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## TRADING VOLUME TREND AS THE INVESTOR'S SENTIMENT INDICATOR IN ISTANBUL STOCK EXCHANGE

### *İSTANBUL MENKUL KIYMETLER BORSASINDA YATIRIMCI DUYARLILIĞI GÖSTERGESİ OLARAK İŞLEM HACMİ TRENDİ*

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**ABSTRACT:** This study relates the changes of trading volume to investor sentiment, and investigates its ability in predicting stock returns. Investor sentiment is the enthusiasm of irrational investors on an asset, relative to that of rational investors. Having investigated the effects of Investor Sentiment on Stock Prices, Baker and Stein argued that an increase in trading volume reflects a rise in investor sentiment, which can be defined as the change in trading volume per unit of time; called the trading volume trend, it can be used as a measure of investor sentiment on individual stocks. This work aims to find out the volume trend characteristics of all listed equities in the Istanbul Stock Exchange. Results suggest that almost all beta coefficients of volume trend values have positive signs, which reflects the positive contribution of volume changes on the corresponding stock returns.

**Keywords:** Investor Sentiment; Volume Trend; Behavioral Finance

**JEL Classification:** G12

**ÖZET:** Bu çalışmada işlem hacmi değişimlerinin ilgili hisse senedinin fiyatına etkileri ve hisse senedinin getirisini tahmin etmedeki etkinliği incelenmektedir. Yatırımcı duyarlılığı belirli bir finansal varlığa rasyonel olmayan yatırımcılar tarafından gösterilen ilginin rasyonel yatırımcılar tarafından rasyonel yatırımcı tarafından gösterilen ilgiliye oranıdır. Baker ve Stein'in de çalışmalarında belirttiği gibi bir hisse senedi üzerinde yatırımcı duyarlılığının etkinliğini gösteren, birim zamandaki işlem hacmi değişimini gösteren ve işlem hacmi trendi olarak tanımlanan bu değişimdeki artışlar aynı zamanda yatırımcı duyarlılığının artışını temsil etmektedir. Bu çalışmada IMKB'deki tüm hisse senetlerinin işlem hacmi trendi karakteristiklerinin gözlemlenmesi hedeflenmektedir. Sonuçta işlem hacmi trendine ilişkin neredeyse tüm beta katsayıları pozitif bulunmuştur. Bu işlem hacmi trendi ile hisse senedi getirilerindeki doğrusal ilişkiyi yansıtmaktadır.

**Anahtar Kelimeler:** Yatırımcı duyarlılığı; Hacim Trendi; Davranışsal Finans

### 1. Introduction

Trading volume provides information on security prices' move over time. For example, Brennan, Chordia, and Subrahmanyam (1998), and Chordia, Subrahmanyam, and Anshuman (2001) focuss in their work on the trading volume and liquidity relationship. According to their findings stocks with high volumes have higher expected returns as a consequence of liquidity. As an alternative approach, Lee and Swaminathan (2000) say that trading volume has no information on liquidity; they argue that the momentum of profits is due to the past level of trading volume. Moreover, they have found that high volume winners (just like low volume

losers) are likely to have faster price reversals in the long term, which should not be interpreted as the effect of liquidity.

In this paper, an alternative approach for trading volume and stock returns is used. This work mainly focuses on the cross section of the explanatory effect of volume trend. However, previous works mostly omit the cross section analysis of volume trend betas.

Investigated by Baker and Stein (2004) argues that market liquidity that is measured by trading volume could be an indicator of investor sentiment; however it is also used as a liquidity indicator. In the model of Baker and Stein (2004), there are two types of investors: rational investors and overconfident investors. Both types of investors have positive weights on the pricing function of the underlying security but the overconfident investors exceed their own information. They trade more as the returns and their beliefs are in line, and gain a greater weight on the pricing function. Overconfident investors' transactions drive security prices up and lower the price impact of trades. Higher prices lead to lower expected returns. Likewise, lower prices attract more trading volume. Because of short-sales constraints on the market, the rational investors cannot counteract the overconfident investors. So the investor sentiment becomes very high, the overconfident investors dominate the market, which is characterized with high liquidity and high trading volume. Therefore increase in trading volume reflects the participation of overconfident investors in the market, and indicates an increase in investor sentiment.

## 2. Literature Review

There are numerous works such as Zweig (1973), Lee, Shleifer, Thaler (1991), Baker and Stein (2004), and Brown and Cliff (2005) that model the market as participation of two counterparties, which mostly agree on the fact that, when investor sentiment becomes high, investor heterogeneity increases as well. On the other hand, the volume literature suggests that investor heterogeneity contributes to trading volume (e.g., Karpoff (1986) and Harris and Raviv (1993)). It is widely recognized in the literature that measuring liquidity directly is difficult if not impossible (e.g., Kyle (1985), Amihud (2002) and Pastor and Stambaugh (2003)). There are numerous definitions to liquidity, such as "immediacy of exchange" (Demsetz, 1968) or the service that "makes quick exchange possible" (Smidt, 1968).

Just like liquidity, sentiment is also a very elusive concept that depends on trading volume. This makes it hard to distinguish the effect of liquidity and sentiment in the price movement of a stock. According to Smidt (1968), sentiment leads to speculative bubbles. For Zweig (1973), it comes from investors' biased expectations on asset values. And for Black (1986), it is the noise in financial markets. Generally, investor sentiment refers to investors' propensity to speculate or investors' optimism/pessimism about stocks (Baker and Stein (2004)). Lee, Shleifer and Thaler (1991) define investor sentiment as the component of investors' expectations about asset returns that are not justified by fundamentals. Baker and Stein (2004) define investor sentiment as investors' misvaluation on an asset.

All in all investor sentiment is the difference between the actual and theoretical price of a security. Two groups of investors exist in a market, where one holds rational

expectations on an asset's value and the other makes biased valuations. In this case, it is equivalent to saying that investor sentiment reflects the valuation difference between the two groups of investors (Zweig (1973), Lee, Shleifer and Thaler (1991), Baker and Stein (2004), and Brown and Cliff (2005)).

Miller (1977) argues that stock prices reflect only the most optimistic opinions among investors when short-sales constraints are present. When investors become more optimistic, i.e., when investor sentiment becomes high, stock prices rise. This means that there should be a positive relation between investor sentiment and stock returns. Baker and Stein (2004) and Brown and Cliff (2005) assume that there are two such types of investors and find that expected stock returns will diminish if the beginning investor sentiment is high.

De Long, Shleifer, Summers, and Waldman (1990) model two types of investors on the market: Rational and irrational (noise) investors. Irrational investors, are subject to the influence of sentiment. But the rational investors are not to trades of irrational investors create extra risk or volatility that the rational investors are likely to escape from. Since different stocks are subject to different extents of noise trader risk, investor sentiment affects stocks differently in the cross section. Lee, Shleifer and Thaler (1991) investigate this prediction by examining the relation between closed-end fund discounts and small firm returns, both arguably reflecting the sentiment of individual investors. Baker and Stein (2004) also argue that investor sentiment affects asset prices in the cross section.

On the empirical side, Lee, Shleifer and Thaler (1991) find a significant relation between closed-end fund discounts and small firm returns, confirming the prediction of De Long, Shleifer, Summers and Waldman (1990). Neal and Wheatley (1998) also find that closed-end fund discounts predict the size premium. However, Swaminathan (1996) documents that the information contained in closed-end fund discounts is related to expectations on future earnings growth and inflation, which suggests that investor sentiment may not be the sole reason explaining the relation between closed-end fund discounts and small firm returns. Brown and Cliff (2005) find that investor sentiment does not predict short-term market returns at weekly and monthly intervals but that investor sentiment predicts long-term market returns at the next two to three years. They attribute these findings to limited arbitrage in the long-run but not in the short term.

Nevertheless, Brown and Cliff (2005) use the Kalman filter and the principal components analysis to construct their composite sentiment measures based on survey data, IPO activities and other technical indicators. They examine the relations between the composite sentiment measures and market returns by VAR systems. Whether their composite sentiment measures capture the underlying but unobservable investor sentiment is arguable, however. Unless investor sentiment drives the sentiment proxies at the same time or with the same time lag, their composite sentiment measures may end up noisier than a single sentiment proxy.

Nevertheless, researchers also use the level of trading volume as a liquidity measure. First, extant models suggest that trading volume can be one aspect of liquidity (e.g., Stoll (1978) and Amihud and Mendelson (1986)). Second, trading volume has negative relations with transaction costs, another aspect of liquidity (e.g., Chordia,

Roll, and Subrahmanyam (2000)). To differentiate the information contained in trading volume as either liquidity-related or sentiment-related, the trend on the trading volume series of a stock is used as the sentiment measure on that stock. It is called the trading volume trend. The trading volume trend by definition is the average change on trading volume per unit of time. It reflects the average propensity of investors to trade. It is a better sentiment measure than the level of trading volume for the following reasons: First, it reflects the movement of overconfident investors on the market in the framework of Baker and Stein (2004). Second, the sentiment literature suggests that the formation of investor sentiment is likely through a process over time (e.g., Smidt ((1968) and Brown and Cliff (2005)). The trading volume trend can summarize the process rather than being a snap- shot on the process. Third, stocks in the cross section can have the same level of trading volume but very different trading volume trends over a period of time. The trading volume trend thus mitigates the problem of mixing investor sentiment information with liquidity information. In the next chapter the construction of the trading volume trend for individual stocks is explained.

### 3. Data and Methodology

The framework of Chordia, Subrahmanyam and Anshuman (2001) is being adopted in this paper for examining the cross-sectional relation between the trading volume trend and expected stock returns. Some removals and additions are made from the principal model of Chordia, Subrahmanyam and Anshuman (2001).

The sample in this work includes 317 common stocks listed on the Istanbul Stock Exchange (ISE) from January 2005 to December 2009. Including numerous downward and upward trends, this period is appropriate for representing the effects of sentiment on stock returns.

Weekly closing price data are obtained from FINNET database on ISE for time series analysis and end of year fundamental analysis data is obtained from ISE website for cross sectional analysis.

**RETURN**  $R_t$ : the raw return of a stock in week  $t$ .

**AR(1)**  $R_{t-1}$ : return of the last week, as a control variable for autocorrelation.

**D\_DOLLAR**  $\$t$ : the raw return of USD in week  $t$ .

**D\_INDEX**  $M_t$ : the raw return of ISE-100 index in week  $t$ .

**D\_VOLUME**  $DV_t$ : the natural logarithm of the weekly volume in Turkish Lira divided by the volume of previous week.

**VOLUME**  $V_t$ : total amount of shares traded within the week  $t$  in Turkish Lira

**VOL\_STD**  $\sigma^V_t$ : standard deviation of the weekly volumes of a stock annually.

**TURNOVER**  $T_t$ : the natural logarithm of share turnover of a stock in week  $t$ . Turnover in week  $t$  is defined as the share trading volume of a stock in month  $t$  divided by the number of shares outstanding for the stock at the end of month  $t$ .

**TURN\_STD**  $\sigma^T_t$ : the natural logarithm of the coefficient of variation of turnover for a stock over the period from week  $t-52$  to week  $t-2$ . If any of the turnover of a

stock in week  $t-52$  to week  $t-2$  is missing, TURN\_STD is redefined over the remaining observations.

**RET\_STD**  $\sigma_t^R$  : the natural logarithm of the standard deviation of daily returns for a stock in the last month.

**ZERO**  $Z_t$  : The proportion of zero returns as defined by Lesmond, Ogden and Trzcinka (1999), the number of days where no price changes occurred divided by the total number of days in sample range.

**ROLL**  $RL_t$  : The Roll spread as defined by Roll(1984) within the period of last 52 weeks.

Our main interest is the coefficient of D\_VOLUME which represents the effect of investor sentiment on the return of stock. All independent variables except D\_VOLUME are controlling variables, which are related with investor sentiment in previous works. After controlling for various effects of potential factors on investor sentiment, we investigate whether D\_VOLUME is still remain as a significant factor on investor sentiment. The bigger the value of the coefficient of D\_VOLUME the more the stock price is being effected by investor sentiment.. If there is any significant effect of D\_VOLUME, in spite of the existence of the above mentioned indicators, then we could argue that there is independent information content of D\_VOLUME.

Moreover, the coefficients of D\_VOLUME among different stocks may vary according to different properties of stocks. In the second stage, these differences are going to be examined. For example, effects of the fundamental indicators such as liability ratios or size of the company etc. are likely to affect the sentiment effect on stocks.

#### 4. Results

The results of the regression model below is presented in Table 1. First, the insignificant coefficients are suppressed to zero, in order to exclude unnecessary data. So the number of observations are different in Table.1 for each variable. The variables with few observations contain more insignificant observations and vice versa.

$$R_t = \beta_0 + \beta_1 R_{t-1} + \beta_2 S_t + \beta_3 M_t + \beta_4 DV_t + \beta_5 V_t + \beta_6 \sigma_t^V + \beta_7 T_t + \beta_8 \sigma_t^T + \beta_9 \sigma_t^R + \beta_{10} Z_t + \beta_{11} RL_t$$

Obviously, the most effective variable is D\_INDEX, which represents the market return. 287 of 317 observations are significant for market return as expected. Mean of the coefficient of D\_INDEX is 0.5071 which proves the positive relation between market and individual stocks. The second variable with most significant observations is D\_VOLUME which represents Investor Sentiment in the model. About 80% of observations are significant for D\_VOLUME, with a mean of 0.0391. 245 observations have positive coefficients and only 2 observations are negative. 70 observations are insignificant. Volume and Turnover have 130 and 92 significant observations respectively, which represent liquidity in the model. Less than one third of the observations represent autoregressive pattern in weekly returns.

Level of volume is also an important variable for explaining the variance of stock returns. The next most effective variable is the change in USD exchange rate.

**Table 1. Descriptive Statistics of Beta Coefficients**

	N	Minimum	Maximum	Mean	Std. Deviation
C	49	-0.32	0.92	-0.0187	0.17331
D DOLLAR	111	-1.09	0.95	-0.5140	0.25350
D INDEX	287	0.18	1.11	0.5071	0.15985
D VOLUME	247	-0.05	0.99	0.0391	0.10217
VOLUME	130	-0.08	0.40	0.0079	0.03877
TURNOVER	92	-13.16	30.04	0.6670	4.52559
TURN STD	43	-7.48	17.27	2.1954	4.62524
VOL STD	76	0.00	0.00	0.0000	0.00000
RET STD	52	-6.61	2.83	0.2967	1.71602
ZERO	30	-0.19	0.16	0.0551	0.09144
ROLL	57	-1.31	1.03	0.0146	0.33767
AR	99	-0.77	0.18	-0.2483	0.10867
Total No of Obs.	317				

Investor sentiment is said to be affected by firm size. Firms with big market capitalization tend to be less vulnerable to investor sentiment. In order to test this property of investor sentiment, the biggest 30 firms' volume trend will be compared with the rest of the companies. As stated before, volume trend (D\_VOLUME) is the natural logarithm of the weekly volume in Turkish Lira divided by the volume of previous week. Results are given in the table below.

**Table 2. Independent Sample T-test for XU030 and XU100 Members**

		N	Mean	Std. Deviation	T-Stat
D_VOLUME	REST	287	0.0335	0.09568	0.000
	XU030	30	0.0015	0.01365	
D_VOLUME	REST	217	0.0342	0.08795	0.281
	XU100	100	0.0222	0.09914	

Mean Volume Trend coefficient for XU030 member stocks is 0.15%. However, the rest of the stocks have a mean value of 3.35%, which supports the previous observations on the effect of firm size on investor sentiment. Members of XU030, in other words firms with high market capitalization are seemingly less vulnerable to investor sentiment. The corresponding coefficient 0.15% is very close to zero, when compared to the rest of the stocks. However the difference is not significant for XU100, which is the index of the biggest 100 stocks in Istanbul Stock Exchange. The average market capitalization of XU100 is less than XU030 companies. Because market capitalization values of the first 30 companies are higher than the following 70 companies in XU100 by definition and the significance of the investor sentiment coefficient drops accordingly. The difference between standard deviations of XU030 and XU100 member stocks is also noticeable. Standard deviation for XU030 stocks was 1.37%, however the standard deviation for XU100 stocks increases up to 9.91%. This means the similarity of investor sentiment coefficient within the group lessens.

Another way of stock grouping is classification by means of the sectors. In this classification the ISE stocks can be grouped into 4 main sets, which are Industrial, Services, Finances and Technology. The basic descriptive statistics for these groups are given in Table 3 below.

**Table 3. Descriptive Statistics of D Volume Coefficients According to Sectors**

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
Industry	140	0.0269	0.08282	0.00700	0.0130	0.0407	0.00	0.99
Services	35	0.0382	0.11539	0.01950	-0.0014	0.0779	0.00	0.69
Finances	63	0.0109	0.01532	0.00193	0.0071	0.0148	-0.05	0.05
Technology	11	0.0204	0.01241	0.00374	0.0121	0.0287	0.00	0.04
Total	249	0.0241	0.07624	0.00483	0.0146	0.0337	-0.05	0.99

More than half of the stocks belong to Industry group, and the second biggest group is Finances, which consists of about one quarter of all observations. Stocks belonging to Finances have a mean of 1.09%, whereas rest of the stocks have means over 2%, in which Services' mean value is approximately 4%. So Finances group seems to differ from other groups. In order to check this hypothesis analysis of variance is made for four groups. As seen in Table 4, the difference among sectors are not significant, so the hypothesis that all groups are of the same distribution cannot be rejected.

**Table 4. ANOVA for D Volume Coefficients According to Sectors**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.019	3	0.006	1.100	0.350
Within Groups	1.422	245	0.006		
Total	1.441	248			

In order to look further for the multiple comparisons among each group, LSD post-hoc test is used. The findings are as follows;

**Table 5. Post-Hoc for D Volume Coefficients According to Sectors**

(I) SECTOR	(J) SECTOR	Mean Diff.(I-J)	Std. Error	Sig.	95% CI	
					Lower	Upper
INDUSTRY	SERVICES	-0.01135	0.01440	0.43122	-0.03971	0.01701
	FINANCES	0.01596	0.01156	0.16872	-0.00681	0.03872
	TECHNOLOGY	0.00648	0.02386	0.78616	-0.04051	0.05347
SERVICES	INDUSTRY	0.01135	0.01440	0.43122	-0.01701	0.03971
	FINANCES	0.02731	0.01606	0.09038	-0.00433	0.05895
	TECHNOLOGY	0.01783	0.02634	0.49899	-0.03404	0.06971
FINANCES	INDUSTRY	-0.01596	0.01156	0.16872	-0.03872	0.00681
	SERVICES	-0.02731	0.01606	0.09038	-0.05895	0.00433
	TECHNOLOGY	-0.00948	0.02490	0.70382	-0.05852	0.03956
TECHNOLOGY	INDUSTRY	-0.00648	0.02386	0.78616	-0.05347	0.04051
	SERVICES	-0.01783	0.02634	0.49899	-0.06971	0.03404
	FINANCES	0.00948	0.02490	0.70382	-0.03956	0.05852

In spite of not rejecting the null hypothesis, the difference between Services and Finances are almost significant with %9.04. Yet the degree of significance is not lower than the %5 threshold. So the individual differences in Table 5 are also not significantly different from each other, supporting the findings of ANOVA in Table 4.

In addition to the above categories, stocks are also divided into subgroups in each sector. First Industry sector is divided into seven subsectors; Food-Beverage (XGIDA), Textile-Leather (XTEKS), Paper-Wood (XKAGT), Chemistry (XKMYA), Cement (XTAST), Metal (XMANA) and Machinery (XMESY). Descriptive statistics of all subsectors are given below;

**Table 6. Descriptive Statistics of D\_Volume Coefficients According to Subsectors of Industry**

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
<b>XGIDA</b>	19	0.0275	0.01498	0.00344	0.0203	0.0347	0.00	0.05
<b>XTEKS</b>	16	0.0274	0.01650	0.00413	0.0187	0.0362	0.01	0.08
<b>XKAGT</b>	16	0.0267	0.01007	0.00252	0.0214	0.0321	0.01	0.05
<b>XKMYA</b>	20	0.0153	0.01174	0.00263	0.0098	0.0208	0.00	0.05
<b>XTAST</b>	26	0.0113	0.01083	0.00212	0.0069	0.0156	0.00	0.03
<b>XMANA</b>	15	0.0198	0.01011	0.00261	0.0142	0.0254	0.00	0.03
<b>XMESY</b>	24	0.0162	0.01422	0.00290	0.0102	0.0223	0.00	0.04
Total	136	0.0197	0.01407	0.00121	0.0173	0.0220	0.00	0.08

All subgroups of Industry Sectors are almost equally distributed by means of number of observations. The smallest number of observation is 15 (XMANA), and the biggest is 26 (XTAST). On the other hand, the beta coefficients are between 1-2% for XKMYA, XTAST, XMESY and XMANA; and between 2-3% for XGIDA, XTEKS and XKAGT. Analysis of variance among subsectors are as follows;

**Table 7. ANOVA for D\_Volume Coefficients According to Subsectors of Industry**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.005	6	0.001	5.489	0.000
Within Groups	0.021	129	0.000		
Total	0.027	135			

The null hypothesis can be rejected, so there is significant difference among subsectors. XGIDA, XTEKS and XKAGT can be grouped together according to their volume trend averages, where on the other hand XKMYA, XTAST, XMANA and XMESY can be grouped together, too.

Stocks belonging to services category are also divided into subgroups in each sector. Services sector is divided into four subsectors; Electricity(XELKT), Tourism(XTRZM), Trade(XTCRT) and Sport(XSPOR). Descriptive statistics of all subsectors are given below;

**Table 8. Descriptive Statistics of D\_Volume Coefficients According to Subsectors of Services**

	N	Mean	Std. Dev.	Std. Er.	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
<b>XELKT</b>	4	0.0239	0.0179	0.0090	-0.0047	0.0525	0	0.041865
<b>XTRZM</b>	5	0.0386	0.0220	0.0098	0.0114	0.0659	0.015056	0.069541
<b>XTCRT</b>	12	0.0119	0.0120	0.0035	0.0043	0.0195	0	0.033452
<b>XSPOR</b>	4	0.0296	0.0051	0.0026	0.0215	0.0378	0.022504	0.034635
Total	25	0.0220	0.0176	0.0035	0.0148	0.0293	0	0.069541

All subgroups of Services Sector except XTCRT are almost equally distributed by means of number of observations. XTCRT has 12 observation, where the rest of the groups have observations around 4. Moreover, XTRZM has a quite high average beta coefficient of 3.86%. Rest of the subsectors has beta values lower than 3%. As seen in Table 9, the difference among subsectors of services sector are significant at



5% significance level, so the hypothesis that all groups are of the same distribution can be rejected at that significance level.

**Table 9. ANOVA for D\_Volume Coefficients According to Subsectors of Services**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.003	3	0.001	4.385	0.015
Within Groups	0.005	21	0.000		
Total	0.007	24			

According to the post-hoc table there are significant differences between XTCRT against XTRZM and XSPOR (probabilities are 0.3% and 5.00% accordingly).

Finances sector is divided into six subsectors; Banks (XBANK), Insurance (XSGRT), Leasing (XFINK), Holdings (XHOLD), Investment Trusts(XYORT) and Real Estate Investment Trusts (XGMYO). Descriptive statistics of all subsectors are given below;

**Table 10. Descriptive Statistics of D\_Volume Coefficients According to Subsectors of Finances**

	N	Mean	Std. Dev.	Std. Er.	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
<b>XBANK</b>	17	0.0053	0.0172	0.0042	-0.003	0.0141	-0.0486	0.02535
<b>XSGRT</b>	7	0.0116	0.0120	0.0045	0.0005	0.0227	0	0.030239
<b>XFINK</b>	7	0.0189	0.0093	0.0035	0.0103	0.0275	0	0.028293
<b>XHOLD</b>	18	0.0096	0.0140	0.0033	0.0026	0.0165	-0.0155	0.038388
<b>XYORT</b>	32	0.0255	0.0183	0.0032	0.0190	0.0321	0	0.081138
<b>XGMYO</b>	13	0.0152	0.0179	0.0050	0.0044	0.0260	0	0.0523
Total	94	0.0159	0.0178	0.0018	0.0122	0.0195	-0.0486	0.081138

XYORT has the biggest number of observations with 32 observation, and in the second and third places there are XHOLD and XBANK with 18 and 17 observations. By means of volume trend beta XYORT has the highest coefficient with 3.86% and the second is XFINK with 1.89%. Moreover XBANK and XHOLD has the lowest D\_VOLUME coefficients such as 0.53% and 0.96%. As seen in Table 11, the differences among subsectors of services sector are significant at even at 1% significance level, so the hypothesis that all groups are of the same distribution can be rejected.

**Table 11. ANOVA for D\_Volume Coefficients According to Subsectors of Services**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.006	5	0.001	4.325	0.001
Within Groups	0.024	88	0.000		
Total	0.029	93			

According to the post-hoc table there are significant differences between XYORT against XBANK, XSGRT and XHOLD (probabilities are 0.00%, 4.50% and 0.01% accordingly).

All in all, volume trend is an effective determinant of stock returns. 247 out of 317 stocks have significant coefficients for volume trend. Stocks of companies enlisted in XU030 Index are less subject to the effect of volume trend than rest of the stocks.

Prices of stocks with higher volume trend coefficients are more dependent on changes in volume patterns. Services industry has the highest coefficients of volume trend, which is related with the relatively lower levels of market capitalization, free floating percentage and trading volumes.

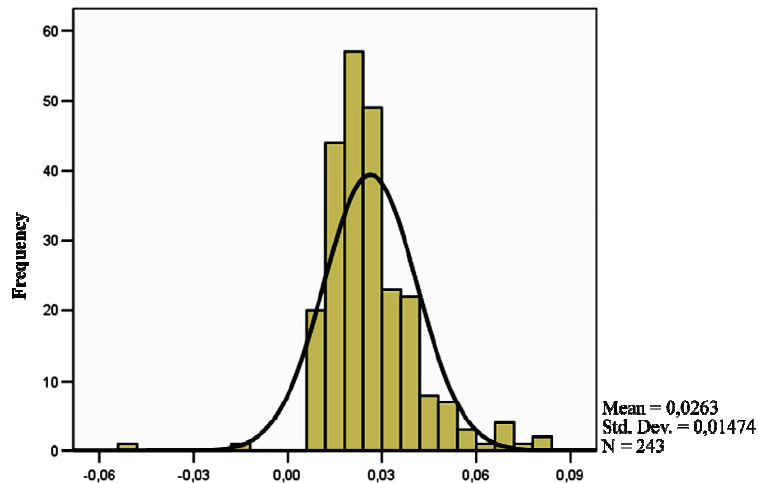


Figure.1 Histogram of volume trend betas

Figure.1 shows the histogram of volume trend betas. Majority of volume trend betas fall within 2 to 3% interval. Almost all of the observations have positive coefficients, which reflects the positive contribution of volume changes on stock returns. The distribution has a positive skewness (0,616) and kurtosis(4.576).

Table 11. Overall Descriptive Statistics of D\_Volume Trend Betas

		Statistic	Std. Error	
D_VOLUME	Mean	0.0263	0.00095	
	95% Confidence Interval for Mean	Lower Bound	0.0244	
		Upper Bound	0.0281	
	5% Trimmed Mean	0.0254		
	Median	0.0238		
	Variance	0.000		
	Std. Deviation	0.01474		
	Minimum	-0.05		
	Maximum	0.08		
	Range	0.13		
	Interquartile Range	0.02		
	Skewness	0.616	0.156	
	Kurtosis	4.576	0.311	

### 5. Conclusion

Sensitivity of investor sentiment by means of volume trend depends on the firm size, financial distress and firm age. In this work, the effect of sector membership is examined for the effects on volume trend. First of all, the biggest 30 companies listed on ISE according to market capitalization is tested for any difference from other firms. The results show that ISE-30 companies are less vulnerable to volume trend than the rest of the companies in the ISE. However the same result doesn't

hold for the biggest 100 companies, the so-called ISE-100 companies. In the second stage of the work, stocks are evaluated according to their sector memberships. There exists no evidence for a difference among groups such as industry, services, finances and technology. Next, analysis is deepened via searching differences among subsectors. In industry, services and finances sectors, significant differences are found.

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