The impacts of the global financial crisis on Southeast Asian equity markets integration. *International Journal of Trade, Economics and Finance*, 3(4), 299-304. doi. 10.7763/IJTEF.2012.V3.216
Tong, H., Wei, S. J., (2008). Real Effects of The Subprime Mortgage Crisis: Is it a Demand or a Finance Shock?, *NBER Working Paper Series*, No. 14205. doi. 10.3386/w14205
Tong, H., &Wei, S. J., (2009). Real Effects of The 2007-2008 Financial Crisis Around the World, *Working Paper*. doi. 10.2139/ssrn.1363819
Treynor, J. L., (1961). *Market Value, Time, and Risk*. Unpublished Manuscript.
Treynor, J. L., (1962). *Toward a Theory of Market Value of Risky Assets*. Unpublished Manuscript.
Ugurlu, E. & Bayar Y., (2012). Foreign direct investment and international trade in Turkey: Time-series-cross-section methods. *Ekonomik Yaklasim*, 25(91), 69-84, doi: 10.5455/ey.35413
Ugurlu, E. (2009). Real exchange rate and economic growth: Turkey. *Manas Üniversitesi Sosyal Bilimler Dergisi*, 22, 191-212.
Vithessonthi, C., & Tongurai, J., (2015). The effect of firm size on the leverage–performance relationship during the financial crisis of 2007–2009. *Journal of Multinational Financial Management*, 29, 1-29. doi. 10.1016/j.mulfin.2014.11.001
Yalciner, K., & Boztosun, D., (2005). Hisse senedi getirilerini açıklamada firma büyüklüğü, hisse senedi betası ve piyasa değeri/defter değeri oranının etkinliği. *Muhasebe Bilim Dünyası Dergisi,* 7(2), 39-50.