The Effects of Sovereign Ratings Changes on Turkey's Stock Market

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Abstract

This study examined the impacts of upgrades and downgrades by the three big major rating agencies (Standard and Poor's, Moody's and Fitch) on Turkey's stock market. §The Istanbul Stock Exchange National 100 Index (XU100) was used as stock market indicators. The data set covers the period 1995 and 2011 and quarterly data was used. Control variables were growth rate of GDP per capita and real interest rates. The findings show that rating changes significantly affect the XU100 and vice-versa. GDP growth per capita affects XU100 positively and real interest rates negatively.

JEL classification numbers: C32, F41, G15, G24
Keywords: Sovereign rating upgrades and downgrades, national 100 indexes, time series analysis

1   Introduction

Many empirical and theoretical studies have shown that financial markets and real markets are mutually correlated. Liberalization and developments in financial markets have positive effect on economies and development in financial markets, etc. Focusing on the Turkish economy, liberalization in real markets has been started since January 24 decisions; financial markets were greatly liberalized at the beginning of the 1990s. The Istanbul Stock Exchange started to operate in 1986. With continuing liberalization of Turkey's financial market, the Turkish economy began to be rated by Credit Rating Agencies (CRA). In 1992, Turkey received the first sovereign rating from Standard and Poor's, with a rating of BBB.

Given the importance of financial markets, this study examines the effects of sovereign ratings on the Turkey's financial markets. First, the literature is reviewed; then, the empirical part of the study examines the effects of Turkish sovereign ratings from the

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three major rating agencies on the Istanbul Stock Exchange National 100 indexes, with GDP per capita growth rates and real interest rates. The findings show that rating upgrades significantly affect the National 100 Index (XU100) and vice versa. Growth in GDP per capita has significant positive long- and short-term effects on the XU100. Although increases in real interest rates have significant negative effects on XU100 in the short term, real interest rates have negative but non-significant effects on XU100 in the long term.

2 Literature Review

The determinants of sovereign ratings are broadly criticized in the literature. Although credit rating agencies (CRAs) announced their methodologies, many empirical studies employed different econometric methods to examine the effects of national macroeconomic and political conditions on the ratings. The results of the studies show that sovereign ratings reflect economic and political changes within the rated countries, and that CRAs rate countries by considering their political and economic conditions (Cantor et al.1994 and 1996; Ul-Haque et al. 1996; Ferri et al. 1999 and 2001; Hu et al. 2002; Mora, 2006; Gaillard 2006, Ratha et al. 2011, Kabadayi, 2012).

In this study, the literature review mainly focuses on studies that examined the effect of sovereign ratings on financial markets. Brooks et al (2001) analyzed the effects of sovereign ratings on the financial sector, and examined the effects of changes in local and foreign currency ratings on bond and stock returns. They study used S&P, Moody's, Fitch and Thompson ratings for the period January 1973 to July 2001. The results showed that ratings upgrades had no strong effects on financial market, whereas financial markets responded negatively to foreign currency downgrades. In addition, it was reported that financial markets in emerging countries do not react to rating changes. Ammer et al (2004) investigated the effects of rating changes on US asset-backed securities. The study analyzed averaged S&P and Moody's credit ratings. Pooled regression analysis used monthly data sets for the period 1997 to 2003. It was found that ratings downgrades reduced the return of asset-backed securities, whereas upgrades had no effects on pricing. The findings emphasized the asymmetric effects between upgrades and downgrades. Hooper et al (2008) examined the impact of changes in sovereign ratings on international financial markets. Panel data analyses were used for 42 countries, using daily data for the years between 1995 and 2003. The volatility of national stock index returns was used as the dependent variable. Explanatory variables were credit rating changes form the three major rating agencies, returns on the world market index, one-term lagged world index and world risk factor. The findings showed that increases (decrease) in ratings, increased (decreased) returns on national stocks; and that increased ratings reduced the volatility in stock markets. As in the study by Ammer et al. (2004), Hooper et al (2008) highlighted the asymmetrical response, in which downgrades have a stronger effect than upgrades on financial markets. Kaminsky et al (2002) studied relationships between sovereign ratings changes and financial markets also examined international spillover effects. The findings showed that: Rating and outlook changes significantly affect bond and stock markets. Outlook changes are as effective as rating changes. Rating changes in one of the emerging markets has spillover to other emerging markets. During economic crises, changes in ratings and outlook and also have stronger spillover effects on financial markets. Rating upgrades follow economic extensions and rating downgrades follow market recessions.

Mateev (2008) examined how changes in sovereign ratings within one country affect the market returns in other countries. Daily data between 1998 and 2006 were used to examine the spillover effects of rating changes by S&P, Moody's and Fitch in Bulgaria, Latvia, the Czech Republic, Hungary, Poland, Romania, Russia, Slovakia, and Slovenia. Stock returns for each country were calculated in US Dollars. No significant effects were found of rating upgrades on the stock market, whereas downgrades had significant negative effects on returns in both the pre-announcement (10 to 20 days before rating announcement) and announcement periods. International contagion effects were observed, especially during times of economic crisis, when spillover effects are stronger.

May (2010) studied the effects of S&P, Moody's and Fitch's rating changes on bond and stock markets. Daily were obtained from the Trade Reporting and Compliance Engine (TRACE) for the period September 2002 to March 2009, during which there were 652 downgrades and 441 upgrades.   Ratings downgrades and upgrades had significant effects on bond markets, with the effect of downgrades being three times greater than that of upgrades. Stock market analysis showed that rating downgrades had significant negative effects, whereas the effects of upgrades were non-significant. The results of cross-sectional analysis were almost parallel with expounded findings. Creighton et al (2004) examined the effects of rating changes on Australia's bond and equity market. They found that rating changes affected bond and equity markets in the same direction.

Wu et al (2008) checked the effects of S&P sovereign ratings on the daily volatility of the stock and currency markets of Australia, Honk Kong, Japan, Korea, and Singapore between 1997 and 2001. The effects of rating changes were analyzed with different pooled regression analysis. Downgrades and upgrades significantly affected both stock and currency markets. In contrast to the findings of May (2010), Ammer et al. (2004), Mateev (2008) and Hooper et al. (2008), there was no asymmetrical effect of ratings upgrades and downgrades on stock markets. However, there were asymmetric effects between markets, with stock markets showing greater response than currency markets to ratings changes.

Upon here, studies showing positive correlation between sovereign ratings and financial markets all around the world have been discussed. In terms of the Turkish context, Mukatel (2006) analyzed the impacts of sovereign ratings on Turkey's financial markets. The effects of the three major CRA sovereign ratings and outlooks for the Istanbul Stock Exchange National 100 Index were analyzed between 1995 and 2005 via OLS (ordinary least square) models. XU100 was taken as the dependent variable; explanatory variables comprised S&P, Moody's and Fitch's foreign currency outlook, local currency outlook, and sovereign ratings. Significant positive correlations were found between sovereign ratings and the performance of Turkey's financial market. Nisanci et al (2012) examined the effects of Turkish S&P sovereign ratings on foreign currency basis at capital inflows to Turkey, using XU100, external debt ratios, real exchange rates, and real interest rates as control variables. Monthly data from January 2003 to September 2011 and bound testing were used. The study found significant positive effects of sovereign ratings on capital inflows. Kabadayi (2012) highlighted the economic and financial effects of sovereign ratings on economies. A correlation matrix between Turkey's sovereign ratings and the Istanbul Stock Exchange National 100 index was calculated between 1992 and 2010, using quarterly data. The correlation between XU100 and Turkey's S&P sovereign rating was calculated as 0.71; the correlation between Moody's and XU100 was 0.54; and that for Fitch and XU100 was 0.67. Higher correlations were shown between sovereign rating and XU100.

3   Data and Empirical Analysis

Data were obtained from the Turkish Central Bank database and the websites of the rating agencies. Data were analyzed quarterly for the period 1995 to 2011.
In the empirical part of the study, upgrades and downgrades of Turkish long-term foreign currency basis sovereign ratings were represented by dummy variables: S&P downgrades DUMSP1, upgrades DUMSP2; Moody's downgrades DUMMDY1, upgrades DUMMDY2; Fitch downgrades DUMFTC1, upgrades DUMFTC2.

$$\text{DUMSP1}_t = \begin{cases} \text{DUMSP1} = 1; \text{ if there are downgrades} \\ \text{DUMSP1} = 0; \text{ if there are upgrades or no changes} \end{cases} \quad (1)$$

$$\text{DUMSP2}_t = \begin{cases} \text{DUMSP2} = 1; \text{ if there are upgrades} \\ \text{DUMSP2} = 0; \text{ if there are downgrades or no changes} \end{cases} \quad (2)$$

The regression model is described by Equation 3.

$$GUX100_t = \beta_0 + \beta_1 \times REER_t + \beta_2 GWRTPC_t + \beta_3 DUM1_t + \beta_4 DUM2_t + e_t \quad (3)$$

where, t = 1995, …, 2011.

In Equation 3, GUX100 represents growth of the Istanbul Stock Exchange National 100 Index in US dollars; REER represent real interest rates; GRWTPC is growth of GDP per capita; DUM1 and DUM2 are the dummy variables.
The stationary properties of the variables were checked by first-generation unit root tests. Augmented Dickey–Fuller (ADF) and Philips–Peron (PP) unit root tests were used (Dickey et al, 1979 and Philips et al 1988). Estimation results are given in Table 1.

Table 1: Unit Root Tests

	ADF		PP	
	Constant	Constant and Trend	Constant	Constant and Trend
Variables	t statistic			
GXU100	-4,499[A]	-4,517[A]	-3,866[A]	-3,829[B]
REER	-2.721[C]	-2.811	-5.366[A]	-5.543[A]
GRWTPC	-2,543	-2,721	-3,609[A]	-3,585[B]
CV1%	-3.536	-4.107		
CV5%	-2.907	-3.481		
CV10%	-2.591	-3.168		
DGXU100	-6,437[A]	-6,376[A]	-7,506[A]	-7,432[A]
DREER	-7.481[A]	-7.453[A]	-11.293[A]	-11.00[A]
DGRWTPC	-7,840[A]	-7,745[A]	-8,947[A]	-8,926[A]

Notes: D is first difference operator. A, B and C are level of significance at 10, 5 and 1 percent levels of significance. Schwarz info criteria are selected to determine optimal lags.

The estimation of ADF test shows that GXU100 is stationary in level and all variables are stationary in first difference. PP tests result shows that all variables are stationary in level at a minimum significance level of 5 percent.

The stationary properties of the variables were checked by Zivot–Andrews unit root tests that consider structural breaks (Zivot et al., 1992). The estimation results are given in Table 2.

Table 2: Zivot-Andrews Unit Root Tests

	In Level				First Difference		
	Model A	Model B	Model C		Model A	Model B	Model C
GXU100				DGXU100			
Lags	4	4	4	Lags	4	4	4
Year	2003q2	2005q4	2000q4	Year	2000q2	2009q4	2000q2
t stat	-4.847[B]	-4.508[B]	-4.918	t stat	-7.722[A]	-7.439[A]	-8.062[A]
GRWTPC		In Level		DGRWTPC		First Difference	
	Model A	Model B	Model C		Model A	Model B	Model C
Year	2002q1	2005q1	2002q1	Year	2003q4	2002q3	2003q4
t stat	-5.784[A]	-4.135	-5.672[A]	t stat	-9.389[A]	-9.090[A]	-9.373[A]
REER		In Level		DREER		First Difference	
	Model A	Model B	Model C		Model A	Model B	Model C
Year	1999q4	2001q3	1999q4	Year	2002q2	2009q3	2000q2
t stat	-7.627[A]	-6.162[A]	-8.577[A]	t stat	-8.627[A]	-8.365[A]	-8.730[A]

Notes: CV for Model A: CV 1% -5.43, CV 5% -4.80; CV for Model B: CV 1% -4.93, CV 5% -4.42 CV for Model C: CV 1% -5.57, CV 5% -5.08. A and B indicate level of significance at 1% and 5%.

In the Table 2, Model A indicates Zivot–Andrews unit root test with no trend and intercept. Model B includes an intercept but no trend, Model C includes intercept and trend. The results of the unit root tests show that all variables are stationary in level at a significance level of at least 5 percent.

After unit root tests, OLS regression model were regressed between the variables in level. The regression model is described by Equation 3. The estimated results are shown in Table 3.

Table 3: Regression Analysis For Three Big Rating Agencies

Dependent Variable: GXU100

	S&P		Moody's		Fitch	
Variables	Coefficient	t values	Coefficient	t values	Coefficient	t values
Constant	0.125	1.16	0.138	1.070	0.164	1.439
GRWTPC	1.064[A]	3.437	1.194[A]	4.176	0.926[A]	3.351
REER	-0.006	-1.290	-0.008	-1.503	-0.006	-1.396
DUMSP1	-0.266[A]	-3.167				
DUMSP2	0.466[A]	2.636				
DUMMDY1			-0.071	-0.492		
DUMMDY2			0.424[A]	4.485		
DUMFTC1					-0.316[A]	-2.773
DUMFTC2					0.407[A]	2.639
R^2	0.418		0.384		0.437	
A. R^2	0.38		0.344		0.401	
DW	0.783		0.688		0.828	
F stat.	10.983[A]		9.530[A]		11.879[A]	

The findings show that GDP per capita growth rates have a significant positive effect on growth rates of the Istanbul Stock Exchange National 100 index. Real interest rates negatively affect GXU100, but do not show significant t-values. Downgraded S&P sovereign ratings negatively impact the GXU100, and upgrades impact positively. The coefficients of DUMSP1 and DUMSP2 are significant at 1 percent significance. Moody's downgrades affect GXU100 negatively, but the coefficient of DUMMDY1 is statistically non-significant. Moody's upgrades have a significant positive effect on GXU100. Fitch's rating downgrades and upgrades significantly affect the GXU100, and coefficient signs are theoretically expected. All of the models have significant F-statistics at 1 percent significance.

"The only fly in the ointment is that the estimated Durbin–Watson statistics are quite low." (Gujarati, 2003:641). As there is the potential for spurious regression, residuals (e_t) from Equation 3 were tested by ADF, PP and Zivot–Andrews unit root tests; results are shown in Tables 4 and 5.

$$e_t = GXU100_t - \beta_0 - \beta_1 \times REER_t - \beta_2 GWRTPC_t - \beta_3 DUM1_t - \beta_4 DUM2_t \qquad (4)$$

Table 4: Unit Root Tests for Residuals

	ADF		PP	
	intercept	intercept and Trend	intercept	intercept and Trend
Variables	t statistic			
RESID01	-4,297[A]	-4,359[A]	-4,382[A]	-4,443[A]
RESID02	-4,132[A]	-4,218[A]	-4,337[A]	-4,410[A]
RESID03	-4,524[A]	-4,519[A]	-4,606[A]	-4,578[A]

Notes: Critical values for the unit tests with intercept are -3,534 for 1% level of significance (LS), -2.906 for 5%, and -2.591 for 10%. Critical values for the unit tests with intercept and trend are -4.105 for 1%, -3.480 for 5%, and -3.168 for 10%. A represents the level of significance level at 1%.

The results for the ADF and PP tests show that residuals from three regression models are stationary in level at 1 percent level of significance.

Table 5: Zivot-Andrews Unit Root Tests for Residuals

Residuals for S&P Model			
	Model A	Model B	Model C
Lags	4	4	4
Year	2000q4	2002q4	2000q2
t stat	-5.126[B]	-4.599[B]	-5.132[B]
Residuals for Moodys Model			
	Model A	Model B	Model C
Lags	4	4	4
Year	2000q4	1997q2	2000q2
t stat	-4.465	-3.657	-4.844
Residuals for Fitch Model			
	Model A	Model B	Model C
Lags	4	4	4
Year	2000q4	2002q4	2000q2
t stat	-5.095[B]	-4.539[B]	-5.277[B]

The results of the Zivot–Andrews unit root tests show that residuals from three regression models are stationary in level at 5 percent level of significance.

The unit root tests of residuals show that the variables used in Equation 3 are co-integrated. The regression models are meaningful (no spurious regression). Residual-based co-integration tests are known as Engle–Granger and augmented Engle–Granger tests (Gujarati, 2003: 822-823).

The short-run relationships between variables were checked by error correction models (ECM). ECMs were estimated by Engle-Granger methods. ECM is parameterized in Equation 5.

$$\Delta GUX100_t = \alpha_0 + \alpha_1 \times \Delta REER_t + \alpha_2 \Delta GWRTPC_t + \alpha_3 DUM1_t + \alpha_4 DUM2_t + e_{t-1} \ (5)$$

The ECM for the three rating agencies is given in Table 6.

Table 6: Error Correction Model for Three Big Rating Agencies

Dependent Variable: GXU100						
	S&P		Moody's		Fitch	
Variables	Coefficient	t values	Coefficient	t values	Coefficient	t values
Constant	-0,021	-0,539	0,001	0,031	-0,029	-0,696
GRWTPC	1,494[A]	4,339	1,697[A]	4,386	1,546[A]	4,766
REER	-0,005	-1,174	-0,010[C]	-1,929	-0,009[B]	-2,310
EC	*-0,323[A]*	*-2,666*	*-0,376[A]*	*-3,254*	*-0,412[A]*	*-3,601*
DUMSP1	-0,203[B]	-2,017				
DUMSP2	0,285[B]	2,622				
DUMMDY1			-0,011	-0,089		
DUMMDY2			0,095	1,067		
DUMFTC1					-0,057	-0,760
DUMFTC2					0,256[B]	2,022
R^2	0,546		0,502		0,579	
A. R^2	0,507		0,459		0,543	
DW	1,620		1,598		1,742	
F stat.	13,961[A]		11,716[A]		16,003[A]	

ECMs show that GDP per capita growth rates have positive impacts on GXU100 in the short-term, and that coefficients are statistically significant. Real interest rates negatively affect GUX100 in the short term. In contrast to long-term relationships, statistically significant coefficients were obtained for short-term real interest rates . Theoretically expected signs for downgrades and upgrades of ratings were obtained. The coefficients for S&P and Fitch upgrades and S&P downgrades are statistically significant at 5 percent significance. DW statistics are relatively higher than long-run DW.

Error correction (EC) coefficients have negative signs and are statistically significant at 1 percent level. Possible shocks or bias from equilibrium will tend to equilibrium for the S&P model at 32 percent in one term (quarterly). For Moody's, it will tend to equilibrium at 38 percent in a term, and for Fitch 41%.

5   Conclusion

Time series analysis showed that sovereign rating upgrades and downgrades have significant impacts on Turkey's stock market. Stock markets respond negatively to downgrades of sovereign ratings and react positively to upgrades. In addition, the effects of real interest rates and GDP per capita were analyzed on stock markets via sovereign ratings. GDP per capita has significant positive effects on Turkey's stock markets. In the long term, real interest rates negatively affect the stock market, but coefficients for real interest rates were non-significant. In the short term, real interest rates have significant negative effects on stock markets.

The literature review and the results of the present study show that changes in sovereign ratings have significant effects on financial markets. CRAs evaluate national political and

economic conditions to export sovereign ratings, and sovereign ratings are positively correlated with the political and economic conditions of a country; that is to say, there is bilateral causality between the sovereign ratings and economic conditions of a country. An evaluation of economic policy to improve national credit ratings will put the economy into a cycle of fruitful. Positive political and economic conditions will increase sovereign ratings, which will have positive effects on financial markets.

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