

**MEF UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES**

**EXCHANGE RATE EXPOSURE: EVIDENCE FROM
TURKEY**

M.A. THESIS

Tolga Canbazođlu

Department of Economics

Economics and Finance M.A. Programme

İSTANBUL, 2020

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Tolga Canbazoglu, a M.A. student of MEF Graduate School of Social Sciences student ID 321806017 successfully defended the thesis entitled “EXCHANGE RATE EXPOSURE: EVIDENCE FROM TURKEY”, which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

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FOREWORD

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Tolga CANBAZOĐLU

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ABBREVIATIONS

| | |
|----------------|---|
| US: | United States |
| BIST: | Borsa Istanbul |
| CBRT: | Central Bank of the Republic of Turkey |
| REIC: | Real Estate Investment Company |
| EBITDA: | Earnings before interest, taxes, depreciation, and amortization |
| OPEX: | Operating Expenses |
| CR: | Cash Ratio |
| LR: | Leverage Ratio |
| FAT: | Fixed Assets Turnover |

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EXCHANGE RATE EXPOSURE: EVIDENCE FROM TURKEY

ABSTRACT

This thesis study aims to measure effects of the fluctuation in the exchange rate on companies' stock returns based on financial statements of 330 firms that were traded on Borsa Istanbul between 2010 and 2019. In this study, exchange rate exposure was analyzed by dividing the firms into sectors based on the methodology of Adler and Dumas (1984) According to the baseline model, the coefficient of exchange rate appears as significant in 8 of 26 sectors for the extended model the coefficients are significant in 6 of 26 sectors. I further categorize firms based on favorable and unfavorable levels of liquidity, financial, profitability and turnover ratios, and measure exchange rate exposure across the two group of firms. The results of the ratio analysis are mixed. Firms with favorable levels of inventory to total asset, leverage, interest expense to sales, and foreign assets to total debt ratio and unfavorable levels of cash, liquidity, receivable turnover ratio are exposed to exchange rate movements. Moreover, firms with different export levels are not affected differently by exchange rate variations.

Key Words: exchange rate, exchange rate exposure, exchange rate fluctuation

DÖVİZ KURU RİSKİ: TÜRKİYE ÖRNEĞİ

ÖZET

Bu tez çalışması, 2010-2019 yılları arasında Borsa İstanbul'da işlem gören 330 firmanın finansal tablolarına dayanarak kurdaki dalgalanmanın şirketlerin hisse senedi getirileri üzerindeki etkilerini ölçmeyi amaçlamaktadır. Bu çalışmada, döviz kuru riski Adler ve Dumas (1984) yöntemine göre firmaların sektörlere bölünmesiyle analiz edilmiştir. Baz modele göre, döviz kuru katsayısı, 26 sektörden 8'inde anlamlı görülmektedir, genişletilmiş model için 26 sektörden 6'sında katsayı anlamlıdır. Ayrıca çalışmada şirketleri, tercih edilebilir ve edilmez likidite, finansal, karlılık ve ciro oranlarına göre kategorilere ayırarak bu iki gruptaki döviz kuru riski ölçülmektedir. Rasyo analizlerinin sonuçları olumlu ve olumsuz seviyede rasyo oranlarına sahip şirketler için döviz kuru riski aynı şekilde tutarlı olarak rapor etmemektedir. Stokların toplam varlıklara oranı, kaldıraç, faiz giderlerinin satışa ve yabancı varlıkların toplam borçlara oranı tercih edilen seviyede olan şirketler ve nakit, likidite, alacak devir hızı tercih edilmeyen seviyede olan firmalar kur hareketlerine maruz kalmaktadır. Ayrıca, farklı ihracat seviyelerine sahip firmalar kur değişimlerinden farklı şekilde etkilenmemektedir.

Anahtar Kelimeler: döviz kuru, döviz kuru riski, döviz kuru dalgalanması

1. INTRODUCTION

Exchange rates are known as the most important indicator affecting economic activities in the world markets. Foreign exchange rates exposure has been a major concern for companies participating in international trade since the implementation of the flexible exchange rate system. Non-stability and uncontrolled changes in the exchange rate have an impact on the general economy through its effects on the prices, interest rates, demand for goods and services, and changes in investments. Therefore, these changes eventually affect companies performance.

Turkey has suffered high inflation and depreciations over the last decades. There was also a series of currency crises during this period. For example, during 2018, the Turkish Lira suffered a huge devaluation, on a yearly basis losing more than 41% of its value against the US dollar. This case affected many firms negatively and cause them shrinkages. Understanding the extent to which firms and at what level are affected by changes in the exchange rate is an important issue. The impact of exchange rates on firms' stock returns has been defined in the macro-finance literature as exchange rate exposure. This study aims to measure effects of the fluctuation in the exchange rate on companies' stock returns, so called exchange rate exposure, based on financial statements of 330 firms that were traded on Borsa Istanbul between 2010 and 2019

International trade is the backbone of firms to produce, commercialise, and grow in modern economy. Due to the globalization of the business environment in the last decade, very few firms today can be completely classified as domestic firms. Exposure to exchange rates is a risk that an increasing number of exporting and importing firms face. Exchange rates could affect the company's value through different channels. An export--oriented company may benefit from a local currency depreciation, thorough competitiveness channel, as its product becomes more affordable to foreign customers. A firm that uses imported materials in its production may suffer from a local currency depreciation because of increased production costs. Consequently, its profits and therefore its firm value decreases. The movements in the exchange rates may also change the structure of the balance sheet and financial position of firms by changing firms' cash flows through different channels. In the second step, I analyse

how firms with different financial ratios and export levels are affected by exchange rate fluctuations.

My results based on sectoral data show that, according to the baseline model, the coefficient of exchange rate appears as significant in 8 of 26 sectors, while for the extended model the coefficients are significant in 6 of 26 sectors. The results of the ratio analysis are mixed. Firms with favorable levels of inventory to total asset, leverage, interest expense to sales, and foreign assets to total debt ratio and unfavorable levels of cash, liquidity, receivable turnover ratio exhibit positive and significant levels of exchange rate exposure. This indicates that these firms are exposed to exchange rate movements. In terms of foreign involvement, there is no significant coefficient for exchange rate has been reported indicating that the firms with different export levels are not affected differently by exchange rate variations.

This thesis has been organized as follows. The next section summarizes the literature on this topic. The third section describes the data. The fourth section explains the methodology and presents the results, the fifth section concludes.

2. LITERATURE SURVEY

Exchange rate exposure research has grown significantly since US adopted a freely floating exchange rate system in the early 1970s (Adler and Dumas, 1984). Since then, there has been many studies conducted in both developing and developed countries which stress exchange rate exposure and the factors affecting its magnitude and significance. These studies are conducted using both industry or firm-level data including different firm-level measures such as multinational status, foreign sales, export ratio which are important factors affecting the level of exposure.

Dumas (1978), Adler and Dumas (1980, 1984), and Hodder (1982) are pioneer studies investigating exchange rate exposure. In the context of these studies exposure to exchange-rate movement is the regression coefficient of the real value of the firm on the exchange rate assuming multivariate normality between the value of the firm and the exchange rate.

Jorion (1990) extends the previous studies by including an additional independent variable market return and based on a sample of multinational firms reports that when the company's export sales increase, exchange rate exposure is higher. On the other hand, Jorion (1991), by conducting a sectoral analysis document significant cross-sectional differences in the exchange rate exposure across U.S. industries. Choi and Prasad (1995) examine 409 multinationals' exchange rate sensitivity during the period 1978-1989. According to their results fluctuations in the exchange rate have an impact on firm values. More than half of the firms exhibit statistically significant coefficients for the exchange rate stressing a positive impact of dollar depreciation on firm returns. Bodnar and Gentry (1993) examine foreign exchange exposures at industry level in Canadian, Japanese, and US markets. The study reports significant exposure in 11 of 39 US industries (28%) over the period of the study. Moreover, by modelling exposure model as a function of industry characteristics, they document that the relation between exposure and industry characteristics is in line with economic theory.

He and Ng (1998) and Doukas et al. (1999) provide further evidence on Japanese firms' foreign exchange exposure. He and Ng (1998) document a significant exposure for 25 percent of the sample consisting 171 Japanese multinationals. The study also stresses that export ratio and hedging needs are also amongst the determinants of exposure. In addition, they report that highly leveraged, low liquidity, and smaller firms tend to have lower exposures. Doukas et al. (1999) also confirms that the association between exchange rate and stock returns are positively related with firm's foreign economic involvement and negatively related to its size and debt to asset ratio. In order to reduce the effects of currency fluctuation, exchange rate risk management plays a main role and is often associated with hedging activities. Hedging is a type of investment activity that aims to provide protection against future price risks. It reduces the threat of negative exchange rate moves through taking an offsetting position (Bekaert and Hodrick, 2009). The firms with higher debt to assets ratios are considered to have higher financial stress and therefore are more likely to engage in hedging activities. Therefore, these firms are expected to have lower exposure.

Khoo (1994) reviews the foreign currency exposure of Australian mining companies. He finds very weak evidence of exchange exposure and links this lack of exposure to the mining companies' extensive use of hedging. Nydahl (1999) examine the relationship between stock price changes and exchange rate fluctuations for Swedish companies. The results show considerable exposure on exchange rate for 26 percent of firms. Furthermore, the study shows that the level of export ratio significantly increases exposure, while hedging, by using derivatives, reduces exposure.

Muller and Verschoor (2007) examine the exchange rate exposure for Asian firms' stocks returns. 25 percent of firms have significant exposure to the US dollar and 22.5 percent to the Japanese yen for the period January 1993 to January 2003. The extent to which firms are exposed to exchange rate fluctuations varies with return horizons. As a consequence, short-term exposure seems to be relatively well hedged, while considerable evidence of long-term exposure is found. Their results suggest that, in contrary to US findings, highly leveraged firms and firms with lower quick ratio are more exposed to exchange rates. Similarly, firms with strong liquidity positions tend to have smaller exposures to exchange rate risk as these firms are profitable and have less incentive to engage in hedging activities.

In the literature there are also some researches which criticize the existing methodology such as Bortov and Bodnar (1994). They criticize earlier studies as they use an incorrect estimation model to explain the relationship between firm value and exchange rate movements. They suggest the inclusion of lagged variables into the model estimation. However, their results do not provide any evidence on the connection between firm value and exchange rate movements.

Dominguez and Tesar (2006) present evidence for exchange rate exposure based on a sample of eight industrialized and emerging markets. The study reports that exchange rate series, time horizon as well as firm size, multinational status, foreign sales, international assets, as well as competitiveness and trade at the industry level are important determinants of exchange rate exposure.

In the context of Turkish economy, Kıymaz (2003) investigate 109 firms which are traded on the Borsa Istanbul Stock Exchange during 1991-1998. According to his results, Turkish firms are noticeably uncovered to exchange rate risks and their earnings are affected considerably through exchange rate variations. Firstly, Kıymaz (2003) analysed how the currency risks could be priced at the level of firms with high inflation, using the monthly stock returns of 109 firms in the period between January 1991 and December 1998. Secondly, he investigated the exchange rate risk exposure across industries. Thirdly, the study compared companies' exposure to risk before and after the crisis. Kıymaz (2003) developed a regression model by using firms' international sales, import amounts and exchange rate data. As a result of his research, he revealed that firms engaged in foreign trade, especially the textile sector, were affected by changes in the exchange rate. He also found that exposure levels of firms' during the pre-crisis period were higher than after the crisis. Solakoglu (2005) based on capital market approach was used to determine the rate of exposure to foreign exchange risk of Turkish firms between 2001-2003. Exchange rate exposure, between 2001 and 2003 for Turkey is estimated using data at the firm level. The results show that the size of the firm and the share of export income in total income negatively affect the level of exposure to exchange rate effect. Larger firms and firms that are more dependent on export revenue are less exposed to exchange rate risk. The level of international activity, measured by the share of export revenue in total revenue and the share of import expenditures in total cost, appears to be important for firms that can be considered net exporters. The level of exposure was much higher for these firms than those considered to be net importers. In a more recent study, Ceylan and Sahin (2015), investigate the relationship between the exchange rate and stock prices have searched for Turkey's economy during the period of inflation targeting. In this study, long and short term relationships between dollar exchange rate and general index of stocks and sector indices are investigated based on monthly time series during 2006-2015 period. The results of the Johansen co-integration test, which is estimated to investigate long-term relationships, show that both the exchange rate and the stock price index move together in the long run. The results of the vector error correction model, which is predicted to predict short-term relationships, showed a one-way causal relationship from exchange rate to stock prices, across all sub-indices.

3. DATA AND DESCRIPTIVE STATISTICS

I use income statement and balance sheet data to measure the exchange rate exposure of 330 firms traded in Borsa Istanbul covering the period 2010-2019. The frequency of the data is quarterly. The firms in my dataset are grouped into sectors based on FINNET classification (See Appendix A). The sectors are classified as detailed as much. If a company operates in more than one sector, it has been categorized in the sector that has the largest share in revenues. I further aggregate sectors defined in FINNET classification because some sectors have few firms. So, the purpose of this merge is to have more observation numbers in a given sector. For example, in FINNET classification “Food” and “Beverage” sectors are classified separately, I have merged these sectors as “Food and Beverage”. Another example is “Retail and Wholesale Trade”. FINNET classification separately classifies these sectors as for "Retail Trade" and "Wholesale" but I have merged them as "Wholesale and Retail Trade". Sectors covered and the number of firms operating in the specific sector are presented in Table 3.1. Sectors based on FINNET classification is available at Appendix A.

Table 3.1: Sectors covered and the number of firms

| Sector | Number of Firms |
|--|-----------------|
| Food and Beverage | 23 |
| Textile, Wearing Apparel and Leather | 17 |
| Chemicals, Petroleum Rubber and Plastic Products | 20 |
| Electricity, Gas and Energy | 17 |
| Public Works | 9 |
| Wholesale and Retail Trade | 12 |
| Telecommunication | 2 |
| Law and Management Institutions | 5 |
| Banks | 12 |
| Insurance Companies | 6 |
| Financial Leasing and Factoring Companies | 8 |
| Holding and Investment Companies | 28 |
| Fabricated Metal and Other Manufacturing | 15 |
| Restaurants and Hotels | 6 |
| Sport | 4 |

| | |
|--|----|
| Real Estate and REIC | 31 |
| Medicine and Health Companies | 7 |
| Media and Communications | 3 |
| Agriculture, Forestry, Metallurgy and Paper Industry | 15 |
| Information Companies | 11 |
| Automat and Automotive Companies | 18 |
| Transportation Companies | 9 |
| Construction Companies | 32 |
| Venture Capital | 5 |
| Defense and Communication | 6 |
| Durable Consumption | 9 |

As an exchange rate series I have used nominal bilateral exchange rate series, specifically Euro and Dollar. I calculate the basket which is the average of buying and selling prices of the dollar and euro exchange rate series. The exchange rate basket series are used to measure the foreign exchange exposure risk of companies and has been calculated by taking the average of EUR and USD nominal exchange rate series (See Figure 1). An increase in the basket exchange rate means a depreciation of the domestic currency.

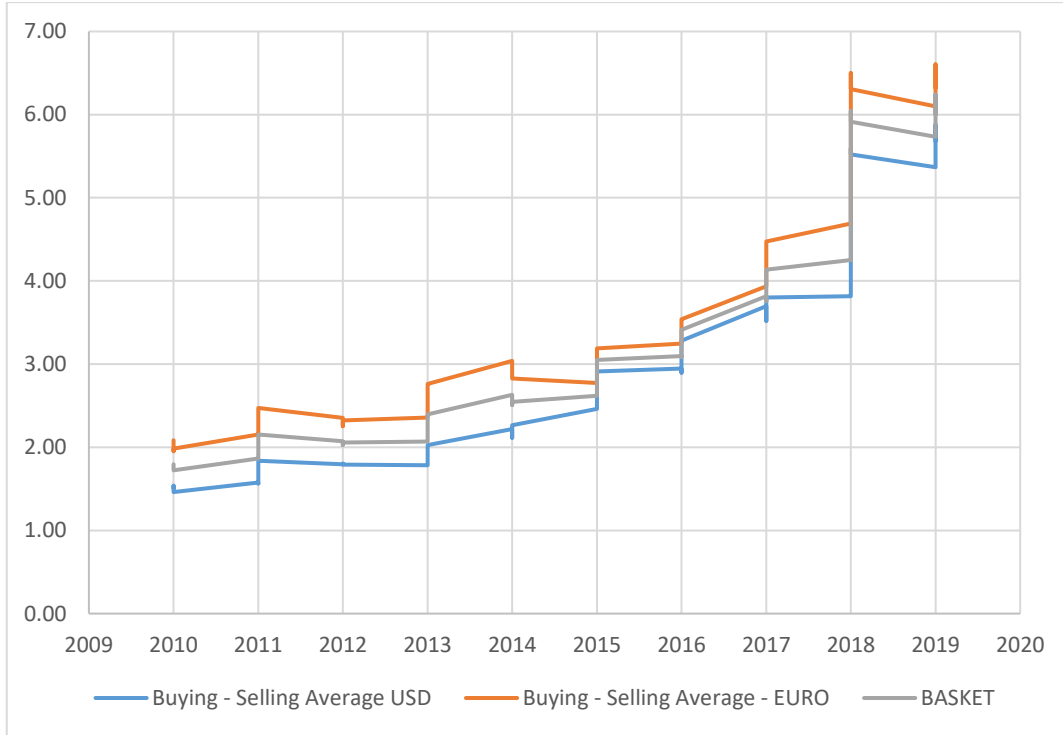


Figure 3.1: Exchange rate graph from 2010 to 2019

Market return is a proxy of how much income you will get from an investment that you made on a given stock index. These data allow you to clearly see your earnings and losses according to the amount of money you invest in and tells you that you are making a profit or loss (Hubbard and O'Brien, 2013). In order to measure market return, I take Borsa Istanbul Stock Market Index (BIST100). BIST 100 is the basic indicator used to measure the performance of the 100 highest stocks in terms of market and trading volume traded on Borsa Istanbul.

In order to calculate the market return, I apply the following formula

$$\text{Market Return} = 100 \times \frac{(\text{BIST100 Indeks}_t - \text{BIST100 Indeks}_{t-1})}{\text{BIST 100 Indeks}_{t-1}}$$

Positive returns imply that the stock market is profitable.

The descriptive statistics on stock returns across different sectors for the period 2010-2019 are given in Table 3.2. The average market return has been recorded as 4.84 percent. During this period sport industry registered the minimum market return as 1.42%, while law and management industry's return was the highest and recorded as 8.69%.

Table 3.2: The descriptive statistics on stock returns across sectors

| Sector | mean | p50 | sd | min | max | N |
|--------------------|------|-------|-------|--------|--------|-------|
| Agriculture | 4.18 | 1.05 | 20.48 | -65.31 | 125.66 | 545 |
| Automotive | 6.55 | 3.39 | 22.62 | -53.97 | 169.23 | 654 |
| Banks | 3.70 | 0.30 | 23.66 | -34.87 | 293.81 | 488 |
| Chemicals | 5.57 | 2.68 | 23.71 | -82.24 | 174.21 | 651 |
| Construction | 5.22 | 0.63 | 35.85 | -79.91 | 678.93 | 1147 |
| Defense & Com. | 5.75 | 2.50 | 25.53 | -41.96 | 163.04 | 219 |
| Durable Cons. | 7.17 | 1.12 | 36.14 | -52.45 | 431.50 | 272 |
| Electricity | 3.44 | 0.14 | 24.82 | -60.86 | 143.21 | 495 |
| Fabricated Metal | 5.40 | 0.64 | 25.84 | -76.25 | 165.71 | 505 |
| Financial Leasing | 4.74 | 2.54 | 17.86 | -58.61 | 110.45 | 289 |
| Food & Beverage | 4.49 | -0.09 | 26.38 | -78.67 | 189.23 | 791 |
| Holding & Invest | 5.16 | -1.07 | 32.04 | -70.00 | 344.83 | 964 |
| Information | 8.09 | 1.76 | 32.07 | -46.28 | 253.49 | 309 |
| Insurance | 3.18 | 1.17 | 16.88 | -29.61 | 110.34 | 205 |
| Law & Man. | 8.69 | -1.52 | 57.88 | -66.79 | 337.03 | 99 |
| Media & Com. | 3.35 | -2.18 | 28.01 | -39.57 | 126.67 | 111 |
| Health | 3.39 | 0.97 | 19.14 | -33.44 | 110.30 | 184 |
| Public Works | 2.88 | -1.67 | 27.88 | -88.06 | 186.00 | 265 |
| R. Estate & REIC | 3.68 | 0.00 | 30.07 | -71.43 | 540.38 | 1002 |
| Restaurant - Hotel | 3.35 | -1.91 | 29.52 | -69.68 | 172.69 | 218 |
| Sport | 1.42 | -2.86 | 30.69 | -46.12 | 194.69 | 151 |
| Telecom. | 2.22 | 1.30 | 11.99 | -27.05 | 28.71 | 75 |
| Textile | 4.93 | 1.06 | 24.87 | -49.56 | 260.74 | 554 |
| Transportation | 7.97 | 4.15 | 45.98 | -86.65 | 625.71 | 280 |
| Venture Capital | 8.57 | -0.87 | 59.31 | -41.82 | 640.38 | 143 |
| Wholesale & Retail | 2.50 | -0.25 | 24.21 | -66.67 | 169.23 | 358 |
| Total | 4.84 | 0.78 | 29.29 | -88.06 | 678.93 | 10974 |

I examine exchange rate exposure across firm with different characteristics. With this respect, I categorize firms with respect to their i) liquidity, ii) financial position iii) turnover, iv) profitability, v) export ratio (defined as exports divided by total sales), and vi) fx revenues. For each group, I use different measurements for robustness checks. The definitions of all these different measures are explained below under relevant section.

3.1 Liquidity Ratios

Liquidity ratio is used to determine the ability of the companies to pay its short term debts and whether the working capital is sufficient. If the company's liquidity is high it means that the company's assets can be converted into cash easily. Liquidity ratio of the company is an important measure for investment decision. Amongst liquidity ratios, I use the following measures based on the categorization of in Company Sector Database of the Central Bank of the Republic of Turkey (CBRT, 2019).

- i) **Current ratio** defined as the ratio of total current assets to short-term liabilities and indicate the level of liquid assets of the business to its liabilities with a maturity of less than one year. The higher the current ration the company is considered as more liquid.
- ii) **Cash ratio** shows how much of the firm's liquid assets and short-term debts can pay in case of worsening in market and economic conditions. It is calculated by dividing liquid assets plus marketable securities to short-term liabilities.
- iii) **Liquidity ratio (acid-test ratio)** determines whether the firm has sufficient short-term assets to cover its short-term liabilities without raising external finance. This ratio does not into consideration current assets which are difficult to liquidate such as inventories. This ratio is preferred to be around 1. The values above one is considered that the company is keeping the cash on hand. However, in some case the higher ratios can be industry specific.
- iv) **Inventories to total assets ratio** account for the parts of the assets that are linked to the inventory and calculated by dividing inventories to total assets. In general, a lower ratio is considered better. A high ratio indicates that more inventory is kept. Surplus inventory may result in increased stocking expenses, increased insurance costs, and losses due to the inventory's depreciation.

Descriptive statistics on liquidity ratios are given in Tables 3.3, 3.4, 3.5, 3.6. For the first two measures, higher ratio means a more liquid company. For the third measure, a values close to one are preferred. For the fourth measure lower ratios are preferred. Venture Capital

Firms, Real Estate, Holding and Investment companies have higher liquidity based on the first two measures.

Table 3.3: The descriptive statistics on current ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|------|--------|------|---------|-------|
| Agriculture | 2.47 | 1.40 | 3.97 | 0.00 | 52.03 | 570 |
| Automotive | 2.04 | 1.54 | 1.99 | 0.00 | 17.64 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 2.32 | 1.59 | 2.51 | 0.00 | 22.81 | 760 |
| Construction | 1.89 | 1.54 | 1.41 | 0.00 | 17.07 | 1216 |
| Defense & Com. | 2.75 | 2.09 | 2.01 | 0.00 | 10.46 | 228 |
| Durable Cons. | 1.76 | 1.49 | 1.42 | 0.00 | 6.79 | 342 |
| Electricity | 3.18 | 1.12 | 5.16 | 0.00 | 49.61 | 608 |
| Fabricated Metal | 1.67 | 1.30 | 1.24 | 0.00 | 7.96 | 570 |
| Financial Leasing | 1.34 | 1.17 | 0.52 | 0.00 | 3.68 | 304 |
| Food & Beverage | 1.71 | 1.32 | 1.81 | 0.00 | 15.99 | 874 |
| Holding & Invest | 16.89 | 1.41 | 80.42 | 0.00 | 1118.38 | 1064 |
| Information | 2.65 | 1.45 | 4.41 | 0.00 | 28.34 | 418 |
| Insurance | 1.49 | 1.22 | 0.87 | 0.71 | 5.91 | 228 |
| Law & Man. | 1.33 | 1.26 | 1.52 | 0.00 | 7.04 | 190 |
| Media & Com. | 2.33 | 1.12 | 1.90 | 0.74 | 6.61 | 114 |
| Health | 1.65 | 1.42 | 1.61 | 0.00 | 8.62 | 266 |
| Public Works | 7.95 | 1.39 | 40.53 | 0.00 | 363.13 | 342 |
| R. Estate & REIC | 20.55 | 1.67 | 80.47 | 0.00 | 864.70 | 1178 |
| Restaurant - Hotel | 5.29 | 1.27 | 17.33 | 0.00 | 158.02 | 228 |
| Sport | 0.58 | 0.33 | 0.95 | 0.00 | 7.32 | 152 |
| Telecom. | 1.54 | 1.39 | 0.66 | 0.68 | 2.92 | 76 |
| Textile | 1.47 | 1.31 | 1.26 | 0.00 | 13.79 | 646 |
| Transportation | 1.41 | 0.92 | 3.58 | 0.00 | 46.32 | 342 |
| Venture Capital | 51.65 | 2.06 | 151.93 | 0.00 | 1336.89 | 190 |
| Wholesale & Retail | 1.36 | 0.96 | 2.96 | 0.00 | 34.38 | 456 |
| Total | 5.86 | 1.31 | 40.42 | 0.00 | 1336.89 | 12540 |

The current rate ratio table for the sectors during the period 2010-2019 is given in Table 3.3. The current ratio average of the sectors is 5.86 in the years investigated. Unlike businesses operating outside the financial sector, banks use different liquidity measures. The reason for this is the commitment to deposit money, which constitutes an important part of bank liabilities, at any time. For this reason, the current ratio of banks is 0. The average of the sports sector is below 1. This indicates that net working capital, defined as the difference

between a company's current assets and current liabilities, is negative and the company cannot pay its short-term debts with current assets.

The cash ratio table for the sectors in the period 2010-2019 is given in Table 3.4. Holding-investment companies and venture capital sectors have a highest cash ratio average amongst 26 sectors. Sport sector has the lowest cash ratio on average. In addition, standard deviation is particularly low with respect to the other sectors showing that the companies in this sector have closer ratios, and prices are more stable.

Table 3.4: The descriptive statistics on cash ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|---------|-------|---------|-------|-----------|-------|
| Agriculture | 48.11 | 11.31 | 150.87 | 0.00 | 1499.01 | 570 |
| Automotive | 56.36 | 11.96 | 144.20 | 0.00 | 1111.64 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 88.76 | 35.08 | 176.94 | 0.00 | 1862.59 | 760 |
| Construction | 41.43 | 19.34 | 66.59 | 0.00 | 802.63 | 1216 |
| Defense & Com. | 62.23 | 37.85 | 73.84 | 0.00 | 454.20 | 228 |
| Durable Cons. | 26.91 | 9.68 | 43.08 | 0.00 | 240.50 | 342 |
| Electricity | 171.06 | 11.35 | 453.64 | 0.00 | 4753.69 | 608 |
| Fabricated Metal | 19.97 | 9.19 | 32.74 | 0.00 | 265.61 | 570 |
| Financial Leasing | 32.41 | 9.60 | 42.17 | 0.00 | 225.62 | 304 |
| Food & Beverage | 19.58 | 4.09 | 59.87 | 0.00 | 1510.74 | 874 |
| Holding & Invest | 1073.99 | 13.66 | 6502.51 | 0.00 | 101537.00 | 1064 |
| Information | 134.36 | 12.37 | 394.51 | 0.00 | 2307.88 | 418 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228 |
| Law & Man. | 28.55 | 2.62 | 69.16 | 0.00 | 491.23 | 190 |
| Media & Com. | 15.24 | 13.05 | 13.50 | 0.00 | 69.40 | 114 |
| Health | 50.74 | 8.80 | 83.82 | 0.00 | 482.36 | 266 |
| Public Works | 671.51 | 8.13 | 4018.33 | 0.00 | 36257.53 | 342 |
| R. Estate & REIC | 734.50 | 26.11 | 2763.05 | 0.00 | 29330.28 | 1178 |
| Restaurant - Hotel | 247.64 | 4.20 | 877.71 | 0.00 | 8581.41 | 228 |
| Sport | 2.88 | 1.85 | 4.22 | 0.00 | 36.27 | 152 |
| Telecom. | 76.87 | 50.88 | 60.28 | 15.73 | 204.59 | 76 |
| Textile | 21.64 | 7.48 | 63.23 | 0.00 | 922.01 | 646 |
| Transportation | 61.98 | 27.08 | 250.83 | 0.00 | 3448.37 | 342 |
| Venture Capital | 1010.60 | 10.19 | 2806.60 | 0.00 | 19011.72 | 190 |
| Wholesale & Retail | 34.22 | 11.74 | 143.18 | 0.00 | 2015.44 | 456 |
| Total | 236.81 | 10.60 | 2240.70 | 0.00 | 101537.00 | 12540 |

Table 3.5: The descriptive statistics on liquidity ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|------|--------|------|---------|-------|
| Agriculture | 1.61 | 0.81 | 3.15 | 0.00 | 38.15 | 570 |
| Automotive | 1.38 | 0.89 | 1.87 | 0.00 | 15.87 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 1.73 | 1.12 | 2.11 | 0.00 | 21.95 | 760 |
| Construction | 1.30 | 1.10 | 0.95 | 0.00 | 8.63 | 1216 |
| Defense & Com. | 1.95 | 1.35 | 1.43 | 0.00 | 7.30 | 228 |
| Durable Cons. | 1.29 | 1.06 | 1.07 | 0.00 | 5.15 | 342 |
| Electricity | 2.69 | 0.73 | 4.89 | 0.00 | 48.65 | 608 |
| Fabricated Metal | 1.02 | 0.86 | 0.84 | 0.00 | 5.90 | 570 |
| Financial Leasing | 1.31 | 1.14 | 0.51 | 0.00 | 3.62 | 304 |
| Food & Beverage | 1.04 | 0.80 | 1.27 | 0.00 | 15.11 | 874 |
| Holding & Invest | 16.41 | 0.99 | 79.00 | 0.00 | 1091.89 | 1064 |
| Information | 2.36 | 1.03 | 4.43 | 0.00 | 28.26 | 418 |
| Insurance | 1.02 | 0.78 | 0.99 | 0.14 | 5.61 | 228 |
| Law & Man. | 1.20 | 1.10 | 1.45 | 0.00 | 7.02 | 190 |
| Media & Com. | 1.97 | 0.96 | 1.64 | 0.46 | 5.30 | 114 |
| Health | 1.23 | 0.94 | 1.23 | 0.00 | 7.32 | 266 |
| Public Works | 7.52 | 0.79 | 40.43 | 0.00 | 362.71 | 342 |
| R. Estate & REIC | 18.38 | 0.78 | 77.66 | 0.00 | 864.47 | 1178 |
| Restaurant - Hotel | 4.58 | 0.60 | 17.32 | 0.00 | 158.02 | 228 |
| Sport | 0.54 | 0.27 | 0.94 | 0.00 | 7.28 | 152 |
| Telecom. | 1.40 | 1.30 | 0.63 | 0.51 | 2.89 | 76 |
| Textile | 0.88 | 0.68 | 1.05 | 0.00 | 12.07 | 646 |
| Transportation | 1.29 | 0.84 | 3.49 | 0.00 | 45.37 | 342 |
| Venture Capital | 51.13 | 1.13 | 151.55 | 0.00 | 1333.62 | 190 |
| Wholesale & Retail | 0.82 | 0.48 | 1.79 | 0.00 | 23.59 | 456 |
| Total | 5.20 | 0.88 | 39.57 | 0.00 | 1333.62 | 12540 |

The liquidity ratio table for the sectors in the period 2010-2019 is given in Table 3.5. For the liquidity ratio, fabricated metal and insurance companies' sectors are the sector with the preferred liquidity levels with an average of 1.02. The liquidity ratio is less than 1 in the sports and wholesale and retail sectors which shows that these sectors suffer from liquidity shortage.

Table 3.6: The descriptive statistics on inventories to total assets ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|-------|-------|------|-------|----------|
| Agriculture | 37.03 | 34.43 | 14.49 | 3.64 | 90.75 | 561.00 |
| Automotive | 33.45 | 34.36 | 14.01 | 3.83 | 78.56 | 670.00 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494.00 |
| Chemicals | 25.14 | 22.94 | 14.62 | 0.00 | 74.41 | 649.00 |
| Construction | 28.08 | 25.48 | 14.69 | 2.73 | 84.86 | 1172.00 |
| Defense & Com. | 21.23 | 21.75 | 13.60 | 1.10 | 54.37 | 225.00 |
| Durable Cons. | 25.31 | 24.97 | 7.98 | 4.94 | 48.69 | 283.00 |
| Electricity | 14.24 | 8.39 | 16.35 | 0.00 | 72.61 | 525.00 |
| Fabricated Metal | 34.86 | 34.32 | 13.50 | 5.76 | 81.63 | 531.00 |
| Financial Leasing | 0.09 | 0.00 | 0.30 | 0.00 | 1.35 | 301.00 |
| Food & Beverage | 30.81 | 26.68 | 17.77 | 0.00 | 90.50 | 791.00 |
| Holding & Invest | 13.01 | 6.57 | 16.94 | 0.00 | 76.02 | 992.00 |
| Information | 16.48 | 17.04 | 14.01 | 0.00 | 64.45 | 330.00 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228.00 |
| Law & Man. | 6.17 | 1.09 | 9.10 | 0.00 | 32.31 | 113.00 |
| Media & Com. | 13.77 | 9.77 | 11.07 | 0.00 | 45.92 | 114.00 |
| Health | 20.79 | 20.43 | 10.75 | 3.89 | 44.80 | 197.00 |
| Public Works | 18.09 | 11.50 | 18.99 | 0.00 | 91.58 | 288.00 |
| R. Estate & REIC | 25.29 | 5.35 | 31.36 | 0.00 | 98.09 | 1090.00 |
| Restaurant - Hotel | 15.63 | 3.72 | 24.91 | 0.00 | 90.85 | 225.00 |
| Sport | 5.32 | 3.32 | 6.05 | 0.00 | 21.46 | 148.00 |
| Telecom. | 1.64 | 1.40 | 1.02 | 0.46 | 4.03 | 76.00 |
| Textile | 39.26 | 39.66 | 18.11 | 3.75 | 89.14 | 581.00 |
| Transportation | 5.27 | 3.15 | 7.69 | 0.00 | 52.91 | 289.00 |
| Venture Capital | 4.25 | 0.00 | 9.32 | 0.00 | 39.99 | 158.00 |
| Wholesale & Retail | 37.53 | 43.00 | 26.16 | 0.00 | 90.12 | 394.00 |
| Total | 22.44 | 19.63 | 20.82 | 0.00 | 98.09 | 11425.00 |

The inventory ratio table for the sectors in the period 2010-2019 is given in Table 3.6. This rate is higher in the textile, wholesale and retail, agriculture, and fabricated metal sectors since they work by holding more stocks. In sectors that do not require inventory such as financial leasing and telecommunication, this ratio is low. Companies operating in financial leasing and telecommunication sector have the lowest values. Even the highest ratio recorded in these sectors is lower than the average of all sample.

3.2 Financial Ratios

Second group measures the company's financial position. In this group I take the following ratios.

- i) **Leverage ratio** is defined as total debt to total assets and examines the relationship between the company's equity and debts. This ratio shows the distribution of resources used by companies to finance their assets. There are two ways companies can finance their assets; equity or debt finance. Borrowing, accelerate the growth of the company but also increases financing expenses. It also increases the risk that the company takes. The higher the leverage ratio, the the company is considered more risky.
- ii) **Equity multiplier ratio** is the ratio of total assets to shareholders' equity. The equity multiplier, therefore, captures the effects of how a company finances its assets, referred to as its financial leverage (Andrei et. al. 2010). Higher ratio meaning that, that assets are funding with more debt rather than equity therefore high equity multiplier is an indicator of company's dependency on debt for its financing which can make the company risky.

Table 3.7: The descriptive statistics on leverage ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|----------|----------|---------|---------|----------|-------|
| Agriculture | 4810.65 | 5274.08 | 2274.26 | 174.22 | 10099.02 | 561 |
| Automotive | 5399.64 | 5489.00 | 2177.60 | 530.75 | 9549.91 | 670 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 4448.26 | 4208.74 | 2142.46 | 130.34 | 9289.93 | 649 |
| Construction | 4107.28 | 3730.56 | 2020.63 | 685.91 | 10412.33 | 1172 |
| Defense & Com. | 4737.53 | 5229.61 | 2024.95 | 969.33 | 8452.02 | 225 |
| Durable Cons. | 5583.69 | 6181.81 | 2090.32 | 1576.81 | 8653.24 | 283 |
| Electricity | 5007.05 | 5825.04 | 3073.82 | 443.05 | 21859.87 | 525 |
| Fabricated Metal | 5577.33 | 5481.36 | 2722.67 | 1062.62 | 17074.54 | 531 |
| Financial Leasing | 7835.49 | 8298.56 | 1642.51 | 2585.92 | 9680.52 | 301 |
| Food & Beverage | 5052.48 | 4926.66 | 2238.69 | 606.10 | 11834.83 | 791 |
| Holding & Invest | 4581.55 | 4741.43 | 2789.43 | 41.44 | 21546.90 | 992 |
| Information | 4621.71 | 4996.60 | 2620.87 | 222.60 | 8755.77 | 330 |
| Insurance | 7654.16 | 7662.42 | 1714.41 | 1042.37 | 9899.27 | 228 |
| Law & Man. | 4272.69 | 4153.44 | 1680.58 | 1360.82 | 8527.00 | 113 |
| Media & Com. | 4921.66 | 5323.77 | 2653.43 | 1421.17 | 8841.48 | 114 |
| Health | 4244.84 | 5015.92 | 2244.28 | 864.49 | 9615.37 | 197 |
| Public Works | 4999.62 | 5160.56 | 1990.55 | 599.02 | 9966.61 | 288 |
| R. Estate & REIC | 2977.26 | 2974.19 | 2542.01 | 5.88 | 10835.18 | 1090 |
| Restaurant - Hotel | 4315.48 | 4190.40 | 3259.70 | 63.16 | 12900.27 | 225 |
| Sport | 16673.71 | 16048.67 | 8777.36 | 1218.35 | 44789.09 | 148 |
| Telecom. | 5763.07 | 6120.98 | 1921.16 | 2854.67 | 8739.84 | 76 |
| Textile | 5442.59 | 5338.45 | 2312.67 | 694.77 | 34219.71 | 581 |
| Transportation | 6653.04 | 7118.53 | 1781.60 | 160.91 | 10378.33 | 289 |
| Venture Capital | 2349.85 | 1818.23 | 2362.77 | 11.22 | 8074.55 | 158 |
| Wholesale & Retail | 6547.52 | 6732.25 | 2940.08 | 550.55 | 18970.66 | 394 |
| Total | 4805.39 | 4746.27 | 3219.73 | 0.00 | 44789.09 | 11425 |

The leverage ratio is preferred to be low. On the other hand, low equity multiplier can be both risky and safe at the same time. Low values imply that the company has low debt, therefore it is less risky. On the other hand, higher values of this ratio may also signal company's strategy and its potential to grow and being able to take credits. Overall, insurance, banks, wholesale and retail trade, financial leasing, and restaurants have lower leverage ratios. For the equity multiplier ratio, the highest ratio is in the sports sector while the lowest ratios are in banking and venture capital firms.

The leverage ratios for the sectors in the period 2010-2019 is given in Table 3.7. The leverage ratio average of the sectors is 4805.39 in the years investigated. Firms operating in the sport

sector have the highest average leverage ratio. The high debt to total assets ratio means higher financial leverage ratio. As the financial leverage ratio increases, it increases the company's risk. Apart from the companies in the sports sector, financial leasing and investment companies are also risky. The low rate indicates that most of the asset funds are covered by equity.

The equity multiplier ratio table for the sectors in the period 2010-2019 is given in Table 3.8. The average of the sectors is 3.87 in the years investigated. Insurance companies sector has highest equity multiplier ratio with 14.14. It shows that insurance companies have been using more debt than equity. Firms operating in the sports sector generally have negative equity and also some of them have high equity. This also causes the standard deviation to be high. Due to low equity the company has, equity multiplier is low in these companies. This indicates that companies pay excessive debt.

Table 3.8: The descriptive statistics on equity multiplier ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|-------|-------|---------|---------|------|
| Agriculture | 2.16 | 2.10 | 8.86 | -172.83 | 20.57 | 561 |
| Automotive | 3.02 | 2.32 | 2.26 | 1.06 | 22.22 | 670 |
| Banks | 9.39 | 9.21 | 2.29 | 2.53 | 16.65 | 494 |
| Chemicals | 2.60 | 2.02 | 1.86 | 1.01 | 14.08 | 649 |
| Construction | 4.65 | 1.69 | 51.70 | -24.25 | 1635.84 | 1172 |
| Defense & Com. | 2.27 | 2.10 | 1.09 | 1.11 | 6.46 | 225 |
| Durable Cons. | 2.92 | 2.68 | 1.43 | 1.19 | 7.68 | 283 |
| Electricity | 1.10 | 2.34 | 31.73 | -571.95 | 58.76 | 525 |
| Fabricated Metal | 1.76 | 2.03 | 13.52 | -245.50 | 144.75 | 531 |
| Financial Leasing | 7.69 | 7.18 | 4.73 | 1.42 | 31.30 | 301 |
| Food & Beverage | 2.42 | 2.04 | 14.24 | -106.61 | 350.67 | 791 |
| Holding & Invest | 4.01 | 2.21 | 21.10 | -124.88 | 584.40 | 992 |
| Information | 2.62 | 2.12 | 1.66 | 1.02 | 9.21 | 330 |
| Insurance | 14.14 | 5.16 | 18.00 | 2.58 | 84.41 | 228 |
| Law & Man. | 2.03 | 1.71 | 1.08 | 1.16 | 6.79 | 113 |
| Media & Com. | 2.92 | 2.29 | 2.01 | 1.17 | 8.63 | 114 |
| Health | 3.28 | 2.03 | 12.10 | 1.08 | 166.97 | 197 |
| Public Works | 4.61 | 2.07 | 30.27 | 1.07 | 510.87 | 288 |
| R. Estate & REIC | 2.74 | 1.47 | 17.60 | -96.08 | 474.68 | 1090 |
| Restaurant - Hotel | 6.01 | 1.60 | 30.11 | -126.21 | 344.04 | 225 |
| Sport | 0.65 | -1.29 | 43.09 | -170.95 | 473.73 | 148 |
| Telecom. | 3.06 | 2.58 | 1.76 | 1.37 | 7.94 | 76 |
| Textile | 2.87 | 2.25 | 1.87 | 1.07 | 24.19 | 581 |
| Transportation | 4.82 | 3.58 | 7.49 | -57.05 | 74.51 | 289 |

| | | | | | | |
|--------------------|------|------|-------|---------|---------|-------|
| Venture Capital | 1.53 | 1.23 | 0.75 | 1.00 | 5.19 | 158 |
| Wholesale & Retail | 9.09 | 2.76 | 19.86 | -78.42 | 194.51 | 394 |
| Total | 3.87 | 2.10 | 22.62 | -571.95 | 1635.84 | 11425 |

3.3 Turnover Ratios

Third group is turnover ratios. Turnover rates indicate the degree of effectiveness and density of the assets held by the firm. Among this group I calculate the following ratios:

- i) **Net working capital turnover** is calculated by dividing net sales to current assets minus liabilities. This rate is a financial calculation that can help you determine how efficiently the company uses its existing assets to generate income. If this rate is high, it means that the company is performing well in using a company's short-term assets and liabilities for supporting sales. In other words, company creates higher sales for very unit of working capital used.
- ii) **Receivable turnover ratio** is the ratio of net sales to firms' receivables. It shows how many times the company collects its receivables in a given period. Increase in this ratio mean that the liquidity value of the receivables increases. Shrinkage of this ratio may indicate that the maturity date of the receivables is extended.
- iii) **Tangible fixed assets turnover ratio** is calculated by dividing net sales to tangible fixed assets. Tangible fixed assets are assets that are bought for use in operating activities and with an estimated usage time of more than one year. To be categorized as tangible asset; an asset i) must have a material structure, ii) must be purchased for use in business activities, iii) a sale should not be thought throughout use, iv) service life should be more than one year (Sevilengül, 2005).

In general, higher values are preferred for working capital turnover and receivable turnover ratios. On the other hand, while higher levels of tangible fixed asset turnover ratio is a signal for efficiency showing that the investment on tangible fixed assets produce high levels of net sales, the higher values of tangible fixed asset turnover ratio may also stem from low levels of tangible fixed assets.

The working capital turnover table for the sectors in the period 2010-2019 is given in Table 3.9. As mentioned, high working capital turnover rates are preferred and this indicates that company is performing well in using a company's short-term assets and liabilities for supporting sales. This turnover ratio is the highest in banking sector (20.75). After banks, financial leasing companies have second highest value with 2.57 ratio rate. The lowest rate is in insurance companies.

The receivable turnover ratio table for the sectors in the period 2010-2019 is given in Table 3.10. For the receivable turnover ratio, the highest ratio average among 26 sectors, in wholesale and retail sector with 32.62 which shows that receivables are easily collected. Food and beverage sectors have the lowest ratio with 2.05 that shows receivables are collected in a longer time period than other sectors.

The tangible fixed assets turnover ratio table for the sectors in the period 2010-2019 is given in Table 3.11. In tangible fixed assets turnover ratio, companies operating in holding and investment, hotel and restaurants, and real estate sectors have the highest values for ratios. On the other hand, companies operating in telecommunication, media and communication and transportation sectors have the lowest ratio.

Table 3.9: The descriptive statistics on working capital turnover ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|------|-------|-------|--------|-------|
| Agriculture | 1.13 | 0.98 | 0.77 | 0.07 | 6.34 | 561 |
| Automotive | 1.25 | 1.06 | 0.84 | 0.09 | 5.33 | 670 |
| Banks | 20.75 | 0.25 | 84.08 | 0.04 | 679.87 | 494 |
| Chemicals | 1.17 | 0.90 | 1.12 | 0.00 | 9.90 | 649 |
| Construction | 1.07 | 0.93 | 0.73 | 0.03 | 4.24 | 1172 |
| Defense & Com. | 0.74 | 0.63 | 0.52 | 0.09 | 2.71 | 225 |
| Durable Cons. | 0.91 | 0.78 | 0.63 | 0.00 | 3.45 | 283 |
| Electricity | 0.99 | 0.71 | 1.00 | 0.00 | 10.74 | 525 |
| Fabricated Metal | 1.13 | 0.97 | 0.75 | 0.12 | 4.26 | 531 |
| Financial Leasing | 2.57 | 0.09 | 7.10 | 0.01 | 76.78 | 301 |
| Food & Beverage | 1.13 | 0.93 | 0.83 | 0.00 | 6.03 | 791 |
| Holding & Invest | 1.56 | 0.34 | 9.90 | 0.00 | 182.12 | 992 |
| Information | 1.39 | 1.21 | 1.37 | 0.00 | 19.73 | 330 |
| Insurance | 0.01 | 0.01 | 0.04 | -0.14 | 0.11 | 228 |
| Law & Man. | 1.46 | 1.24 | 1.16 | 0.00 | 5.31 | 113 |
| Media & Com. | 1.00 | 0.84 | 0.60 | 0.17 | 2.81 | 114 |
| Health | 1.07 | 0.84 | 0.75 | 0.12 | 4.00 | 197 |
| Public Works | 0.70 | 0.50 | 0.71 | 0.00 | 5.44 | 288 |
| R. Estate & REIC | 1.12 | 0.25 | 6.84 | 0.00 | 142.65 | 1090 |
| Restaurant - Hotel | 2.19 | 0.33 | 11.88 | 0.00 | 129.14 | 225 |
| Sport | 1.61 | 1.13 | 1.52 | 0.07 | 9.35 | 148 |
| Telecom. | 1.06 | 0.90 | 0.68 | 0.22 | 2.98 | 76 |
| Textile | 0.99 | 0.91 | 0.56 | 0.00 | 4.64 | 581 |
| Transportation | 1.47 | 1.13 | 1.31 | 0.00 | 9.32 | 289 |
| Venture Capital | 0.34 | 0.10 | 0.70 | 0.00 | 5.01 | 158 |
| Wholesale & Retail | 2.41 | 1.91 | 2.25 | 0.00 | 14.56 | 394 |
| Total | 2.07 | 0.72 | 18.41 | -0.14 | 679.87 | 11425 |

Table 3.10: The descriptive statistics on receivable turnover ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|-------|-------|-------|-------|-------|
| Agriculture | 4.46 | 3.68 | 0.89 | 3.68 | 5.72 | 570 |
| Automotive | 6.08 | 4.42 | 1.86 | 4.42 | 8.16 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 4.44 | 2.00 | 5.21 | 0.00 | 12.82 | 760 |
| Construction | 4.47 | 3.58 | 2.02 | 2.87 | 8.25 | 1216 |
| Defense & Com. | 2.94 | 2.94 | 0.00 | 2.94 | 2.94 | 228 |
| Durable Cons. | 3.90 | 3.90 | 0.00 | 3.90 | 3.90 | 342 |
| Electricity | 14.07 | 7.74 | 13.44 | 3.64 | 37.15 | 608 |
| Fabricated Metal | 5.25 | 5.78 | 1.13 | 1.89 | 5.78 | 570 |
| Financial Leasing | 22.44 | 12.60 | 18.29 | 5.68 | 45.76 | 304 |
| Food & Beverage | 2.05 | 0.00 | 3.09 | 0.00 | 6.72 | 874 |
| Holding & Invest | 9.50 | 7.22 | 3.94 | 7.22 | 16.33 | 1064 |
| Information | 4.27 | 4.27 | 0.00 | 4.27 | 4.27 | 418 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228 |
| Law & Man. | 4.08 | 2.57 | 3.04 | 2.57 | 10.15 | 190 |
| Media & Com. | 3.06 | 3.06 | 0.00 | 3.06 | 3.06 | 114 |
| Health | 3.79 | 3.79 | 0.00 | 3.79 | 3.79 | 266 |
| Public Works | 5.56 | 5.56 | 0.00 | 5.56 | 5.56 | 342 |
| R. Estate & REIC | 2.63 | 2.66 | 0.18 | 1.66 | 2.66 | 1178 |
| Restaurant - Hotel | 4.43 | 4.43 | 0.00 | 4.43 | 4.43 | 228 |
| Sport | 4.19 | 4.19 | 0.00 | 4.19 | 4.19 | 152 |
| Telecom. | 5.33 | 5.33 | 0.00 | 5.33 | 5.33 | 76 |
| Textile | 4.90 | 3.81 | 2.89 | 2.53 | 11.04 | 646 |
| Transportation | 14.69 | 14.69 | 0.00 | 14.69 | 14.69 | 342 |
| Venture Capital | 4.25 | 4.25 | 0.00 | 4.25 | 4.25 | 190 |
| Wholesale & Retail | 32.62 | 48.76 | 22.86 | 0.33 | 48.76 | 456 |
| Total | 6.59 | 4.19 | 9.19 | 0.00 | 48.76 | 12540 |

Table 3.11: The descriptive statistics on tangible fixed assets turnover ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|----------|--------|------------|------|-------------|-------|
| Agriculture | 3.50 | 3.00 | 3.70 | 0.00 | 52.94 | 570 |
| Automotive | 6.29 | 5.58 | 4.70 | 0.00 | 33.12 | 684 |
| Banks | 6.49 | 3.79 | 9.38 | 0.95 | 65.88 | 494 |
| Chemicals | 3.43 | 2.06 | 4.08 | 0.00 | 31.13 | 760 |
| Construction | 3.55 | 1.47 | 10.67 | 0.00 | 81.94 | 1216 |
| Defense & Com. | 22.57 | 12.57 | 23.27 | 0.00 | 110.03 | 228 |
| Durable Cons. | 8.76 | 6.50 | 9.69 | 0.00 | 51.66 | 342 |
| Electricity | 110.14 | 1.23 | 2555.05 | 0.00 | 63003.29 | 608 |
| Fabricated Metal | 4.09 | 2.94 | 4.40 | 0.00 | 28.74 | 570 |
| Financial Leasing | 623.38 | 125.57 | 1215.70 | 0.00 | 7057.06 | 304 |
| Food & Beverage | 3.24 | 2.45 | 4.03 | 0.00 | 29.89 | 874 |
| Holding & Invest | 89928.30 | 1.84 | 1466674.00 | 0.00 | 29700000.00 | 1064 |
| Information | 690.88 | 43.97 | 2200.89 | 0.00 | 19866.70 | 418 |
| Insurance | 2.06 | 1.24 | 2.61 | 0.00 | 14.54 | 228 |
| Law & Man. | 17.36 | 9.32 | 24.03 | 0.00 | 143.16 | 190 |
| Media & Com. | 2.73 | 2.45 | 1.38 | 0.00 | 9.18 | 114 |
| Health | 9.27 | 2.33 | 18.24 | 0.00 | 120.35 | 266 |
| Public Works | 24.93 | 6.08 | 58.35 | 0.00 | 671.40 | 342 |
| R. Estate & REIC | 1445.30 | 46.71 | 34326.80 | 0.00 | 1174987.00 | 1178 |
| Restaurant - Hotel | 1634.99 | 0.25 | 12239.52 | 0.00 | 96396.37 | 228 |
| Sport | 47.00 | 32.98 | 107.78 | 0.00 | 1325.12 | 152 |
| Telecom. | 1.89 | 1.91 | 0.21 | 1.57 | 2.44 | 76 |
| Textile | 4.89 | 2.24 | 14.88 | 0.00 | 328.10 | 646 |
| Transportation | 3.12 | 1.25 | 7.79 | 0.00 | 84.19 | 342 |
| Venture Capital | 128.59 | 16.26 | 239.85 | 0.00 | 1285.93 | 190 |
| Wholesale & Retail | 163.31 | 7.92 | 1047.84 | 0.00 | 12721.77 | 456 |
| Total | 7851.64 | 2.90 | 427904.20 | 0.00 | 29700000.00 | 12540 |

3.4 Profitability Ratios

Another ratio group that are included in the analysis and used by investors when making company analysis is profitability ratio. It shows whether the profitability of the business is sufficient and some other factors like interest expense and operating expenses as a percentage of sales. Amongst this group I take the following ratios:

- i) **EBITDA / Equity:** EBITDA stands for earnings before interest, taxes, depreciation, and amortization.
- ii) **Interest Expenses / Net Sales Ratio** is a ratio used to measure the weight of interest expenses on the profit for the specified period.
- iii) **Operating Expenses to Net Sales** is a ratio used to measure the weight of operating expenses on the profit for the specified period.

The profitability ratios for the sectors in the period 2010-2019 is given in Table 3.12, 3.13 and 3.14. Across the EBITDA to equity ratios the highest ratios belong to the financial leasing, telecommunication, and transportation sectors, while the lowest ratios are recorded in the restaurant, hotel and sport sector (Table 3.12). Table 3.13 presents the descriptive statistics for interest expenses to net sales ratios. Table 3.13 depicts that venture capital, holding and investment and food and beverage firms have much bigger ratios than other firms. Accounts such as exchange difference expenses, leasing expenses, bank loan interests are accounted in the finance expenses account. For this reason, this rate is high in the venture capital trust, holding and investment companies' sector. In the sport sector, broadcasting revenues, revenue and license rights revenues, sales and rental income of football players increase the net sales. This ratio is low in this sector as net sales are high. Table 3.14 presents the descriptive statistics for operating expenses to net sales ratio. As the operating expenses increase, this rate increases. law and management companies have the lowest average as they have less operating expenses than the other sectors. For example; a law firm have less interest paid, accounting fees, repair and maintained compared to restaurant and hotels.

Table 3.12: The descriptive statistics on EBITDA to equity ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|-------|--------|----------|---------|-------|
| Agriculture | 11.79 | 8.75 | 28.74 | -483.42 | 148.59 | 561 |
| Automotive | 20.57 | 15.97 | 20.63 | -29.27 | 173.21 | 670 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 12.36 | 9.30 | 14.38 | -50.43 | 105.38 | 649 |
| Construction | 3.05 | 7.98 | 162.20 | -5386.12 | 188.11 | 1172 |
| Defense & Com. | 6.29 | 5.15 | 12.73 | -59.84 | 77.76 | 225 |
| Durable Cons. | 14.59 | 10.72 | 16.52 | -16.41 | 98.64 | 283 |
| Electricity | 11.85 | 7.12 | 34.07 | -316.95 | 399.08 | 525 |
| Fabricated Metal | 12.88 | 8.39 | 37.05 | -268.41 | 546.24 | 531 |
| Financial Leasing | 32.91 | 22.28 | 31.43 | -23.03 | 189.27 | 301 |
| Food & Beverage | 9.57 | 6.43 | 75.20 | -524.76 | 1839.20 | 791 |
| Holding & Invest | 7.43 | 4.05 | 48.86 | -500.38 | 918.92 | 992 |
| Information | 13.46 | 11.76 | 13.84 | -42.08 | 68.49 | 330 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228 |
| Law & Man. | 6.43 | 7.00 | 30.74 | -167.05 | 160.23 | 113 |
| Media & Com. | 11.41 | 1.24 | 22.46 | -73.90 | 77.32 | 114 |
| Health | 19.72 | 8.67 | 98.74 | -6.46 | 1365.53 | 197 |
| Public Works | 7.60 | 4.42 | 26.52 | -124.41 | 294.29 | 288 |
| R. Estate & REIC | 6.81 | 3.08 | 65.53 | -664.66 | 1945.56 | 1090 |
| Restaurant - Hotel | 0.18 | 0.31 | 104.62 | -1169.02 | 499.65 | 225 |
| Sport | 0.66 | 7.59 | 205.32 | -1754.54 | 584.57 | 148 |
| Telecom. | 27.30 | 21.03 | 18.43 | 3.95 | 72.03 | 76 |
| Textile | 15.84 | 8.95 | 26.02 | -40.30 | 252.38 | 581 |
| Transportation | 28.03 | 17.12 | 80.13 | -687.99 | 767.09 | 289 |
| Venture Capital | 0.61 | 1.02 | 22.52 | -126.01 | 72.66 | 158 |
| Wholesale & Retail | 12.20 | 4.97 | 46.47 | -241.36 | 461.66 | 394 |
| Total | 10.49 | 6.32 | 72.31 | -5386.12 | 1945.56 | 11425 |

Table 3.13: The descriptive statistics on interest expenses to net sales ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|--------|-------|---------|-------|-----------|-------|
| Agriculture | 12.86 | 10.42 | 8.27 | 0.00 | 55.42 | 570 |
| Automotive | 10.49 | 8.94 | 5.51 | 0.00 | 34.20 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 23.67 | 12.90 | 147.25 | 0.00 | 2765.54 | 760 |
| Construction | 11.80 | 10.40 | 12.55 | 0.00 | 167.54 | 1216 |
| Defense & Com. | 21.28 | 10.10 | 42.85 | 2.03 | 556.47 | 228 |
| Durable Cons. | 11.14 | 11.28 | 7.79 | 0.00 | 27.61 | 342 |
| Electricity | 76.92 | 8.74 | 757.69 | 0.00 | 17052.01 | 608 |
| Fabricated Metal | 11.97 | 10.11 | 8.41 | 0.00 | 78.06 | 570 |
| Financial Leasing | 15.21 | 13.97 | 13.02 | 0.00 | 60.73 | 304 |
| Food & Beverage | 80.49 | 12.57 | 1760.98 | 0.00 | 51982.64 | 874 |
| Holding & Invest | 147.36 | 14.35 | 3656.56 | 0.00 | 119005.50 | 1064 |
| Information | 30.48 | 3.72 | 55.42 | 0.00 | 433.44 | 418 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228 |
| Law & Man. | 13.59 | 6.25 | 18.12 | 0.00 | 113.20 | 190 |
| Media & Com. | 24.68 | 21.01 | 9.79 | 13.01 | 42.77 | 114 |
| Health | 12.83 | 5.38 | 12.32 | 0.00 | 53.75 | 266 |
| Public Works | 42.46 | 4.57 | 330.22 | 0.00 | 4609.30 | 342 |
| R. Estate & REIC | 45.13 | 15.74 | 200.61 | 0.00 | 4532.14 | 1178 |
| Restaurant - Hotel | 51.48 | 30.38 | 66.64 | 0.00 | 341.01 | 228 |
| Sport | 10.00 | 8.78 | 6.61 | 0.00 | 56.67 | 152 |
| Telecom. | 22.71 | 22.66 | 4.92 | 10.57 | 30.49 | 76 |
| Textile | 16.50 | 12.21 | 14.36 | 0.00 | 60.13 | 646 |
| Transportation | 11.89 | 10.26 | 10.59 | 0.00 | 67.45 | 342 |
| Venture Capital | 688.40 | 12.60 | 2930.96 | 0.00 | 25851.84 | 190 |
| Wholesale & Retail | 26.57 | 17.77 | 75.48 | 0.00 | 1442.11 | 456 |
| Total | 48.06 | 10.45 | 1234.14 | 0.00 | 119005.50 | 12540 |

Table 3.14: The descriptive statistics on operating expenses to net sales ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|---------|-------|----------|--------|-----------|-------|
| Agriculture | 6.16 | 3.57 | 9.02 | -0.89 | 103.24 | 570 |
| Automotive | 6.76 | 3.83 | 9.30 | -1.47 | 96.46 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 80.25 | 4.44 | 978.26 | 0.00 | 19234.17 | 760 |
| Construction | 6.87 | 3.47 | 9.07 | -1.20 | 94.81 | 1216 |
| Defense & Com. | 6.51 | 3.38 | 9.05 | 0.06 | 86.91 | 228 |
| Durable Cons. | 6.22 | 4.94 | 5.92 | 0.00 | 29.00 | 342 |
| Electricity | 58.86 | 5.91 | 889.01 | -34.37 | 21878.73 | 608 |
| Fabricated Metal | 7.92 | 4.98 | 12.58 | -1.24 | 134.24 | 570 |
| Financial Leasing | 43.08 | 55.01 | 35.34 | 0.00 | 120.41 | 304 |
| Food & Beverage | 20.86 | 4.79 | 380.14 | 0.00 | 11220.18 | 874 |
| Holding & Invest | 17.80 | 5.25 | 92.22 | -22.68 | 2658.97 | 1064 |
| Information | 5.73 | 1.47 | 13.18 | 0.00 | 122.85 | 418 |
| Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 228 |
| Law & Man. | 2.15 | 0.50 | 4.31 | -2.49 | 34.86 | 190 |
| Media & Com. | 9.10 | 7.82 | 7.57 | 0.25 | 43.94 | 114 |
| Health | 3.75 | 1.50 | 4.72 | 0.00 | 24.26 | 266 |
| Public Works | 72.25 | 3.60 | 477.24 | 0.00 | 6373.39 | 342 |
| R. Estate & REIC | 88.33 | 15.32 | 579.56 | -4.28 | 18377.77 | 1178 |
| Restaurant - Hotel | 114.58 | 26.91 | 273.75 | -5.31 | 2152.63 | 228 |
| Sport | 32.93 | 24.64 | 28.91 | 0.00 | 218.38 | 152 |
| Telecom. | 13.52 | 10.53 | 11.36 | 1.26 | 62.64 | 76 |
| Textile | 10.05 | 8.06 | 8.91 | 0.00 | 65.13 | 646 |
| Transportation | 13.66 | 6.46 | 20.49 | -0.44 | 110.44 | 342 |
| Venture Capital | 3691.44 | 0.00 | 25473.91 | 0.00 | 272108.40 | 190 |
| Wholesale & Retail | 32.53 | 1.68 | 127.42 | 0.00 | 1288.21 | 456 |
| Total | 84.91 | 4.00 | 3182.61 | -34.37 | 272108.40 | 12540 |

In addition to this we also consider the following ratios available in the dataset.

- i) **Foreign assets to total debt ratio:** It shows the rate of how much of the assets of the company are denominated in foreign currency.
- ii) **Export ratio** is the ratio of total export to total sales of a given firm.

Table 3.15: The descriptive statistics on foreign assets to total debt ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|--------|-------|---------|------|----------|-------|
| Agriculture | 31.83 | 12.27 | 42.29 | 0.00 | 265.44 | 570 |
| Automotive | 75.81 | 36.32 | 158.25 | 0.00 | 1371.50 | 684 |
| Banks | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 494 |
| Chemicals | 37.65 | 19.38 | 54.91 | 0.00 | 643.16 | 760 |
| Construction | 17.52 | 10.99 | 22.95 | 0.00 | 264.09 | 1216 |
| Defense & Com. | 75.23 | 48.24 | 80.67 | 0.00 | 453.47 | 228 |
| Durable Cons. | 30.02 | 31.90 | 27.33 | 0.00 | 97.55 | 342 |
| Electricity | 44.91 | 15.32 | 93.08 | 0.00 | 617.92 | 608 |
| Fabricated Metal | 31.85 | 18.71 | 38.74 | 0.00 | 282.73 | 570 |
| Financial Leasing | 39.10 | 40.68 | 31.43 | 0.00 | 94.88 | 304 |
| Food & Beverage | 15.03 | 5.40 | 25.46 | 0.00 | 264.03 | 874 |
| Holding & Invest | 33.59 | 10.14 | 237.32 | 0.00 | 7566.05 | 1064 |
| Information | 83.56 | 17.03 | 180.12 | 0.00 | 1317.98 | 418 |
| Insurance | 8.22 | 6.44 | 8.51 | 0.00 | 59.45 | 228 |
| Law & Man. | 12.71 | 0.59 | 33.12 | 0.00 | 215.94 | 190 |
| Media & Com. | 16.24 | 13.89 | 15.94 | 0.00 | 86.00 | 114 |
| Health | 25.96 | 1.84 | 42.38 | 0.00 | 170.39 | 266 |
| Public Works | 17.42 | 4.82 | 27.80 | 0.00 | 239.94 | 342 |
| R. Estate & REIC | 222.46 | 2.83 | 1116.70 | 0.00 | 14709.02 | 1178 |
| Restaurant - Hotel | 30.72 | 7.41 | 73.14 | 0.00 | 503.53 | 228 |
| Sport | 20.14 | 3.80 | 63.06 | 0.00 | 518.83 | 152 |
| Telecom. | 23.63 | 19.83 | 17.61 | 3.16 | 62.64 | 76 |
| Textile | 25.74 | 20.80 | 24.99 | 0.00 | 170.55 | 646 |
| Transportation | 70.14 | 14.19 | 363.45 | 0.00 | 4221.79 | 342 |
| Venture Capital | 33.60 | 0.04 | 94.86 | 0.00 | 708.59 | 190 |
| Wholesale & Retail | 11.26 | 0.49 | 27.84 | 0.00 | 230.14 | 456 |
| Total | 50.52 | 9.86 | 364.37 | 0.00 | 14709.02 | 12540 |

Table 3.15 presents the descriptive statistics for foreign assets to total debt ratio. The average ratio has been recorded as 50.52. According to the table companies operating in real estate and real estate real estate investment trust company sector have the highest ratio. Companies operating in the insurance sector have the lowest rate with 8.22.

Table 3.16: The descriptive statistics on export ratio across different sectors

| Sector | Mean | P50 | SD | Min | Max | N |
|--------------------|-------|-------|-------|------|--------|------|
| Agriculture | 16.61 | 8.58 | 17.18 | 0.00 | 80.39 | 399 |
| Automotive | 44.48 | 45.41 | 24.70 | 0.00 | 94.83 | 501 |
| Banks | . | . | . | . | . | 0 |
| Chemicals | 21.96 | 19.26 | 19.62 | 0.00 | 85.00 | 488 |
| Construction | 16.82 | 12.53 | 15.59 | 0.00 | 80.00 | 1078 |
| Defense & Com. | 13.82 | 10.66 | 12.48 | 0.00 | 68.37 | 202 |
| Durable Cons. | 42.35 | 51.49 | 26.98 | 0.00 | 95.72 | 257 |
| Electricity | 20.84 | 8.26 | 26.53 | 0.00 | 99.94 | 377 |
| Fabricated Metal | 33.69 | 33.41 | 22.87 | 0.00 | 85.81 | 494 |
| Financial Leasing | . | . | . | . | . | 0 |
| Food & Beverage | 24.99 | 15.39 | 24.54 | 0.00 | 96.68 | 733 |
| Holding & Invest | 16.83 | 9.45 | 20.87 | 0.00 | 100.00 | 492 |
| Information | 3.03 | 0.69 | 7.47 | 0.00 | 40.65 | 257 |
| Insurance | . | . | . | . | . | 0 |
| Law & Man. | 2.37 | 0.73 | 4.07 | 0.00 | 21.17 | 83 |
| Media & Com. | 23.62 | 25.52 | 19.87 | 0.03 | 56.90 | 109 |
| Health | 4.63 | 0.53 | 8.29 | 0.00 | 43.06 | 117 |
| Public Works | 28.57 | 23.86 | 31.83 | 0.00 | 100.00 | 135 |
| R. Estate & REIC | 3.91 | 0.00 | 12.59 | 0.00 | 60.86 | 102 |
| Restaurant - Hotel | 0.26 | 0.00 | 1.44 | 0.00 | 11.17 | 107 |
| Sport | 12.74 | 9.60 | 13.85 | 0.00 | 46.60 | 47 |
| Telecom. | 6.52 | 6.39 | 3.17 | 1.58 | 13.29 | 61 |
| Textile | 35.78 | 34.54 | 25.40 | 0.00 | 98.22 | 515 |
| Transportation | 42.90 | 43.34 | 29.82 | 2.26 | 90.35 | 185 |
| Venture Capital | 17.37 | 0.00 | 29.35 | 0.00 | 99.17 | 54 |
| Wholesale & Retail | 2.24 | 0.00 | 11.58 | 0.00 | 99.15 | 205 |
| Total | 22.82 | 14.29 | 24.17 | 0.00 | 100.00 | 6998 |

Due to the export made by the companies operating in the automobile sector, the export ratios are the highest. (Sector average is 44.48). This rate is also high in the durable consumption sector. The lowest ratio among the sectors belongs to the service sectors such as restaurants and hotel sectors as well as companies operating in the law and management sector.

4. MODEL AND EMPIRICAL FINDINGS

Exchange rate exposure is estimated from the following baseline regression following Adler and Dumas (1984) and Jorion (1990);

$$R_{it} = \beta_{0i} + \beta_{er,i}ER_{st} + \varepsilon_{i,t} \quad t = 1, \dots, T \quad (1)$$

where, R_{it} rate of return on the i th firms stock price and ER_{st} is the rate of change in a foreign exchange rate calculated as the value of the Turkish lira per foreign currency. Jorion (1990) states that the above-mentioned definition would be appropriate if it is assumed that changes in stock prices and exchange rates are unpredictable.

This model can also be extended by taking into account market moves. The extended version of the regression equation is following:

$$R_{it} = \beta_{0i} + \beta_{er,i}ER_{st} + \beta_{m,i}(U)R_{mt} + \lambda_{i,t} \quad t = 1, \dots, T \quad (2)$$

Throughout our analysis, I assume that exchange rate fluctuations are unpredictable. Increase in the exchange rate represents a depreciation of Turkish Lira. Our main coefficient of interest is β . Positive (negative) and significant values of beta implies that as the currency depreciates stock return increase (decrease).

The impact of depreciation can be both positive and negative effect the firms. There are different channels that potentially effect the amount of revenues, therefore the stock return of a given firm. These channels are:

- i. **Competitiveness channel:** When exchange rate depreciates, exported good are more competitive therefore firms sell more in international markets. This is expected to be more prevalent in exporting firms.
- ii. **Substitution effect:** When exchange rate depreciates, the price of the imported goods will increase, the price difference between domestic goods and imported goods will increase. This will create a substitution effect and domestic sales increase.

- iii. **Financial status:** When the exchange rate depreciates, the financial status of the exporting companies will be affected positively as their revenues are denominated in mostly dollars and euro, while the companies that borrow foreign assets will adversely affected.
- iv. **Cost of production:** The production cost will increase when the exchange rate increases.

Depending on the relative importance of these channels net effect of currency depreciation may be positive, negative or insignificant.

Using the models described in equation 1 and 2, I conduct a simple linear regression analysis using the firm level data for each sector.

According to the baseline model, the coefficient of exchange rate, beta, is significant in 8 of 26 sectors. Significant sectors are; automotive companies, banks, construction companies, durable consumption, fabricated metal and other manufacturing, financial leasing and factoring companies, holding and investment companies and sports. Among the 8 sectors; automotive and construction companies have significant negative coefficient which implies that as the currency depreciates stock return in the sector declines. On the other hand, for the sample of financial leasing companies, I find significant and positive coefficient for exchange rate variable. For this sector exchange rate depreciation has a positive impact on stock returns.

According to extended model, the coefficients are significant in 6 of 26 sectors. Overall, for the significant coefficients across sectors, the sign of the coefficients are in line with the baseline model except construction and sport sectors in which the coefficients turn insignificant. The sectors with significant and positive exposure coefficients are durable consumption, banks, financial leasing and factoring, holding and investment, media and communication companies while automotive sector has a negative and significant coefficient. Automotive sector and automotive companies is the only sector with negative and significant coefficient implying that as Turkish Lira depreciates stock return in the sector decrease.

Table 4.1: Regression for the baseline and extended model

| Sector | Baseline Regression | | Extended Model | |
|--------------------|---------------------|-------------|----------------|-----------------|
| | Number of firms | FX Exposure | FX Exposure | Market Exposure |
| Agriculture | 15 | -0.795 | 0.0587 | 0.751*** |
| Automotive | 18 | -2.857*** | -1.883*** | 0.853*** |
| Banks | 12 | 1.459* | 2.231*** | 0.808*** |
| Chemicals | 20 | -1.165 | -0.461 | 0.815*** |
| Construction | 32 | -2.186*** | -0.919 | 0.749*** |
| Defense & Com. | 6 | -0.672 | -0.151 | 0.806*** |
| Durable Cons. | 9 | 2.804* | 3.785** | 0.880*** |
| Electricity | 17 | -0.911 | -0.364 | 0.807*** |
| Fabricated Metal | 15 | -1.666* | -0.813 | 0.588*** |
| Financial Leasing | 8 | 2.242*** | 2.706*** | 0.451*** |
| Food & Beverage | 23 | -0.598 | 0.105 | 0.549*** |
| Holding & Invest | 28 | 1.525* | 2.257*** | 0.796*** |
| Information | 11 | -1.874 | -0.531 | 1.049*** |
| Insurance | 6 | 0.295 | 0.929 | 0.724*** |
| Law & Man. | 5 | 5.982 | 6.433 | 0.552 |
| Media & Com. | 3 | 2.738 | 3.690* | 0.999*** |
| Health | 7 | -0.251 | 0.450 | 0.877*** |
| Public Works | 9 | -1.714 | -0.924 | 1.065*** |
| R. Estate & REIC | 31 | -0.740 | 0.0405 | 0.722*** |
| Restaurant - Hotel | 6 | -0.196 | 1.736 | 0.857*** |
| Sport | 4 | -3.780* | -3.041 | 1.182*** |
| Telecom. | 2 | -0.818 | -0.399 | 0.756*** |
| Textile | 17 | -0.0537 | 0.695 | 0.781*** |
| Transportation | 9 | 1.745 | 2.690 | 1.279*** |
| Venture Capital | 5 | -4.192 | 0.199 | 0.669*** |
| Wholesale & Retail | 12 | -1.487 | -0.926 | 0.601*** |

Notes: *** p<0.01, ** p<0.05, * p<0.1

Next, I test the degree of exposure across firms with different levels of liquidity. In order to do that I divide the sample in two groups based on the distribution of the current and inventory to total assets ratio. High ratio (High, 50%) represent the sample consisting the firms with ratios belonging to the upper 50 percentile of the distribution, while the low ratio (Low, 50%) represents the firms with ratios belonging to the lower 50 percentiles. In addition, I test the results using the groups that corresponds to upper (High, 25%) and lower quartiles (Low, 25%) of the distributions. For the cash ratio and liquidity ratio, there is no linear relationship between the value of the ratios and its preference level, therefore, I have applied a different method to divide the sample. Cash ratio is preferred to be close to 0.20. (Gündoğdu, 2017) Therefore I have divided the sample between firms whose cash ratio is

close to 0.20 or not. Accordingly, firms that has cash ratio between 0.10 and 0.20 are considered preferable while the others not. Similarly, liquidity ratio is preferred to be close to 1, therefore I have divided the sample between firms whose cash ratio is close to 1 or not. As a result, firms that has cash ratio between 0.80 and 1.20 are considered preferable while the others not.

Below, I present the results based on the extended specification described in equation 2.

The results associated with firms with different levels of current and inventory to total assets ratios are present in Table 4.2. For the current ratio, in the two-specification, there is no significant exchange rate coefficient reported indicating no evidence for exchange rate exposure of firms with different liquidity levels. On the other hand, when I look at the sample of firm with low inventory to total assets ratio, my results show that firms with preferable inventory to total assets ratio (low levels) have positive and significant coefficients for exchange rate indicating that these firms are positively affected by exchange rate depreciation. For the other group firm which have higher values of inventory to total assets ratio the coefficients of exchange rate exposure are insignificant, indicating no evidence for exchange rate exposure.

Table 4.3 presents results based on cash ratio and liquidity ratios. The results show that firms with favourable cash ratio are not affected by exchange rate variations as shown by insignificant coefficients of exchange rates depicted in Table 4.3, while firms with unfavourable cash ratio are affected positively by exchange rate depreciations. In parallel to the findings of cash ratio, firms with favourable liquidity ratio are not affected by exchange rate fluctuations as shown insignificant coefficients, while firms with unfavourable cash ratio are affected positively by exchange rate depreciations.

For the financial ratios, I further investigate the sample with high and low leverage and equity multiplier ratios. If the leverage ratio increases that means companies use more loans therefore, the leverage ratio is preferred to be low. Companies that are potentially adversely affected by the exchange rate due to an increase in lows may be more vulnerable to negative impacts of exchange rate fluctuations. On the other hand, low equity multiplier can be both risky and safe at the same time. Low values imply that the company has low debt, therefore

it is less risky. High values represent more aggressive company strategy which can create further growth. Because of this, it's difficult to make any assertion.

The results of financial ratios are depicted in Table 4.4. In parallel to my expectations, I see no significant relation between firms having low and high equity ratios. On the other hand, firms with preferable (low) levels of leverage ratio have positive and significant exchange rate coefficients implying that stock returns are positively affected by exchange rate depreciation.

Next, I investigate the samples with different profitability ratios. The results are present in Table 4.5. Companies with low EBITDA to equity ratio have positive and significant exchange rate coefficients while there is no significant exchange rate coefficient reported for the companies with high EBITDA to equity ratios. As a profitability indicator, I use two additional ratios, namely interest expenses to net sales, and operating expenses to net sales (OPEX) . Interest expenses to net sales ratio measured weight of interest expenses on the profit. My results depicted in Table 4.5 show that firms with low levels of expense (net sales ratio, have significant and positive exchange rate coefficient implying that depreciation positively affects these firms. On the other hand, for the firms with high and low OPEX values, there is no significant exposure coefficient reported.

I investigate the sample for turnover ratios with high and low working capital turnover, receivable turnover and tangible fixed assets turnover ratios. The results are depicted in Table 4.6. There is no evidence for exchange rate exposure for firms with different levels of working capital turnover ratios. On the other hand, according to the table companies with low receivable turnover ratio are positively and significantly affected by the exchange rate implying that stock returns are positively affected by exchange rate depreciation.

The high rate of receivables turnover shows that receivables are collected faster. Companies with low collection rates are positively affected by the exchange rate.

If the companies have a higher tangible fixed assets turnover ratio means that the company is using its fixed assets more effectively. There is statistical positive significance between

tangible fixed assets and basket and this is more common in companies within the lower and upper quartile of the distribution of this ratio.

Moreover, I test exposure degree for firms with different levels of exports and FX assets. The increase in the ratio of foreign assets to total debt will affect the company's financials negatively in case of cash depreciation or the company's assets can be more valuable by the appreciation in the foreign exchange. For the export ratio there are different channels. If export ratio increases, depreciation results in increasing stock returns because firms exports are in dollar or euro, and therefore the dollar value of the exported goods become more competitive. However, if firms use imported inputs, the reverse effect can be seen. As a result, the results may be mixed depending on the relative importance of imported inputs and exports as these two effects may counterbalance.

The results are depicted in table 4.7. Based on the categorization of firms with different export ratios, there is no significant coefficients for exchange rates reported indicating no evidence of exchange rate exposure for firms with lower and higher foreign involvement. Moreover, for firms in the lower quartile of foreign assets to debt ratio, the coefficient of exchange rate appear as positive and significant implying that these firms are positively affected by exchange rate depreciation.

Table 4.2: Regression analysis for liquidity ratios

| | (1) | (2) | (7) | (8) | (9) | (10) | (11) | (12) |
|------------------|----------------------------------|-----------------------------|--|--|-------------------------------|-----------------------------------|---|--|
| | Current Ratio Low (%25) | Current Ratio High (%25) | Inventories to Total Assets Low (%25) | Inventories to Total Assets High (%25) | Current Ratio Low (%50) | Current Ratio High (%50) | Inventories to Total Assets Low (%50) | Inventories to Total Assets High (%50) |
| Variables | | | | | | | | |
| Basket | 0.430 (0.468) | 0.568 (0.438) | 1.023*** (0.389) | -0.145 (0.372) | 0.294 (0.272) | 0.445 (0.293) | 0.542* (0.284) | 0.0742 (0.278) |
| Bist Return | 0.849*** (0.0680) | 0.838*** (0.0567) | 0.728*** (0.0530) | 0.761*** (0.0515) | 0.780*** (0.0388) | 0.774*** (0.0380) | 0.785*** (0.0380) | 0.772*** (0.0382) |
| Constant | 0.709 (1.695) | 1.744 (1.448) | -0.361 (1.341) | 2.659** (1.296) | 1.680* (0.977) | 1.814* (0.967) | 1.081 (0.967) | 2.655*** (0.961) |
| Observatio ns | 2,037 | 2,887 | 2,616 | 2,641 | 4,949 | 5,799 | 5,262 | 5,340 |
| R-squared | 0.071 | 0.070 | 0.068 | 0.078 | 0.076 | 0.067 | 0.075 | 0.071 |
| N | 2037 | 2887 | 2616 | 2641 | 4949 | 5799 | 5262 | 5340 |
| r2 | 0.0711 | 0.0703 | 0.0680 | 0.0777 | 0.0756 | 0.0670 | 0.0750 | 0.0713 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.3: Regression analysis for cash and liquidity ratios

| VARIABLES | (1) CR Good 1 (10-30) | (2) CR Bad CR (10-30) | (3) LR Good 0 | (4) LR Bad 0 |
|--------------|--------------------------|--------------------------|------------------|-----------------|
| BASKET | 0.101 | 0.411* | 0.127 | 0.412* |
| | -0.386 | -0.231 | -0.381 | -0.233 |
| BIST Return | 0.844*** | 0.758*** | 0.755*** | 0.782*** |
| | -0.0525 | -0.0315 | -0.0542 | -0.0313 |
| Constant | 1.764 | 1.858** | 2.547* | 1.628** |
| | -1.33 | -0.794 | -1.343 | -0.794 |
| Observations | 2,317 | 8,431 | 2,396 | 8,352 |
| R-squared | 0.101 | 0.064 | 0.075 | 0.07 |
| N | 2317 | 8431 | 2396 | 8352 |
| r2 | 0.101 | 0.0641 | 0.0752 | 0.0695 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.4: Regression analysis for financial position ratios

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|--------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Leverage Ratio | Leverage Ratio High | Equity Multiplier | Equity Multiplier | Leverage Ratio Low | Leverage Ratio High | Equity Multiplier | Equity Multiplier |
| Variables | Low (%25) | (%25) | Low (%25) | High (%25) | (%50) | (%50) | Low (%50) | High (%50) |
| Basket | 1.176*** (0.436) | -0.100 (0.345) | 0.577 (0.470) | 0.535 (0.345) | 0.717** (0.302) | -0.0292 (0.264) | 0.222 (0.307) | 0.379 (0.259) |
| BIST Return | 0.766*** (0.0553) | 0.833*** (0.0506) | 0.743*** (0.0601) | 0.788*** (0.0497) | 0.728*** (0.0388) | 0.832*** (0.0374) | 0.732*** (0.0396) | 0.826*** (0.0366) |
| Constant | -0.501 (1.414) | 2.489** (1.262) | 1.716 (1.538) | 0.765 (1.244) | 0.935 (0.998) | 2.665*** (0.936) | 2.287** (1.012) | 1.476 (0.922) |
| Observations | 2,656 | 2,646 | 2,641 | 2,669 | 5,273 | 5,329 | 5,267 | 5,335 |
| R-squared | 0.068 | 0.094 | 0.055 | 0.086 | 0.063 | 0.086 | 0.061 | 0.087 |
| N | 2656 | 2646 | 2641 | 2669 | 5273 | 5329 | 5267 | 5335 |
| r2 | 0.0682 | 0.0940 | 0.0548 | 0.0860 | 0.0625 | 0.0856 | 0.0613 | 0.0871 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.5: Regression analysis for profitability ratios

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | EBITDA/Equity | EBITDA/Equity | Expense to Sales | Expense to Sales | OPEX | OPEX |
| Variables | Low (%25) | High (%25) | Low (%25) | High (%25) | Low (%25) | High (%25) |
| Basket | 1.186*** (0.436) | -0.375 (0.387) | 1.291*** (0.486) | -0.227 (0.341) | 0.610 (0.476) | 0.470 (0.395) |
| BistRetun | 0.751*** (0.0577) | 0.847*** (0.0583) | 0.663*** (0.0642) | 0.851*** (0.0510) | 0.788*** (0.0667) | 0.745*** (0.0528) |
| Constant | -3.083** (1.467) | 6.515*** (1.441) | -0.606 (1.631) | 1.712 (1.260) | 1.258 (1.668) | 0.682 (1.335) |
| Observations | 2,630 | 2,647 | 2,156 | 2,900 | 2,133 | 2,872 |
| R-squared | 0.061 | 0.076 | 0.049 | 0.089 | 0.062 | 0.065 |
| N | 2630 | 2647 | 2156 | 2900 | 2133 | 2872 |
| r2 | 0.0615 | 0.0760 | 0.0489 | 0.0887 | 0.0616 | 0.0650 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.5 continued: Regression analysis for profitability ratios

| | (7) | (8) | (9) | (10) | (11) | (12) |
|--------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | EBITDA/Equity | EBITDA/Equity | Expense to Sales | Expense to Sales | OPEX | OPEX |
| Variables | Low (%50) | High (%50) | Low (%50) | High (%50) | Low (%50) | High (%50) |
| Basket | 0.723** (0.300) | -0.237 (0.264) | 0.867*** (0.316) | 0.0616 (0.258) | 0.272 (0.298) | 0.364 (0.268) |
| BistRetun | 0.755*** (0.0386) | 0.835*** (0.0377) | 0.713*** (0.0402) | 0.828*** (0.0369) | 0.792*** (0.0418) | 0.764*** (0.0356) |
| Constant | -1.051 (0.998) | 5.262*** (0.932) | 0.951 (1.041) | 2.192** (0.920) | 2.789*** (1.047) | 1.163 (0.905) |
| Observations | 5,242 | 5,360 | 5,038 | 5,710 | 4,979 | 5,769 |
| R-squared | 0.068 | 0.085 | 0.059 | 0.081 | 0.067 | 0.074 |
| N | 5242 | 5360 | 5038 | 5710 | 4979 | 5769 |
| r2 | 0.0680 | 0.0849 | 0.0592 | 0.0813 | 0.0675 | 0.0740 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.6: Regression analysis for turnover ratios

| VARIABLES | (1) Working Capital Low (%25) | (2) Working Capital High (%25) | (3) receivable turnover ratio Low (%25) | (4) receivable turnover ratio High (%25) | (5) FAT Low (%25) | (6) FAT High (%25) |
|--------------|--|---|--|---|-------------------------|--------------------------|
| Basket | 0.565 (0.387) | -0.0684 (0.400) | 0.860** (0.399) | -0.0110 (0.460) | 1.117** (0.539) | 0.779* (0.442) |
| Bist Return | 0.795*** (0.0516) | 0.761*** (0.0525) | 0.688*** (0.0547) | 0.841*** (0.0630) | 0.769*** (0.0727) | 0.793*** (0.0625) |
| Constant | 0.292 (1.338) | 3.400** (1.321) | 0.0261 (1.386) | 3.227** (1.587) | -1.148 (1.855) | 1.220 (1.570) |
| Observations | 2,637 | 2,648 | 2,782 | 2,073 | 1,981 | 2,871 |
| R-squared | 0.083 | 0.075 | 0.054 | 0.080 | 0.054 | 0.053 |
| N | 2637 | 2648 | 2782 | 2073 | 1981 | 2871 |
| r2 | 0.0828 | 0.0748 | 0.0543 | 0.0798 | 0.0543 | 0.0533 |

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 4.6 continued: Regression analysis for turnover ratios

| VARIABLES | (7) | (8) | (9) | (10) | (11) | (12) |
|--------------|---------------------------------|----------------------------------|---|--|----------------------|----------------------|
| | Working Capital Low (%50) | Working Capital High (%50) | receivable turnover ratio Low (%50) | receivable turnover ratio High (%50) | FAT Low (%50) | FAT High (%50) |
| Basket | 0.685** (0.290) | -0.0507 (0.273) | 0.608** (0.286) | 0.0774 (0.277) | 0.0615 (0.290) | 0.569** (0.274) |
| Bist Return | 0.765*** (0.0395) | 0.795*** (0.0371) | 0.733*** (0.0390) | 0.821*** (0.0378) | 0.782*** (0.0394) | 0.773*** (0.0375) |
| Constant | 0.445 (1.017) | 3.195*** (0.917) | 0.803 (0.985) | 2.891*** (0.953) | 1.937* (0.991) | 1.791* (0.948) |
| Observations | 5,229 | 5,373 | 5,450 | 5,298 | 4,928 | 5,820 |
| R-squared | 0.067 | 0.079 | 0.061 | 0.082 | 0.074 | 0.068 |
| N | 5229 | 5373 | 5450 | 5298 | 4928 | 5820 |
| r2 | 0.0672 | 0.0795 | 0.0608 | 0.0822 | 0.0743 | 0.0681 |

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 4.7: Regression analysis for export and foreign assets to total debt ratios

| VARIABLES | (1) Export Ratio Low (%25) | (2) Export Ratio High (%25) | (3) Foreign Assets to Total Debt Ratio Low (%25) | (4) Foreign Assets to Total Debt Ratio High (%25) | (5) Export Ratio Low (%50) | (6) Export Ratio High (%50) | (7) Foreign Assets to Total Debt Ratio Low (%50) | (8) Foreign Assets to Total Debt Ratio High (%50) |
|--------------|--|---|---|--|--|---|---|--|
| Basket | -0.00506 (0.644) | -0.0496 (0.418) | 1.587** (0.637) | 0.317 (0.303) | -0.00554 (0.384) | 0.0527 (0.306) | 0.376 (0.342) | 0.328 (0.231) |
| BIST Return | 0.735*** (0.0876) | 0.785*** (0.0600) | 0.684*** (0.0871) | 0.809*** (0.0414) | 0.746*** (0.0517) | 0.765*** (0.0419) | 0.762*** (0.0469) | 0.788*** (0.0313) |
| Constant | 3.256 (2.262) | 3.573** (1.473) | -0.923 (2.196) | 2.466** (1.027) | 3.084** (1.327) | 2.882*** (1.049) | 1.412 (1.183) | 2.160*** (0.791) |
| Observations | 1,569 | 1,605 | 1,922 | 2,963 | 3,203 | 3,235 | 4,843 | 5,905 |
| R-squared | 0.043 | 0.098 | 0.033 | 0.115 | 0.062 | 0.094 | 0.052 | 0.097 |
| N | 1569 | 1605 | 1922 | 2963 | 3203 | 3235 | 4843 | 5905 |
| r2 | 0.0434 | 0.0979 | 0.0327 | 0.115 | 0.0616 | 0.0939 | 0.0517 | 0.0968 |

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

5. CONCLUSION

Changes in money value affect both the value of companies and their cash flows in terms of sustaining their activities and profitability. In this thesis, based on the financial statements of 330 firms operating in 26 sectors between 2010-2019, exchange rate exposure has been examined across different sectors and across firms with different liquidity, financial, turnover and profitability ratios.

The exchange rate exposure was examined using a basket consisting of the average of the euro and the dollar, based on baseline and extended model. The exchange rate exposure in the baseline model is the coefficient of the exchange rate following Adler and Dumas' (1984) methodology and calculated by regressing firm returns on the change in the basket exchange rate index. On the other hand, in the extended model, I add an additional independent variable, market return in order to take into account market movements.

According to the baseline model, the coefficient of exchange rate, beta, is significant in 8 of 26 sectors. Significant sectors are; automotive companies, banks, construction companies, durable consumption, fabricated metal & other manufacturing, financial leasing and factoring companies, holding and investment companies and sports. According to extended model, the coefficients are significant in 6 of 26 sectors. Overall, for the significant coefficients across sectors, the sign of the coefficients are in line with the baseline model except construction and sport sectors in which the coefficients turn insignificant.

According to the ratio distribution, it was divided into two groups and examined. High Ratio (High, 50%, High 25%) represent the sample consisting the firms with ratios belonging to the upper 50 and 25 percentile of the distribution, while the Low Ratio (Low, 50%, Low 25%) represents the firms with ratios belonging to the lower 50 percentiles.

For the liquidity ratios, firms with favourable liquidity position based on cash ratio, and liquidity ratio exhibit insignificant exchange rate coefficients, indicating no evidence of

exchange rate exposure. On the other hand, firms with unfavourable levels of cash and liquidity ratios have positive and significant exchange rate coefficients. For the current ratio, the results are insignificant for firms having both favourable and unfavourable liquidity levels. In terms of inventory to total assets ratio, while firms with favourable ratios have positive coefficient, unfavourable firms are not exposed to exchange rate variations.

When I categorize firms with respect to financial ratios (leverage and equity multiplier ratio). Except firms with favourable (low levels) of leverage ratio, all groups have no significant exchange rate coefficient. On the other hand, firms with low leverage, in other words with lower debt, have positive coefficients of exchange rate exposure.

When I categorize firms with respect to profitability ratios, only firms low EBITDA to equity ratio (unfavourable) and interest expense to sales ratio (favourable) have significant and positive exchange rate coefficient. For the turnover ratios, firms with low levels of receivable turnover ratios, (unfavourable) have positive exchange rate coefficients. On the other hand, the coefficient of tangible fixed asset turnover ratio is positive across the two group of firms having low and high levels of this ratio.

Moreover, for firms in the lower quartile of foreign assets to debt ratio (favourable), the coefficient of exchange rate appears as positive and significant implying that these firms are positively affected by exchange rate depreciation. On the other hand, for firms with different levels of export ratio, there is no evidence for exchange rate exposure.

Table 5.1: Results for investigated ratios

| Ratio | Results | Ratio | Results |
|------------------------|---|---|---|
| Current Ratio | There is no significant exchange rate coefficient reported | Receivable Turnover Ratio | Companies with low receivable turnover ratio are positively and significantly affected by the exchange rate implying that stock returns are positively affected by exchange rate depreciation. |
| Cash Ratio | Firms with favourable cash ratio are not affected by exchange rate variations, while firms with unfavourable cash ratio are affected positively by exchange rate depreciations. | Tangible Fixed Assets Turnover Ratio | There is statistical positive significance and this is more common in companies within the lower and upper quartile of the distribution of this ratio. |
| Liquidity Ratio | Firms with favourable liquidity ratio are not affected by exchange rate fluctuations as shown insignificant coefficients, while firms with unfavourable cash ratio are affected positively by exchange rate depreciations | EBITDA / Equity | Companies with low EBITDA to equity ratio have positive and significant exchange rate coefficients while there is no significant exchange rate coefficient reported for the companies with high EBITDA to equity ratios |

Table 5.1 continued: Results for investigated ratios

| | | | |
|---|---|---|--|
| <p>Inventories To Total Assets Ratio</p> | <p>Preferable inventory to total assets ratio (low levels) have positive and significant coefficients for exchange rate higher values of inventory to total assets ratio the coefficients of exchange rate exposure are insignificant</p> | <p>Interest Expenses / Net Sales Ratio</p> | <p>Firms with low levels of expense to sales ratio, have significant and positive exchange rate coefficient implying that depreciation positively affects these firms.</p> |
| <p>Leverage Ratio</p> | <p>Firms with low levels of leverage ratio have positive and significant exchange rate coefficients implying that stock returns are positively affected by exchange rate depreciation</p> | <p>Foreign Assets To Total Debt Ratio</p> | <p>Firms in the lower quartile of foreign assets to debt ratio, the coefficient of exchange rate appear as positive and significant implying that these firms are positively affected by exchange rate depreciation.</p> |
| <p>Equity Multiplier Ratio</p> | <p>No significant relation between firms having low and high equity ratios.</p> | <p>Operating Expenses To Net Sales</p> | <p>There is no significant exposure coefficient reported.</p> |
| <p>Net Working Capital Turnover</p> | <p>Except low fifty percent, There is no evidence for exchange rate exposure for working capital turnover ratios</p> | <p>Export Ratio</p> | <p>There is no significant coefficients for exchange rates reported indicating no evidence of exchange rate exposure for firms with lower and higher foreign involvement</p> |

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7. APPENDIX A: FIRMS

| No | Code | Name | Sector |
|----|-------|-------------------------|------------------------------|
| 1 | AVOD | A.V.O.D Gıda Ve Tarım | Food |
| 2 | ACSEL | Acıpayam Selüloz | Chemical Other |
| 3 | ADANA | Adana Çimento (A) | Cement Concrete |
| 4 | ADBGR | Adana Çimento (B) | Cement Concrete |
| 5 | ADNAC | Adana Çimento (C) | Cement Concrete |
| 6 | ADEL | Adel Kalemcilik | Stationery |
| 7 | ADESE | Adese Alışveriş Ticaret | Retail |
| 8 | AFYON | Afyon Çimento | Cement Concrete |
| 9 | AKENR | Ak Enerji | Energy |
| 10 | AKBNK | Akbank | Banks |
| 11 | AKCNS | Akçansa | Cement Concrete |
| 12 | AKGUV | Akdeniz Güvenlik Hız. | Administrative Support |
| 13 | AKFGY | Akfen GMYO | Real Estate Investment Trust |
| 14 | ATEKS | Akın Tekstil | Textile Products |
| 15 | AKSGY | Akiş GMYO | Real Estate Investment Trust |
| 16 | AKMGY | Akmerkez GMYO | Real Estate Investment Trust |
| 17 | AKSA | Aksa | Textile Chemistry |
| 18 | AKSEN | Aksa Enerji | Energy |
| 19 | AKGRT | Aksigorta | Insurance |
| 20 | AKSUE | Aksu Enerji | Energy |
| 21 | ALCAR | Alarko Carrier | Durable Consumption |
| 22 | ALGYO | Alarko GMYO | Real Estate Investment Trust |
| 23 | ALARK | Alarko Holding | Holding |
| 24 | ALBRK | Albaraka Türk | Banks |
| 25 | ALCTL | Alcatel Lucent Teletaş | Communication Defense |
| 26 | ALKA | Alkim Kağıt | Paper Product Industry |
| 27 | ALKIM | Alkim Kimya | Chemical Other |
| 28 | ANACM | Anadolu Cam | Glass |
| 29 | AEFES | Anadolu Efes | Beverage |
| 30 | AGHOL | Anadolu Grubu Holding | Holding |
| 31 | ANHYT | Anadolu Hayat Emek. | Insurance |
| 32 | ASUZU | Anadolu Isuzu | Automotive |
| 33 | ANSGR | Anadolu Sigorta | Insurance |
| 34 | ANELE | Anel Elektrik | Public Work |
| 35 | ARCLK | Arçelik | Durable Consumption |
| 36 | ARENA | Arena Bilgisayar | Informatics |
| 37 | ARMDA | Armada Bilgisayar | Informatics |
| 38 | ARSAN | Arsan Tekstil | Textile Products |
| 39 | ASELS | Aselsan | Communication Defense |
| 40 | ASLAN | Aslan Çimento | Cement Concrete |

| | | | |
|----|-------|-------------------------|------------------------------|
| 41 | ATAGY | Ata GMYO | Real Estate Investment Trust |
| 42 | AGYO | Atakule GMYO | Real Estate Investment Trust |
| 43 | AVISA | AvivaSA Emeklilik Hayat | Insurance |
| 44 | AVGYO | Avrasya GMYO | Real Estate Investment Trust |
| 45 | AVTUR | Avrasya Petrol ve Tur. | Restaurant - Hotel |
| 46 | AVHOL | Avrupa Yatırım Holding | Holding |
| 47 | AYEN | Ayen Enerji | Energy |
| 48 | AYGAZ | Aygaz | Petroleum |
| 49 | BAGFS | Bagfaş | Fertilizer Agricultural |
| 50 | BAKAB | Bak Ambalaj | Paper Product Industry |
| 51 | BNTAS | Bantaş Ambalaj | Other Manufacturing |
| 52 | BANVT | Banvit | Food |
| 53 | BTCIM | Batı Çimento | Cement Concrete |
| 54 | BSOKE | Batsöke Çimento | Cement Concrete |
| 55 | BERA | Bera Holding | Holding |
| 56 | BRKSN | Berkosan Yalıtım | Building Materials |
| 57 | BJKAS | Beşiktaş Futbol Yat. | Sport |
| 58 | BEYAZ | Beyaz Filo | Transportation |
| 59 | BOYP | Beymen Perakende Yat. | Investment Companies |
| 60 | BLCYT | Bilici Yatırım | Textile Products |
| 61 | BIMAS | Bim Mağazalar | Retail |
| 62 | BIZIM | Bizim Mağazaları | Retail |
| 63 | BOLUC | Bolu Çimento | Cement Concrete |
| 64 | BRSAN | Borusan Mannesmann | Fabricated Metal |
| 65 | BRYAT | Borusan Yat. Paz. | Investment Companies |
| 66 | BFREN | Bosch Fren Sistemleri | Automotive Supply Industry |
| 67 | BOSSA | Bossa | Textile Products |
| 68 | BRISA | Brisa | Automotive Supply Industry |
| 69 | BURCE | Burçelik | Fabricated Metal |
| 70 | BUCIM | Bursa Çimento | Cement Concrete |
| 71 | CRFSA | Carrefoursa | Retail |
| 72 | CEOEM | Ceo Event Medya | Administrative Support |
| 73 | CCOLA | Coca Cola İçecek | Beverage |
| 74 | CRDFA | Creditwest Faktoring | Factoring |
| 75 | CLEBI | Çelebi | Transportation |
| 76 | CELHA | Çelik Halat | Fabricated Metal |
| 77 | CEMAS | Çemaş Döküm | Fabricated Metal |
| 78 | CEMTS | Çemtaş | Fabricated Metal |
| 79 | CMBTN | Çimbeton | Cement Concrete |
| 80 | CMENT | Çimentaş | Cement Concrete |
| 81 | CIMSA | Çimsa | Cement Concrete |
| 82 | CUSAN | Çuhadaroğlu Metal | Fabricated Metal |
| 83 | DAGI | Dagi Giyim | Wearing Apparel |
| 84 | DGATE | Datagate Bilgisayar | Informatics |
| 85 | DMSAS | Demisaş Döküm | Fabricated Metal |
| 86 | DENGE | Denge Holding | Holding |
| 87 | DZGYO | Deniz GMYO | Real Estate Investment Trust |
| 88 | DENIZ | Denizbank | Banks |

| | | | |
|-----|-------|---------------------------|------------------------------|
| 89 | DENCM | Denizli Cam | Glass |
| 90 | DERIM | Derimod | Leather Products |
| 91 | DERAS | Derlüks Deri | Leather Products |
| 92 | DESA | Desa Deri | Leather Products |
| 93 | DESPC | Despec Bilgisayar | Informatics |
| 94 | DEVA | Deva Holding | Medicine and Health |
| 95 | DITAS | Ditaş Doğan | Automotive Supply Industry |
| 96 | DOCO | DO-CO | Transportation |
| 97 | DOHOL | Doğan Holding | Holding |
| 98 | DGKLB | Doğtaş Kelebek Mobilya | Forest Products |
| 99 | DOGUB | Doğusan | Building Materials |
| 100 | DGGYO | Doğuş GMYO | Real Estate Investment Trust |
| 101 | DOAS | Doğuş Otomotiv | Automotive |
| 102 | DOKTA | Döktaş Dökümcülük | Fabricated Metal |
| 103 | DURDO | Duran Doğan Basım | Media |
| 104 | DYOBY | Dyo Boya | Dyeing |
| 105 | ECILC | Eczacıbaşı İlaç | Medicine and Health |
| 106 | ECZYT | Eczacıbaşı Yatırım | Investment Companies |
| 107 | EDIP | Edip Gayrimenkul | Public Work |
| 108 | EGEEN | Ege Endüstri | Automotive Supply Industry |
| 109 | EGGUB | Ege Gübre | Fertilizer Agricultural |
| 110 | EGPRO | Ege Profil | Building Materials |
| 111 | EGSER | Ege Seramik | Building Materials |
| 112 | EMKEL | Emek Elektrik | Electrical Supplies |
| 113 | EKGYO | Emlak Konut GMYO | Real Estate Investment Trust |
| 114 | ENJSA | Enerjisa Enerji | Energy |
| 115 | ENKAI | Enka İnşaat | Public Work |
| 116 | ERBOS | Erbosan | Fabricated Metal |
| 117 | EREGL | Ereğli Demir Çelik | Iron-Steel |
| 118 | ERSU | Ersu Gıda | Beverage |
| 119 | ESCOM | Escort Teknoloji | Informatics |
| 120 | EUHOL | Euro Yatırım Holding | Investment Companies |
| 121 | FENER | Fenerbahçe Futbol | Sport |
| 122 | FLAP | Flap Kongre Toplantı Hiz. | Administrative Support |
| 123 | FMIZP | F-M İzmit Piston | Automotive Supply Industry |
| 124 | FONET | Fonet Bilgi Teknolojileri | Informatics |
| 125 | FROTO | Ford Otosan | Automotive |
| 126 | FORMT | Formet Çelik Kapı | Durable Consumption |
| 127 | GSRAY | Galatasaray Sportif | Sport |
| 128 | GARAN | Garanti Bankası | Banks |
| 129 | GARFA | Garanti Faktoring | Factoring |
| 130 | GEDIK | Gedik Y. Men. Değ. | Intermediary Firm |
| 131 | GEDZA | Gediz Ambalaj | Chemical Other |
| 132 | GENTS | Gentaş | Forest Products |
| 133 | GEREL | Gersan Elektrik | Electrical Supplies |
| 134 | GLYHO | Global Yat. Holding | Holding |
| 135 | GOODY | Good-Year | Automotive Supply Industry |
| 136 | GOLTS | Göltaş Çimento | Cement Concrete |

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|-----|-------|--------------------------|------------------------------|
| 137 | GOZDE | Gözde Girişim | Venture Capital |
| 138 | GSDDE | GSD Denizcilik | Transportation |
| 139 | GSDHO | GSD Holding | Holding |
| 140 | GUBRF | Gübre Fabrik. | Fertilizer Agricultural |
| 141 | GLRYH | Güler Yat. Holding | Holding |
| 142 | GUSGR | Güneş Sigorta | Insurance |
| 143 | HLGYO | Halk GMYO | Real Estate Investment Trust |
| 144 | HATEK | Hatay Tekstil | Textile Products |
| 145 | HDFGS | Hedef Girişim | Venture Capital |
| 146 | HEKTS | Hektaş | Fertilizer Agricultural |
| 147 | HURGZ | Hürriyet Gzt. | Media |
| 148 | ICBCT | ICBC Turkey Bank | Banks |
| 149 | INFO | Info Yatırım | Intermediary Firm |
| 150 | IEYHO | Işıklar Enerji Yapı Hol. | Holding |
| 151 | IDEAS | İdealist Danışmanlık | Law-Management |
| 152 | IHEVA | İhlas Ev Aletleri | Durable Consumption |
| 153 | IHLGM | İhlas Gayrimenkul | Mining |
| 154 | IHGZT | İhlas Gazetecilik | Media |
| 155 | IHLAS | İhlas Holding | Holding |
| 156 | IHYAY | İhlas Yayın Holding | Holding |
| 157 | INDES | İndeks Bilgisayar | Informatics |
| 158 | INTEM | İntema | Building Materials |
| 159 | IPEKE | İpek Doğal Enerji | Petroleum |
| 160 | ISDMR | İskenderun Demir Çelik | Iron-Steel |
| 161 | ISCTR | İş Bankası (C) | Banks |
| 162 | ISFIN | İş Fin.Kir. | Financial Leasing |
| 163 | ISGSY | İş Girişim | Venture Capital |
| 164 | ISGYO | İş GMYO | Real Estate Investment Trust |
| 165 | ISMEN | İş Y. Men. Değ. | Intermediary Firm |
| 166 | ITTFH | İttifak Holding | Holding |
| 167 | IZTAR | İz Hayvancılık Tarım | Food |
| 168 | IZMDC | İzmir Demir Çelik | Iron-Steel |
| 169 | IZFAS | İzmir Fırça | Chemical Other |
| 170 | JANTS | Jantsa Jant Sanayi | Automotive Supply Industry |
| 171 | KFEIN | Kafein Yazılım | Informatics |
| 172 | KAPLM | Kaplamin | Paper Product Industry |
| 173 | KRDMA | Kardemir (A) | Iron-Steel |
| 174 | KRDMB | Kardemir (B) | Iron-Steel |
| 175 | KRDMD | Kardemir (D) | Iron-Steel |
| 176 | KAREL | Karel Elektronik | Communication Defense |
| 177 | KARSN | Karsan Otomotiv | Automotive |
| 178 | KRTEK | Karsu Tekstil | Textile Products |
| 179 | KARTN | Kartonsan | Paper Product Industry |
| 180 | KATMR | Katmerciler Ekipman | Automotive Supply Industry |
| 181 | KENT | Kent Gıda | Food |
| 182 | KERVT | Kerevitaş Gıda | Food |
| 183 | KLGYO | Kiler GMYO | Real Estate Investment Trust |
| 184 | KLMSN | Klimasan Klima | Durable Consumption |

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| 185 | KCHOL | Koç Holding | Holding |
| 186 | KNFRT | Konfrut Gıda | Food |
| 187 | KONYA | Konya Çimento | Cement Concrete |
| 188 | KORDS | Kordsa Teknik Tekstil | Automotive Supply Industry |
| 189 | KOZAL | Koza Altın | Mining |
| 190 | KOZAA | Koza Madencilik | Mining |
| 191 | KRSTL | Kristal Kola | Beverage |
| 192 | KRONT | Kron Telekomünikasyon | Communication Defense |
| 193 | KUYAS | Kuyumcukent Gayrimenkul | Public Work |
| 194 | KUTPO | Kütahya Porselen | Other Manufacturing |
| 195 | LINK | Link Bilgisayar | Informatics |
| 196 | LOGO | Logo Yazılım | Informatics |
| 197 | LKMNH | Lokman Hekim Sağlık | Medicine and Health |
| 198 | MAKTK | Makina Takım | Fabricated Metal |
| 199 | MRDIN | Mardin Çimento | Cement Concrete |
| 200 | MARKA | Marka Yatırım Holding | Holding |
| 201 | MAALT | Marmaris Altinyunus | Restaurant - Hotel |
| 202 | MRSHL | Marshall | Dyeing |
| 203 | MRGYO | Martı GMYO | Real Estate Investment Trust |
| 204 | MARTI | Martı Otel | Restaurant - Hotel |
| 205 | MAVI | Mavi Giyim | Wearing Apparel |
| 206 | MEGAP | Mega Polietilen | Chemical Other |
| 207 | MNDRS | Menderes Tekstil | Textile Products |
| 208 | MERKO | Merko Gıda | Food |
| 209 | METUR | Metemtur Otelcilik | Restaurant - Hotel |
| 210 | METRO | Metro Holding | Investment Companies |
| 211 | MEPET | Metro Petrol ve Tesisleri | Retail |
| 212 | MGROS | Migros Ticaret | Retail |
| 213 | MIPAZ | Milpa | Wholesale Trade |
| 214 | MSGYO | Mistral GMYO | Real Estate Investment Trust |
| 215 | MPARK | MLP Sağlık | Medicine and Health |
| 216 | TIRE | Mondi Tire Kutsan | Paper Product Industry |
| 217 | NATEN | Naturel Yen.Enerji Ticaret | Energy |
| 218 | NTHOL | Net Holding | Holding |
| 219 | NETAS | Netaş Telekom. | Communication Defense |
| 220 | NIBAS | Niğbaş Niğde Beton | Cement Concrete |
| 221 | NUHCM | Nuh Çimento | Cement Concrete |
| 222 | NUGYO | Nurol GMYO | Real Estate Investment Trust |
| 223 | ODAS | Odaş Elektrik | Energy |
| 224 | OLMIP | Olmüksan-IP | Paper Product Industry |
| 225 | ORGE | Orge Enerji Elektrik | Public Work |
| 226 | OSTIM | Ostim Endüstriyel Yat | Investment Companies |
| 227 | OTKAR | Otokar | Automotive |
| 228 | OYLUM | Oylum Sınai Yatırımlar | Food |
| 229 | OZKGY | Özak GMYO | Real Estate Investment Trust |
| 230 | OZBAL | Özbal Çelik Boru | Fabricated Metal |
| 231 | OZGYO | Özderici GMYO | Real Estate Investment Trust |
| 232 | PAGYO | Panora GMYO | Real Estate Investment Trust |

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| 233 | PRKME | Park Elek.Madencilik | Mining |
| 234 | PARSN | Parsan | Automotive Supply Industry |
| 235 | PGSUS | Pegasus | Transportation |
| 236 | PEKGY | Peker GMYO | Real Estate Investment Trust |
| 237 | PENGD | Penguen Gıda | Food |
| 238 | PEGYO | Pera GMYO | Real Estate Investment Trust |
| 239 | PSDTC | Pergamon Dış Ticaret | Wholesale Trade |
| 240 | PETKM | Petkim | Petroleum |
| 241 | PETUN | Pınar Et Ve Un | Food |
| 242 | PINSU | Pınar Su | Beverage |
| 243 | PNSUT | Pınar Süt | Beverage |
| 244 | PKART | Plastikkart | Communication Defense |
| 245 | POLHO | Polisan Holding | Holding |
| 246 | POLTK | Politeknik Metal | Chemical Other |
| 247 | PRZMA | Prizma Press Matbaacılık | Paper Product Industry |
| 248 | QNBFB | QNB Finansbank | Banks |
| 249 | RALYH | Ral Yatırım Holding | Investment Companies |
| 250 | RAYSG | Ray Sigorta | Insurance |
| 251 | RYGYO | Reysaş GMYO | Real Estate Investment Trust |
| 252 | RYSAS | Reysaş Lojistik | Transportation |
| 253 | RHEAG | Rhea Girişim | Venture Capital |
| 254 | RTALB | RTA Laboratuvarları | Medicine and Health |
| 255 | SAHOL | Sabancı Holding | Holding |
| 256 | SAFKR | Safkar Ege Soğutmacılık | Durable Consumption |
| 257 | SANEL | Sanel Mühendislik | Public Work |
| 258 | SANKO | Sanko Pazarlama | Wholesale Trade |
| 259 | SAMAT | Saray Matbaacılık | Paper Product Industry |
| 260 | SARKY | Sarkuysan | Fabricated Metal |
| 261 | SASA | Sasa Polyester | Textile Chemistry |
| 262 | SEKUR | Sekuro Plastik | Chemical Other |
| 263 | SELEC | Selçuk Ecza Deposu | Medicine and Health |
| 264 | SNKRN | Senkron Güvenlik | Administrative Support |
| 265 | SRVGY | Servet GMYO | Real Estate Investment Trust |
| 266 | SEYKM | Seyitler Kimya | Medicine and Health |
| 267 | SILVR | Silverline Endüstri | Durable Consumption |
| 268 | SNGYO | Sinpaş GMYO | Real Estate Investment Trust |
| 269 | SMART | Smartiks Yazılım | Informatics |
| 270 | SODA | Soda Sanayii | Chemical Other |
| 271 | SKTAS | Söktaş | Textile Products |
| 272 | SONME | Sönmez Filament | Real Estate Activities |
| 273 | SEKFK | Şeker Fin. Kir. | Financial Leasing |
| 274 | SKBNK | Şekerbank | Banks |
| 275 | SISE | Şişe Cam | Glass |
| 276 | SOKM | Şok Marketler | Retail |
| 277 | HALKB | T. Halk Bankası | Banks |
| 278 | KLNMA | T. Kalkınma ve Yatırım Bankası | Banks |
| 279 | TSKB | T.S.K.B. | Banks |
| 280 | TBORG | T.Tuborg | Beverage |

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|-----|-------|---------------------------|------------------------------|
| 281 | TACTR | Taç Tarım Ürünleri | Food |
| 282 | TATGD | Tat Gıda | Food |
| 283 | TAVHL | TAV Havalimanları | Transportation |
| 284 | TEKTU | Tek-Art Turizm | Restaurant - Hotel |
| 285 | TKFEN | Tekfen Holding | Holding |
| 286 | TKNSA | Teknosa İç ve Dış Ticaret | Retail |
| 287 | TMPOL | Temapol Polimer Plastik | Chemical Other |
| 288 | TGSAS | TGS Dış Ticaret | Wholesale Trade |
| 289 | TOASO | Tofaş Oto. Fab. | Automotive |
| 290 | TRGYO | Torunlar GMYO | Real Estate Investment Trust |
| 291 | TLMAN | Trabzon Liman | Transportation |
| 292 | TSPOR | Trabzonspor Sportif | Sport |
| 293 | TRKCM | Trakya Cam | Glass |
| 294 | TSGYO | TSKB GMYO | Real Estate Investment Trust |
| 295 | TUCLK | Tuççelik | Iron-Steel |
| 296 | TUKAS | Tukaş | Food |
| 297 | TRCAS | Turcas Petrol | Petroleum |
| 298 | TCELL | Turkcell | Telecommunication |
| 299 | TMSN | Tümosan Motor ve Traktör | Automotive |
| 300 | TUPRS | Tüpraş | Petroleum |
| 301 | THYAO | Türk Hava Yolları | Transportation |
| 302 | PRKAB | Türk Prysmian Kablo | Electrical Supplies |
| 303 | TTKOM | Türk Telekom | Telecommunication |
| 304 | TTRAK | Türk Traktör | Automotive |
| 305 | TURGG | Türker Proje Gayrimenkul | Public Work |
| 306 | ULUSE | Ulusoy Elektrik | Electrical Supplies |
| 307 | ULUUN | Ulusoy Un Sanayi | Food |
| 308 | USAK | Uşak Seramik | Building Materials |
| 309 | UTPYA | Utopya Turizm | Restaurant - Hotel |
| 310 | ULKER | Ülker Bisküvi | Food |
| 311 | UNYEC | Ünye Çimento | Cement Concrete |
| 312 | VAKFN | Vakıf Fin. Kir. | Financial Leasing |
| 313 | VKGYO | Vakıf GMYO | Real Estate Investment Trust |
| 314 | VAKBN | Vakıflar Bankası | Banks |
| 315 | VAKKO | Vakko Tekstil | Wearing Apparel |
| 316 | VANGD | Vanet Gıda | Food |
| 317 | VERUS | Verusa Holding | Holding |
| 318 | VERTU | Verusaturk Girişim | Venture Capital |
| 319 | VESTL | Vestel | Durable Consumption |
| 320 | VESBE | Vestel Beyaz Eşya | Durable Consumption |
| 321 | YKGYO | Yapı Kredi Koray GMYO | Real Estate Investment Trust |
| 322 | YKBNK | Yapı ve Kredi Bank. | Banks |
| 323 | YATAS | Yataş | Forest Products |
| 324 | YAYLA | Yayla En. Ür. Tur. Ve İnş | Public Work |
| 325 | YGGYO | Yeni Gimat GMYO | Real Estate Investment Trust |
| 326 | YGYO | Yeşil GMYO | Real Estate Investment Trust |
| 327 | YYAPI | Yeşil Yapı | Public Work |
| 328 | YESIL | Yeşil Yatırım Holding | Holding |

329 YUNSA Yünsa
330 ZOREN Zorlu Enerji

Textile Products
Energy

