ASSET PRICING MODELS IN FINANCIAL CRISES, FAMILY OWNERSHIP AND PRIVATISATION: EVIDENCE FROM TURKEY

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Declaration

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Abstract

This thesis studies asset pricing from three different angles. Firstly, it reveals that there is a possibility that economic shocks could damage asset pricing model performance, taking the recent 2007/2008 financial crisis and a number of recent asset pricing models as examples. Although there has been research suggesting the potential impacts of "bad" and "good" economic conditions on stock performance and forecasting power of economic models, this possibility remains an undiscussed idea. This is perhaps due to a range of methodological obstacles in testing the link. The thesis, therefore, proposes a new approach to overcome the issues and finds that financial shocks indeed have impacts and need to be adjusted for when assessing performance of asset pricing models. Secondly, in search for potential risk exposure associated with family ownership in pricing assets in stock markets, an examination in Turkey, a family business country, shows that family firms are not necessarily riskier that non-family firms. Instead, such ownership characteristics are associated with the sensitivity of some other risk factors. We find that within firms with low growth prospects and/or small firms, family firms outperform non-family firms and as firms grow in size and market-to-book value, non-family firms appear to perform better. Also, liquidity ratio, firm age and current stock prices are also among those factors which can explain the return differentials between family and non-family firms. Thirdly, privatisation with involvement of family ownership does have positive impacts on firm performance and stock return in the long-run but has negative impacts on short-term investors. An investigation on a recent privatisation deal of Tupras, the largest refineries firm in Turkey, shows that unless shareholders' investment horizon is in line with the owner family, they would not benefit from the firm long-term investment projects and could even suffer from low dividends.

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Abbreviation

2SLS-IV	Two-Stage Least-Squared Instrumental Variable
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criteria
APT	Arbitrage Pricing Theory
ARMA	Autoregression and Moving Average
B/M	Book-to-Market equity
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CCAPM	Consumption Capital Asset Pricing Model
CEO	Chief Executive Officer
C/P	Cash-flow per Price
CRSP	Center for Research in Security Prices
DY	Dividend yield
EBIT	Earnings Before Interest and Taxes
E/P	Earnings per Price
GDP	Gross Domestic Product
HML	High-minus-Low
ICAPM	Intertemporal Capital Asset Pricing Model
ICIS	Independent Chemical Information Services
IMF	The International Monetary Fund
IPO	Initial Public Offering
ISE	Istanbul Stock Exchange
LIBOR	London Interbank Offered Rate
LM	Minimum Lagrange multiplier
OLS	Ordinary Least Squares

PCSE	Panel Corrected Standard Error
Petrol-IS	Union of Petroleum Chemical and Rubber Workers of Turkey
PP	Phillips-Perron
SIC	Schwarz Information Criterion
SIP	Share Issue Privatisation
SMB	Small-minus-Big
TRY	Turkish Lira
Tupras	Turkiye Petrol Rafinerileri Anonim Sirketi (the Turkish name of Turkey Petroleum Refineries Joint-stock Company)
VAR	Vector AutoRegression
WML	Winner-minus-Loser.

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CHAPTER 1: INTRODUCTION

1.1. Objectives

The main objective of this thesis is to examine asset pricing models from the stock market view and to show how they are affected by shifts in the overall economic condition such as the recent financial crisis, or differences in ownership structure and major ownership transfers at the firm level. These ideas will be explored in the context of Turkey, an emerging market that has been restructuring itself rapidly during the last two decades. The advantage of considering this market is that it allows testing the main hypotheses of the thesis. The country has a stock market that is developed enough for a formal analysis through asset pricing models. Also, since it imposes no restrictions on foreign investment or large ownership, Turkey provides a relatively free platform for investors to access and express their views in the stock market. Thus, analysing stock expected returns would reflect fairly the market views and their evaluation about firm value.

Chapter 2 addresses the question of whether asset pricing models are affected by shocks such as the recent 2007/2008 financial crisis, and if so, how to take their effects into account when examining model performance. The Fama and French (1993) three-factor model and a number of commonly used risk-based models are selected as sample-cases to test our hypotheses. There are four main hypotheses that the chapter aims to examine. The first hypothesis suggests that Turkey suffered little impact from the recent financial crisis and therefore it is a suitable sample for assessing the performance of asset pricing models. Secondly, we examine whether stocks of firms with low growth prospects outperform those with high growth prospects: in other words, whether there is a value anomaly in the Turkish stock market. Thirdly, we verify the presence of size effects, which refer to an abnormal return generated by investing on stocks of small firms than those of big firms. Last but not least, the chapter aims to answer its key question of whether or not financial shocks have any impacts, and thus if they need to be accounted for when assessing the performance of asset pricing models.

In chapter 3, the main objective is to test whether in a weak legal protection system like Turkey, outside investors and the market would view stocks of family firms as a riskier asset and if so, what are the underlying reasons behind this divergence. Unlike previous studies, the chapter intends to seek for the answer on a broader scale, from the largest to

the smallest enterprises and from direct to indirect ownership, since both were documented to be crucial in family ownership analysis. It also tests for the possible links between family ownership and other firm characteristics to explain expected stock returns.

Chapter 4 looks at privatisation, a special type of ownership change, by adopting a case study approach. It studies the case of Tupras privatisation, one of the most significant deals in the 2000s in Turkey. Specifically, the process involved a family firm - Koc Holding - and the chapter is interested in understanding whether such involvement would cause any issues for the existing shareholders. By extending its analysis to fifteen years of privatisation, it aims to test the following propositions:

(i) Privatisation has positive impacts on firm operating performance;

(ii) Privatisation has positive impacts on firm stock performance;

(iii) Privatisation by direct sale is more profitable than by share issue;

(iv) Family owners pursue a dividend policy which is biased in favour of their own interests after privatisation.

1.2. Scope and Methodology

This thesis covers discussions on theories and on some recent methods of security pricing, in which risk-based asset pricing models are the focus. It particularly seeks for potential risk components in economic condition changes and firm ownership structure that could explain the movement of asset prices in stock markets. The Istanbul Stock Exchange (ISE) is selected as a testing sample in the thesis for its demonstrative ability as the market was little affected by the recent financial crisis. It is also mature enough to offer a rich and accessible dataset for a substantial analysis.

Chapter 2 consists of two parts. The first section involves cointegration tests in order to verify that the Turkish market suffered little impact from the recent financial crisis. Accordingly, a wide range of tests are performed, including conventional methods such as Engle-Granger, Johansen and an augmented test with one added structural break. The second part of the chapter studies asset pricing models and possible consequences of the financial crisis on their performance. The Fama and French three factor model and some alternative models are selected to be the testing objects. Additionally, out of many risk factors discussed in the literature, the chapter selects some of most commonly used

variables for experiment purposes. This does not aim to be exhaustive but to provide a comprehensive analysis hoping to improve some commonly-used measures and pricing methods. The chapter also employs Vector AutoRegression (VAR) to check the robustness of the results.

In terms of data, chapter 2 obtains information from the DataStream Thomson Reuters database. For the first part, global indices used in cointegration tests are collected from 1988 (the first trading date of the youngest index, the ISE National 100) up to 2010. The rest of the chapter covers from July 1989, when there are a sufficient number of firms in the sample, until December 2010. For the first time, the chapter takes account of de-listed firms when they existed in order to eliminate potential survivorship bias. Like most previous studies in asset pricing models, it only includes non-financial firms in the analysis since the meaning of some measurements in asset pricing models, such as book-to-market equity, is different for financial institutions.

In contrast, Chapter 3 sees no reasons to exclude financial firms when analysing family owned firms versus non-family firms. Thus, all firms in the ISE All-share are considered. It is however not possible to include de-listed firms due to data unavailability. Therefore, it is conceivable that the results might suffer from survivorship bias but we argue that the bias is likely to be immaterial. While most data can be obtained from DataStream, chapter 3 also accesses Bloomberg database to collect ownership data and ISE official website as well as individual firm websites for cross checking. The analysis covers 210 months, starting from July 1993 when more than a single family firm was listed.

Chapter 3 computes multivariate regressions on a wide range of risk-based factors that are either commonly used in the asset pricing literature or documented to be associated with family ownership, such as firm age and current prices. For diagnostic tests, the analysis controls for the main econometric issues that normally concern firm ownership studies, such as endogeneity, heteroskedasticity and serial correlation in residuals to ensure the robustness of its findings.

Following up on the role of firm ownership, Chapter 4 analyses the privatisation case of Tupras, the biggest refineries firm in Turkey, from the firm Initial Public Offering (IPO) in 1991 to the end of 2010. Using case study techniques, we analyse the firm operating performance and its stock returns before and after each one of the stages of the

privatisation process. The study also tests both long-term and short-term impacts of the ownership transfer on the firm following different privatisation methods. In addition, the firm's accounting performance and stock returns in the long run are considered in relation to the market and to the firm's domestic rivals. Several commonly used return measurements, for instance the compounded rate of return, are considered and the results are also adjusted for the movement of the market and industry index. Additionally, concerns over the benefits of existing shareholders under the new owner family management are analysed from a dividend and an investment perspective.

1.3. Contributions

The thesis contributes to the existing literature from methodological and empirical aspects.

Firstly, chapter 2 proposes a new approach to assess the possible impacts of economic shocks, taking the recent financial crisis as an example, on asset pricing models. Some commonly used models are observed on U.S market where the impact from the crisis was high. We then examine a number of markets, including the emerging market groups, using cointegration tests to find that Turkey was little affected by the financial shock. Thus, it appears to be a suitable best candidate for cross-referencing the results in the U.S. A range of experiments are also carried out by controlling for other relevant risk factors, such as past returns, to eliminate the potential bias caused by omitting necessary explanatory factors. The results show that shocks such as the recent financial crisis can make a substantial impact on a model and therefore should be controlled for when assessing model performance.

In addition, chapter 2 contributes to resolving the inconsistent results which were partly due to a short testing horizon of the previous studies in Turkey. It finds that there are value and size anomalies in the ISE but that they are statistically insignificant. This suggests a form of market efficiency in Turkey in the long run. In other words, investors seem to correctly value financial assets in a timely manner.

Chapter 3 enhances the limited findings on family ownership and stock performance in a number of ways. Firstly, there have not been any comprehensive works on the Turkish market where family businesses have historically seen dominant. In addition, unlike in advanced economies, most family businesses in emerging countries including Turkey have their unique way to structure their firms. For example, owner families in Turkey

control firms without clearly revealing a high concentration in ownership by using complex business groups. As studies in firm ownership tend to obtain only direct ownership, their controlling power over the firms may be overlooked. Because of this possibility, the chapter includes not only direct ownership but also indirect ownership in the analysis. This allows the analysis to capture fully the ultimate control of family owners for the first time.

Secondly, previous studies on concentrated ownership tend to pay attention to large family firms only, while this chapter also covers small and medium size businesses which are how most family firms started. It is plausible to believe that exclusion of such firms could lead to a positive bias for family firms. This is because, in practice, many new businesses do not survive in the first five years of starting up and among the survivors, not all could carry on and grow to reach the top group. Hence, those firms which could achieve that level while still retaining family control are usually exceptionally strong ones. This could explain why many studies found a better performance for family firms in comparison to non-family firms. Also, examining firms regardless of size will allow performance of firms at all stages of their business life to be assessed.

More importantly, the chapter hopes to contribute to the existing literature on family firms from the stock market point of view. As mentioned in the previous sections, most studies focus on the impact of block shareholders on firm performance from an accounting standpoint. Among those studying family ownership, few have analysed its impact on stock performance. As family firms are documented to improve firm performance but may exploit minority shareholders' interests, outside investors should consider these factors in their investment decisions. If they are indeed concerned about potential tunneling and exploitation caused by family firm owners, they should expect to receive higher returns on stocks of family firms for bearing higher risks.

The results in Turkey show that although the market may not favour family firms in relation to non-family firms, the former do exhibit a fundamentally different behaviour from their non-family counterparts. More specifically, ownership could interact with some other firm characteristics, such as High-minus-Low (HML) and Small-minus-Big (SMB). Within firms with low growth prospects and/or small firms, family firms outperform non-family firms and as firms grow in size and market to book-value, non-family firms tend to perform better. Additionally, the empirical results also confirm the

findings from other countries that liquidity ratio, firm age and current stock prices could largely explain the return differentials between the two groups.

In chapter 4, family ownership is studied from a different setup. It takes a closer look at possible impacts of owner families on firm performance and minority shareholder interests in a privatised firm. The chapter contributes to the literature on privatisation and family ownership with regard to the following aspects. First of all, it explores a privatisation experience in the oil and gas sector which has been left un-discussed for many years. As recent privatisations are usually designed on a case-by-case basis, the chapter employs case studies techniques in studying Tupras, one of the largest privatisation deals in the Turkish refineries industry. Secondly, this case study allows us to compare and contrast the performance of different privatisation methods while still addressing methodological issues in large scale analysis, such as lack of data or variance in market conditions. Finally, perhaps for the first time family involvement is taken into consideration in privatisation research. Results in chapter 4 show that privatisation indeed has positive impacts on firm performance and stock returns in the long run. However, the involvement of the Koc family in Tupras seems to have negative impacts on shareholders with a short investment horizon.

1.4. Thesis Outline

The thesis consists of three essays on asset pricing models when there is a shift in economic conditions, asset pricing in family businesses or a shift in corporate ownership involved by a family firm, taking Turkey as a testing sample. The first empirical essay (Chapter 2) examines value anomaly and the performance of the Fama and French (1993) model as well as a number of alternative models over financial crises, such as the recent 2007/2008 credit crunch. Using various cointegration methods, it shows that Turkey is a suitable object to test the model validity without suffering various methodological issues and potential biases that traditional methods might face.

Chapter 2 begins by briefly introducing the existing literature on value anomaly and arguments on its underlying explanations in asset pricing models. The tests on cointegration are derived from the chapter's main argument that the criticism against the Fama and French model might have been subject to a number of methodological issues. For example, two alternative asset pricing models proposed by Petkova (2006) and by Hahn and Lee (2006) have not accounted for the 2000/2001 economic downturn in their

sample period. Thus, the chapter argues that perhaps this is one explanation for a slightly better performance of their models over the Fama and French model. Also, the chapter notices a multicollinearity problem in both studies. Although this problem does not invalidate the model as such, it could limit the ability of the studies to draw a precise conclusion on the explanatory power of each independent variable. After correcting these potential biases, chapter 2 carries out a comprehensive assessment with a range of experiments aiming to enhance the models. The chapter ends with robustness checks and concluding remarks.

Still from an asset pricing model viewpoint, chapter 3 tests if family ownership is riskier and if this factor helps explain stock expected returns. First of all, the chapter summarises typical ownership characteristics associated with a civil-law legal regime in Turkish firms. Some of them present high concentration, a complex structure and insider voting right. The second section briefly reviews the literature on potential costs and benefits of family ownership and its impacts on firm stock performance. Empirical analysis starts by introducing the data, control variables and valuation methodology. For this purpose, a dummy variable, D_{Family}, is interacted with both constant and explanatory variables although only the significant factors are reported in the final results.

Following discussion of the empirical findings, chapter 3 performs robustness checks on the final results. It adjusts for a wide range of possible econometric issues that could arise in a family ownership analysis, namely endogeneity, heteroskedasticity and serial correlation of residuals, as well as the effects of Turkish economic reform in 2001. The chapter concludes with further research suggestions.

Chapter 4 is particularly interested in a privatisation case of Tupras. It starts by reviewing a vast literature in privatisation and pointing out some potential areas where the chapter can contribute to the field. The chapter then briefly describes the privatisation scheme in Turkey, the Tupras background and its privatisation process. This is followed by the data and methodology section focusing on identifying the main propositions that will be tested in the chapter. The first part of the empirical analysis focuses around the share issuing privatisation method that was chosen to sell the first 49% shares of Tupras in several stages. The method Tupras chose to privatise the remaining 51% shares was via direct sales. An in-depth analysis of each method and their impact is presented separately. The study analyses both short-term and long-term impacts of each privatisation stage on the firm accounting performance and on its stock returns.

From these experiences, the chapter could reveal some useful lessons for a successful privatisation deal. Finally, taking a closer look at the role of family ownership, the chapter finds evidence that the involvement of family ownership could be potentially more beneficial to those who have a similar investment horizon as the owner family while other shareholders may be negatively affected.

CHAPTER 2: THE VALUE ANOMALY

2.1. Introduction

Value stocks have been shown to earn superior returns than growth stocks[1]. In other words, the stocks with low market value in relation to their fundamental values should have been preferred to the high market value stocks. This return differential is called the value premium. For decades, the investment strategy of buying (or taking a long position in) value stocks and selling (or taking a short position in) growth stocks, a so called value strategy, has shown a great success around the world. However, both academia and practitioners have raised doubts about the abnormal returns gained by this investing strategy for several reasons. First of all, it seems illogical to pursue stocks that recently performed poorly instead of the well performing ones and expect to receive higher returns. Even if one believes in the positive relation between risk and return, it is not necessarily true that bearing extra risks will guarantee a premium to compensate for the risk. Secondly, if low market price stocks are considered to be cheap, or being undervalued, once the success of this simple strategy is known, its return premium should be wiped out. A large amount of research, however, has found this is not the case. Last but not least, since the strategy was first discussed, none of the conventional theories including the well-known Capital Asset Pricing Model (CAPM) by Sharpe (1964) and Lintner (1965) could explain these abnormal returns. It is therefore called a value anomaly in stock markets.

More importantly, it is irrational that such return premium should still exist in a rational and fast-learning world. Is this because of the impatience and lack of courage to stand against the crowd or are there more logical reasons behind the success of value strategy? On one hand, some authors, such as Delong, Shleifer, Summers and Waldmann (1990) argue that noise trading could explain deviations of stock valuation from their fundamentals. On the other hand, others argue that financial modelling should capture value anomaly.

Those questions have motivated both scholars and investors to investigate possible answers. That has created an extensive discussion on the sources of value premium,

[1]Value stocks refer to firms with high ratios of book-to-market value (B/M), earnings-to-price (E/P), cash flow-to-price (C/P), or dividend yield (DY). Stocks, of which the above fundamental values are small, are characteristically called as growth stocks.

among which the Fama and French (1993) three factor risk-based model seems to attract most attention. Despite its achievements, since the three factors are not *ad hoc*, a wide range of for and against arguments have been raised. While many recent studies question the validity of the Fama and French model, none has considered shocks occurring during their sample periods.

It is widely documented in financial econometrics that structural breaks can cause considerable forecasting errors and can damage the reliability of econometric models. For many years, researchers focused on improving asset pricing models and while crises have been found to have considerable impacts on risk bearing levels, they have not yet been fully accounted for in the models. The recent financial crisis in 2007/2008, for example, has caused major macroeconomic changes across the world and is not yet over. It is worth mentioning that the nearest recession was back in 2001/2003, and that many opponents of Fama and French's model have not made adjustment for it. Failure to take into account structural breaks could bias the results and lead to erroneous conclusions on the validity of an asset pricing model.

This chapter addresses value anomaly and the issue of assessing asset pricing model performance after carefully taking into account the effects of structural breaks such as the recent financial crisis.

A test covering the period up to December 2010 will therefore aim to eliminate such bias while providing a fair environment for model performance evaluation. One may argue that the traditional event studies techniques, which were designed to capture the effects of an event occurring during the testing time by splitting the sample into sub-samples, are appropriate to this purpose. However, there are a number of reasons why these techniques and some other traditional methods using factor loadings to capture event and seasonal effects cannot be fully satisfactory. Firstly, unlike company's announcements, it may be difficult to establish the exact starting date of a crisis. Crises or shocks are normally a series of events that tend to cause "domino effects" in the global economy with no clear-cut beginning and ending dates. Without a specific starting date, event studies are unable to form a proxy capturing the possible effects of an event. Moreover, the methods of splitting samples or building proxies require sufficient observations to carry out an efficient estimation. However, since the recent financial crisis occurred only a few years ago, it is hard to expect the test on extreme unbalanced sub-samples would be unbiased.

This chapter contributes to the literature of asset pricing by proposing a new method of assessing asset pricing model performance which controls for the potential bias caused by shocks, such as the recent 2007/2008 financial crisis. More specifically, it suggests using independence tests to identify a market that suffered little effects from the crisis, where the model performance can be fairly assessed. The concerns over methodological issues related to estimation and testing in the context of structural breaks will therefore be adequately addressed. The tests find that Turkey appears to be a suitable object.

Examining value anomaly and asset pricing models in the Istanbul Stock Exchange (ISE) can also reach a second goal. Because of the inconsistency among previous studies in the ISE, this thesis would make a contribution by filling the gap in the Turkish market anomaly literature with a more appropriate analysis.

The results in this chapter help establish the signs of value and size premia. Additionally, the failure of momentum strategy indirectly supports the success of value strategy. The return differentials appear to be statistically insignificant. They also have a tendency to increase over market downturn periods, providing additional evidence supporting the risk-based theory.

Tests on a market that has been little affected by the recent financial crisis show that the simple but efficient Fama and French three-factor model remains relevant in spite of criticism. Some experimental improvement can be made, for example by controlling for more risk factors, but the difference is immaterial. The results are robust and relatively free from bias.

The rest of the chapter is organised as follows. Section 2.2 reviews the existing literature in value anomaly and the underlying reasons for such value abnormal returns. Section 2.3 proposes a new approach for testing model performance through independence tests. Data and methodology are described in section 2.4. Section 2.5 summarises the main findings while the final section concludes the chapter, discusses its implication, and recommends possible areas for further research.

2.2. Literature review

This section aims to introduce value anomaly and to review the most discussed sources of return differentials of value versus growth portfolios. The performance of value strategy has generated a great deal of academic and practitioner discussion for decades. Although the majority of research documents the success of value strategy, recent studies are more interested in understanding why such simple investing strategy still works, especially after it has become well-known. Perhaps most controversial is the underlying reasons of the abnormal returns from investing on recently poor performers rather than their growing counterparts. Among these, data bias, behavioural theory, risk-based explanations and firms' characteristics have been documented to play an important role. This section starts by reviewing the main results and debates on the presence of value anomaly, and is followed by a discussion on the above four explanations.

2.2.1. Value premium

Pioneering work on what was later known as value investing by Graham and Dodd (1934, reprinted in 1940, 2009) suggests that growing firms are not likely to keep up their high performance over time and that weak firms might also enhance their poor performance. They argue that the strategies of buying stocks that have low dividends, market prices relative to book value or to earnings, or other measures of value will outperform the market in several following years. In other words, value-oriented investors should gain significant value premium from pursuing firms with low fundamental ratios instead of trying to well-diversify their portfolios.

For many years, analysts and researchers were concerned that this unusual strategy would not last long and that value stocks might exhibit long-term poor performance, especially once the strategies had become well known (Asness, Friedman, Krail and Liew 2000, and Chan and Lakonishok 2004). They believed that the abnormal returns may be arbitraged away after investors had learnt about them via published research and adjusted their portfolios accordingly. This tendency, which is also known as the learning effects towards market efficiency, has been observed in other investment strategies, such as the disappearance of small-firm effect in the late 1980s.

Moreover, some authors argue that value anomaly is simply the result of collective data-snooping bias, which will be discussed further in the next section. Chan and Lakonishok (2004), however, point out that if these were true, the value premium should not appear

in other markets or other periods. A large amount of subsequent studies on the success of value strategies around the world has shown that it is not the case.

Furthermore, some empirical evidence shows that value premium does not hold under certain restrictions. For instance, research exclusively on large-cap or small-cap stocks provide an unclear view. A study by Houge and Loughran (2006) on the large-cap S&P 500 and Russell 3000 indices finds no significant value premium. They, however, admit that the book-to-market effect is strongest among smaller stocks. Fama and French (1993, 2006) confirm this is the case in the US market while the opposite is true in Japan (Daniel, Titman and Wei 2001) and in Australia (Gaunt 2004). Another example is a research in Singapore, where short-selling is restricted. In that study, Yen, Sun and Yan (2004) document that, although in general value stocks outperform growth stocks over the period from 1975 to 1997, the value premium is only prominent in the first two years after portfolio formation date and disappears in the subsequent years.

Despite considerable criticism, academia and practitioners have produced mounting evidence of the success of value strategy across times and markets. To begin with, this section will review the main findings on value anomaly in developed markets. The most commonly discussed studies are Fama and French (1992, 1996) and Lakonishok, Shleifer and Vishny (1994) that confirm existence of value anomaly in US stocks. Strong value premium is also seen in Japan (Chan, Hamao and Lakonishok 1991) in France (Arisoy 2010) and Europe (Bird and Whitaker 2003). Capaul, Rowley and Sharpe (1993) document persistent value abnormal returns in a range of major stock markets over the world.

A comprehensive study by Fama and French (1998) on a broad sample of markets, covering 13 developed countries and 16 emerging countries, using a variety of indicators, B/M, E/P, C/P and DY has been the central of literature. They found that the value premium exists in 12 out of 13 developed markets, with the exception of Italy. In other words, value stocks outperform growth stocks. In emerging markets, the premium is found for 12 out of 16 countries (except Argentina, Colombia, Mexico and Pakistan). Their recent study in 2012 updates and confirms the results on a broader scale for 23 markets across four continents[2].

[2] The study looks at North America, Europe, Japan and Asia Pacific. Turkey is however left out.

In addition to a large number of studies on the behaviours of these investment styles in well-developed markets, research in smaller and less developed markets is growing in number. Generally, this value anomaly appears to be unpredictable in these markets. A study by Chen and Zhang (1998) shows that the difference in market growth rate could lead to variation in behaviour of value strategies. They show stronger effects of value investing in the US, less in Japan, Hong Kong and Malaysia[3], and undetectable in countries with high growth rate, such as Thailand and Taiwan.

Despite the growing roles of Turkish stock markets at both the regional and global level, this candidate for the European Union membership has only attracted little attention. While Akdenniz, Altay-Salih and Aydogan (2000) and Aksu and Onder (2003) document the success of value strategy over five to seven years up to 1998, Gonenc and Karan (2003) argue that there was no value premium from 1993 to 1998. Inclusion of financial firms in Gonenc and Karan's (2003) sample may be responsible for the dissimilarity in results between these studies over a similar sample period. Moreover, a five-to-seven year sample horizon is rather short for value strategy test. Fama and French (1992) document that over at least five years since B/M is measured, firms tend to maintain their performance. Therefore, the validity of those studies on Turkey during such a short sample period is questionable. This chapter aims to examine the performance of value versus growth strategies in the ISE with a wider testing horizon.

More comprehensive research on the ISE could additionally benefit both domestic and foreign investors. Existing studies found low linkage to other markets (Wong, Penm, Terrell and Lim 2004 and Hassan, Haque and Lawrence 2006). This is also shown in this thesis through the absence of cointegration. Turkey is a fast growing and sound investment environment. Overall its characteristics make it a diversification opportunity for investors. According to Quach (1998) and Swedroe (2006), these diversification opportunities can reduce potential risk and volatility without having to sacrifice return.

Beyond the B/M, subsequent studies experiment other indicators and their combination for testing value strategy: the most discussed variables are E/P, C/P and DY. For example, Fama and French (1992), Lakonishok, Shleifer and Vishny (1994), Rosenberg, Reid and Lanstein (1985), Teo and Woo (2004), and Chan and Lakonishok (2004) analyse price to earnings and price to book value ratios, whereas Chan et al. (1991), and

[3] More recently, Arshanapalli, Coggin and Doukas (1998) and Drew and Veeraraghavan (2002) also confirm the success of value strategy in Malaysia.

Capaul et al. (1993) base their study on price to cash flow ratio while Fama and French (1998) use all four indicators. Besides, Chan, Lakonishok and Sougiannis (2001) included intangible assets in book value of common equity while Piotroski (2000) used a range of financial ratios to classify value stocks. The results of these studies suggest that using various indicators and approaches may allow investors to achieve a higher level of accuracy. Although the evidence on B/M indicator ability is relatively uncontroversial, results from other indicators are far less consistent.

While the majority of the research has agreed on the success of the value strategy, regardless of the indicators and methods used, fewer underlying reasons are actually accepted about the abnormal return.

The CAPM of Sharpe (1964) and Lintner (1965) has set a milestone in financial economics history, and early evidence tends to support the theory's central view that the market portfolio should remain mean-variance efficient (Black, Jensen, and Scholes 1972, Fama and MacBeth 1973). This means the market risk beta is the key factor determining the average returns of stocks.

However, there has been an ongoing debate on the validity of the CAPM. Besides requiring a series of strict assumptions, CAPM is considered to fail in many cases due to poor proxies of stock indexes and other market measurement (Roll 1977). This is known as the Roll's critique. Subsequently, increasing evidence has showed that the CAPM is inconsistent with many empirical common findings of cross-sectional asset pricing data (Fama and French 1993, Shefrin and Statman 1994, Campbell 1996). Perhaps one of the most disappointing results is that the CAPM has failed to explain the cross section of average returns on assets sorted by size and book-to-market equity ratios (Fama and French 1992, 1993).

The CAPM inability to explain this abnormal movement of average returns is known as market anomalies. The next sections will discuss the four most common explanations for one of these anomalies, the value premium.

2.2.2. Data snooping and selection bias

The argument of data-snooping bias was initially raised by Lo and MacKinlay (1990), and later by Berk (1998) and Conrad, Cooper and Kaul (2003) to name but a few. They argue that inappropriate methods of data mining, which are called data snooping, in testing financial asset pricing model arise from test statistics that tends to narrow the probability of rejecting a certain hypothesis. More specifically, because of the linkage between characteristics and asset prices, tests based on returns of portfolios sorted by size or B/M

instead of individual stock returns can cause misleading inferences. A recent study on single securities by Avramov and Chordia (2006), however, confirms the findings of portfolio-based studies.

In some opinions (Black 1993, MacKinlay 1995), the higher return of high B/M stocks compared to low B/M stocks occurs for the United States and is unlikely to be observed out of sample. However, other studies such as Chan, Hamao, and Lakonishok (1991), Capaul et al. (1993), and Fama and French (1998) show further out-of- sample evidence on the value premium in markets outside the US.

In addition, another explanation to value investing by Kothari, Shanken and Sloan (1995) is the bias relating to data-selection methodologies. They claim the value anomaly is simply a result of selection bias occurring in a typical data source such as Compustat. They argue that there are at least two related potential sources of selection bias. Firstly, when adding a firm to its data file in the early years prior to 1978, Compustat often "back-fills" historical data back to 1946, while firms added in 1978 include data going back to 1973. This is claimed to cause data bias. Consider the high B/M firms that were not in the Compustat tapes in 1978. These value firms are likely to be distressed firms. If the firms perform poorly in the previous five years with for example negative stock returns and relatively low market values, they might not be added in Compustat database in 1978. This is because they had been delisting or failed to meet the minimum requirements on asset value or market values of Compustat. On the other hand, if the firms unexpectedly overcome their financial distress and performed well in the previous five years, they would be added to the database with data filled back to 1973. The analysis based on current data in Compustat, therefore, tends to favour the high B/M that subsequently performed well. This seems to give an erroneous impression that the high ex post returns and high B/M ratio imply a positive relation between expected returns and B/M.

Secondly, since Compustat includes only data of surviving firms, firms that went bankrupt due to financial distress were dropped. Those recovering from financial distress might update the retroactive reports for non-reporting period. Many firms that have data on Center for Research in Security Prices (CRSP) are being omitted on Compustat. This selection procedure might unintentionally favour high B/M firms.

Among many others, a careful study by Chan, Jegadeesh and Lakonishok (1995), however, provides a thorough study that documents it is unlikely for such bias to be able to explain the difference in performance between value and growth stocks. They form a sample that is free from any selection bias and reveal that the bias in Compustat

is relatively insignificant. In addition, Barber and Lyon (1997) confirm that neither data-snooping nor selection bias explains the pattern of size and B/M in stock returns, not only in non-financial firms but also in financial firms.

2.2.3. Behavioural Finance

Supporters of behavioural asset pricing believe that asset prices reflect investors' beliefs on future cash flows and risks which are driven mainly by their sentiment rather than prospective profits of the assets. Hence, investors' overreaction is the reason behind the value premium.

According to Lakonishok, Shleifer and Vishny (1994), investors have a tendency to consistently overvalue growth stocks as well as to undervalue value stocks. They prefer growth stocks, because their recent high growth rate may appear to be an indicator of future performance, and out-of-favour sentiment may be placed toward value stocks. As a consequence, the purchase of growth and sale of value stocks could result in value stocks being undervalued (Drew and Veeraraghavan 2002). This is the fundamental explanation of "contrarian strategies", which aim to create benefits from potential outperformance of value portfolios in the long run by investing against the prevailing trend. Discussion on the on-going debate over these strategies is vast but beyond the scope of this thesis. From a brief view of contrarian strategies, a study by Antoniou, Galariotis and Spyrou (2005) provides supporting evidence of market overreaction, which is believed to lead to the profitability of contrarian strategies across markets.

Following psychology theory, Lakonishok et al. (1994) believe that favouritism toward growth stocks may be caused by a possible conflict of interest between shareholders and fund managers. Even when the benefits of value strategies can be seen, there are several reasons why fund managers would like to pursuit growth strategies. Firstly, recent good performance is a promising ground for money managers to recommend stocks. Secondly, growth stocks are generally those of well-known companies or growing sectors, making the managers' published reports more impressive (Bhushan 1989, Jegadeesh, Kim, Krische and Lee 2004). Furthermore, since value strategies are widely documented to be profitable in the long run, fund managers with a short term appointment may find this unattractive and will have to explain the poor performance of the value strategies with the owners (Lakonishok et al.1994). Overall, behavioural finance economists argue that the conflict of interest or agency problems is the value premium's possible explanation (DeBondt and Thatler 1985, Lakonishok et al. 1994, Haugen and Baker 1996, Daniel and

Titman 1997, and Chan and Lakonishok 2004). This has raised a growing concern regarding the market efficiency.

In contrast, Yen et al. (2004) show that in Singaporean stock market, the overreaction is present in one direction only. This is investors overvalue growth stocks but find no evidence to support the undervaluation of value stocks. The lack of short selling in Singapore is believed to be the root of these results. Additionally, Rozeff and Zaman (1998) demonstrate through a detailed analysis of insider investors' behaviour that they do not normally overreact due to their advantage of information while outside traders do. Moreover, Doukas, Kim and Pantzalis (2002) find that growth stocks are not overvalued over value stocks and hence the abnormal returns on value strategies might not be explained by the overreaction theory. Clare and Thomas (1995) even point out that the overreaction observed in the UK is indeed size effects. In short, the psychological reasoning of neoclassical finance on value anomaly is far from certain.

2.2.4. Risk-based explanations

Supporting the market efficiency theory, Fama and French (1993, 1996) argue that value premium is indeed not an anomaly at all. The higher average returns on high B/M stocks are compensation for bearing risks in a multifactor version of Intertemporal Capital Asset Pricing Model by Merton's (1973) (ICAPM) or Ross's (1976) arbitrage pricing theory (APT). In other words, the value abnormal returns are driven by fundamental risks. Although the positive relation between returns and B/M is beyond the explanatory ability of the market portfolio return, B/M is indeed a common factor in explaining returns. Fama and French (1995) find that there are book-to-market effects in fundamental values such as earnings and sales in returns. It is therefore natural to ask if the inclusion of B/M factor in a multifactor risk-based model can explain differences in average returns. Fama and French (1993, 1996) propose a three factor model that uses the market portfolio and mimicking portfolios as common factors associated with size (i.e. market value) and B/M to capture asset returns. Although these two factors have no theoretical reason to support their explanatory abilities, the three factor model is able to capture most of the average returns on the US. Expanding the study, Fama and French (1998) confirm that their multifactor model also seems to describe average returns on portfolios formed on scaled price variables in international markets.

Independent studies have also confirmed the explanatory power of the three factors on value premium in both developed and developing countries comparing to the conventional CAPM. For example, Chan et al. (1991) prove the success of the model in

Japan while Chen and Zhang (1998) perform a similar experiment in US, Japan, Hong Kong, Malaysia, Thailand and Taiwan. Moreover, from a firm-level perspective, Avramov and Chordia (2006) found that most of the model improvement is captured by Fama and French three factors and that adding two commonly-used variables, winner-minus-loser and liquidity, does not improve the model. Interestingly, their experiment with both conditional and unconditional versions of CAPM does not capture any of the size, B/M, liquidity and winner-minus-loser (also known as momentum) effects, even after allowing the beta(s) to vary with size, B/M, default spread or all the three.

While supporting the risk-based theory, a number of subsequent studies have been searching for additional factor loadings that mean to capture common risks in cross-sectional expected stock returns which have not been priced by the CAPM or Fama and French model. For example, Carhart (1997) augments the three factor model with momentum factor and find that the four-factor model outperforms the high-skilled and well informed manager theory in explaining expected returns of mutual funds. More recently, Pastor and Stambaugh (2003) propose liquidity risk as an important factor that accounts for significant return differentials even in the presence of Fama and French three factors and winner-minus-loser factor whilst Arisoy (2010) emphasize the importance of volatility risk. The following sections of this thesis, therefore, will also take momentum and liquidity variables into account in order to verify their potential power in improving Fama and French three-factor model.

Furthermore, some argue that Fama and French three factors are poor proxies for risk element in value premium. A case in point is a recent study by Petkova (2006) who claims to have formed a better model than Fama and French's model and that Fama and French factors lost their powers in explaining returns. Petkova argues that a desirable cross-sectional asset pricing model is one whose variables proxy changes in investment opportunities. In the paper, Petkova included four more factors: the short-term T-bill, aggregate dividend yield, term spread, and default spread factors. These variables are believed to have a power of predicting future investment opportunities. However, the latter two elemental factors are used in existing literature (Fama and French 1992) as proxies for factor changes in bond markets. Though Fama and French document the possibility to mirror those factors in stock markets' modelling, this thesis believes that the effects of the changes in bond investments on stock returns should not dominate the effects of the stocks' "internal" factors. Another example is a study by Hahn and Lee

(2006), in which they propose an alternative set of variables, changes in default spread (ΔDEF) and changes in term spread (ΔTERM), and size and value premium are compensation for bearing higher risks associated with ΔDEF and ΔTERM. These studies however, involve some econometric drawbacks that will be discussed further in section 2.4.2.B later in this chapter.

In contrast to the growing support, Fama and French's findings have also faced a great deal of criticism. Notable opponents are Jegadeesh and Titman (1993) who document that a return premium of high over low past return stocks is neither due to overreaction nor to risk theories, but rather to short-term delay in price reaction to firm announcements. From a macroeconomic point of view, Campbell (1996) and Jagannathan and Wang (1996) believe that labour income growth is an important factor in capturing cross-sectional aspect of security returns.

2.2.5. Firm characteristics

In contrast to the risk-based models, a competing explanation for the returns on value stocks draws on value-characteristics (Daniel and Titman 1997). They argue that prior studies cannot differentiate the risk pattern from the characteristics pattern in average stock returns. Since the high versus low book-to-market characteristics are associated with covariation in security returns, when the market experiences periods of distress and growth, the value and growth characteristics rather than risks are responsible for the returns differentials. Indeed, firms share common variation because they have similar characteristics and expect to be distressed at the same time. Therefore, when portfolios are formed to capture a risk factor related to relative distress, it appears that the value premium is related to the covariance of returns with a common distress risk, when in fact it is due to the distress and growth characteristics. Thus, it is hard to distinguish the risk pattern from the characteristics pattern in multifactor models that are based on analysing common factors. In order to distinguish the risk model from the characteristics model, the only empirical solution left is identifying variation in risk loadings that are not related to B/M. They find that cross section returns cannot be explained by the three factors after controlling for firms' characteristics.

In summary, the characteristics hypothesis believes that firm relative distress induces differences in stock returns, and B/M characteristic is a proxy for relative distress. Accordingly, low B/M firms which are typically characterised as growth firms tend to

yield low stock returns, regardless of risk loadings. In the same way, high B/M or distressed firms produce high returns.

However, Davis, Fama and French (2000) argue that the failure of the three factor risk-based model and in favour of the characteristics model in Daniel and Titman (1997)'s study is subject to the short sample period (20.5 years). Testing on a much longer sample period (68 years), they successfully defend the three factor model against B/M characteristics theory. In particular, when examining the three factor regression for July 1929 to June 1997, the intercept in is economically and statistically close to zero while if they exclude the 20.5-year period examined by Daniel and Titman (1997), the intercept for the rest of the 68-year sample period could clearly distinguish from zero as being predicted by the risk model. Therefore, the short sample period in Daniel and Titman (1997) explains their favouritism for the characteristics model.

Among a large number of studies supporting the risk theory, most attention was paid to seeking sufficient proxies for risk loadings. Yet, the impacts of external shocks or market downturns, which naturally link to the level of risk taking, are also vital. The recent on-going credit crunch in 2007/2008, which has been causing great damages for the global economy with too short a post-event horizon to validate conventional approaches, naturally leads to the need of a different methodology. The next section reviews recent studies on performance of value strategy and risk-based asset pricing models under different states of economy (i.e. good, normal and bad times). This chapter then aims to answer the questions of whether the shock did affect them and if so, how to assess their performance without bias.

2.2.6. Value premium from business cycle perspective

An earlier study discovering the link between business cycles and stock expected returns is tracked back to Fama and French (1989). They suggest that expected returns follow an opposite direction to the economic conditions. When the market is down, income is low, expected returns on both stocks and bonds must be high enough to encourage people to invest rather than consume and vice versa.

Testing in every possible states of economy, Abhyankar, Ho, Yu and Zhao (2008) finds strong evidence of value premium, regardless of investor preferences, and even risk-averse investors would prefer value to growth stocks. However, a closer look reveals that the success of value investing is only significant during economic booms, while neither of these strategies performs better than the other during recessions. Examining

the interactions between risk and "economic primitives" (p.67), such as tastes and technology, at the firm level, Zhang (2005) argues that growth firms are riskier during good times, whereas value firms are riskier during bad times when the price of risk is high. Supporting this view, Arisoy (2010) confirms that value stocks among CAC40 index (France) become riskier at bad times and less risky at good times compared to those in the normal situation. The opposite is true for growth stocks.

Lakonishok et al. (1994) defend traditional measures of standard deviation and market beta, saying dwelling into the examination of extremely bad times provides refuge for those looking for proofs that high return strategies are riskier. Studies in extreme states have a tendency to distort the value premium.

In order not to fall into that tendency, this study explains value premium using a different approach. The test will be performed in a market that has little effect by bad states, and thus could act as a benchmark for the others. The method allows our analysis to examine the whole time frame of the market without being concerned by methodological obstacles mentioned earlier when taking the effects of extreme economic conditions, such as the 2007/2008 credit crunch, into account. Hence, the test of model performance will be more accurate and widely applied.

The aims of this chapter are to examine the validity of Fama-French model, and also to check if crises affect the explanatory power of the model. The approach presented in the present research will allow us to test the model performance in both crisis and normal economic conditions.

Recent criticism on the Fama and French (1993) three factor model includes Petkova (2006) and Hahn and Lee (2006) who offer models with different factor loadings. They document that the Fama and French three factor model fails and that its success is merely because the three factors are parts of their models' predictive innovations. In other words, the factors in Petkova's, and Hahn and Lee's models have stronger predictive abilities and in the presence of these innovations, the Fama and French factors are superfluous. The driving motivation behind their works is to come up with an arguably better model. One problem of their arguments is that they have not taken into account events occurred, such as crises and shocks, during the sample periods. It is worth mentioning that Fama and French's (1993) opponents expanded the test to 2001, which coincided with a stock market downturn. Looking at Figure 2.1, we can see a

clear drop starting in 2000 due to a collapse of the Dot-com bubble and since then the US market has never reached the point before the shock. A question raised is what if the original model still works and is widely used across markets but economic booms or recessions have undermined its explanatory power.

One possible reason behind the Petkova (2006) and Hahn and Lee (2006) results is that the Fama and French model through which anomalies were well explained, fails doing so after a crisis happens. The problem is one tends to use the same model for different sample periods and markets regardless of events happening within it. Doing so could reduce the explanatory effectiveness of this type of models. This thesis hopes to identify these cases, or at least proposes a method that has potential to do so.

In terms of methodology, the thesis proposes using co-integration tests in conjunction with testing model strength. First, it is widely known that co-integration tests can detect long-run equilibrium relationship between two or more variables. The tests therefore can be used to check if one market has significant linkage with other markets in the long term. A group of four leading markets across continents are selected including US, UK, Germany and Japan. They are not only widely used in co-integration tests but also share similar characteristics that well served the purpose of this thesis, since they are significantly influenced by the recent 2007/2008 financial crisis. The present research scanned through many markets, including the emerging market groups, in order to find Turkey as the best candidate that shows insignificant co-integration with these four markets. The data are ideally suited to the comparison of the effects of a financial shock because the ISE stocks are little affected by it.

An existing problem is how to know if a model starts failing after a shock. One method is to analyse it before the shock, observe and use it again after this shock and note down the difference in effect. A problem with this method is that it could be that the model used to work well and for some external reason it performs poorly, and therefore although the model was adequate, we are unable to test its own strength.

An alternative method - which this chapter has just introduced earlier - is testing on a market less affected by the shock using independence tests. This will isolate the shock-affecting possibility leaving us able to compare the effectiveness of a model on two (or more) testing samples. The advantage of this approach (method 2) is that we have the same time period of long enough observations for both tests. This is significant because

say for the 2008 shock, there are not enough observations following the event up to now to carry unbiased examination. A second advantage is that unlike firms' announcements, a crisis is not a break point, but rather a lasting period, one without a single date of representation; using method 2 we can avoid splitting the sample and arrive to a more accurate approach than the splitting sample.

Despite the advantages of method 2, at the best of the author's knowledge, this is the first application of this approach to assess a models' adequacy. The selected market first should have insignificant link to main global indices which are heavily affected by the 2008 crisis, and the market must also be mature enough to carry out the test for a better asset pricing model. The first step could be done via cointegration check and then the tests of model performance are relatively free from significant external effects caused by the shock. Section 2.3 will demonstrate the process in detail.

2.2.7. Conclusion

For decades value premium has attracted a great deal of attention among academics and practitioners. Although it has become widely accepted that in the long run value stocks outperform growth stocks, their performance in markets outside the U.S is rather diverse. Though developed markets tend to confirm the success of value strategy, there are still some exceptions, such as the case of Italy. In emerging markets, while the behaviour of value strategy is unpredictable, perhaps due to their rapid market growth and high market volatility, they may also present higher profitability opportunities for value oriented investors. The higher return of value over growth stocks however has not been fully explained by the conventional CAPM, and the strategy therefore remains as an anomaly in stock markets.

Interestingly, there is no evidence that abnormal returns disappear after the strategy has become well known. Hence, arguments over underlying reasons behind the success of value strategy appear to be more debatable among researchers. The most discussed theories are data snooping and selection bias, behavioural finance, risk-based theory, and firm characteristics. Among them, the risk-based explanation seems to inspire a wider range of studies seeking to develop the argument, and result in many augmented versions of the initial risk-based model.

Recently, the question of whether or not value stocks are fundamentally riskier than their growth counterparts is found to have some linkage with economic conditions. More specifically, holding growth stocks may be riskier during economic booms while

value firms seem to be riskier especially when shocks or financial crises like the 2007/2008 credit crunch come along. It is therefore crucial to take into account the possible impacts of these shocks on the performance of investment strategies.

This chapter proposes a new approach which aims to consider the recent financial crisis without suffering the methodological issues encountered when one uses conventional methods.

2.3. Independence tests

By independence test, the present research refers to a linear test for long-term independence. There are at least three reasons for looking at the test from this particular angle. First, the asset pricing models studied in this chapter are in a linear form. Secondly, the chapter is concerned with testing the models' ability to predict expected returns in the long run rather than arbitrage opportunities. Also, the effects of business cycles are likely to persist over the long term. Thus, this chapter employs cointegration analysis to test for the orthogonality independence between selected markets in the long run.

To begin with, it considers the possibility that financial crises could cause an unexpected shift or a structural break in the data.

2.3.1 Financial crises and structural breaks

This section does not intend to summarise the enormous literature on endogenous breaks and financial crises. It rather pays attention to their effects on financial modelling and how to control for such effects in the asset pricing context. To start with, the section will briefly discuss possible effects of economic shocks on financial modelling.

The globalisation of financial transactions has created a tighter relationship between financial markets across the world. It is undoubted that the dynamic interactions bring advantages for both domestic and international investments, they however have a potential downside. They are claimed to make economic shocks, such as financial crises, spread wider, quicker cross borders. The most recent crisis is an example of how problems in one country can damage others. The 2007/2008 credit crunch started in the U.S and quickly became a global financial crisis with victims among the leading countries that have strong linkages to the U.S market.

It is widely accepted that financial crises tend to cause structural breaks, when the market mechanism breaks down (Pesaran and Timmermann 2002). They are also likely to have serial impacts on firm specific as well as on macroeconomic variables, and it is

hard to adjust for all of the effects in financial modelling. Among others, Bai (1997) points out those structural breaks are particularly common and need to be considered in time series data over long horizons. In addition, there is mounting empirical evidence in financial econometrics that structural breaks can cause considerable forecasting errors and damage the reliability of econometric models (see Bai 1997, and Neely and Weller 2000 for discussion). Thus, failure to take into account crises, such as the recent 2007/2008 credit crunch, in assessing model performance in long run could lead to erroneous conclusions on the validity of asset pricing models.

There are a number of ways to identify breaks in parameters in regressions, such as Chow (1960), Andrew (1993) or Bai-Perron (1998, 2003) techniques. Once break(s) are found, it is however hard to account for effects of "recent" break points where few number of observations are available. This chapter proposes a new method to this problem in model evaluation context. The idea is to identify a market that has little effects from the shocks but which is also mature enough to carry out model performance assessments.

Visually, Figure 2.2 shows that the stock markets in UK, U.S, Japan and Germany appear to share similar movements over the 2008 crisis while the Turkish national index does not. It is however important to check this first with proper econometrics procedures.

2.3.2 National Index data

The analysis concentrates on the world's four largest stock exchanges: New York (Standard and Poor's 500 Composite – S&P), Frankfurt (DAX 30 Performance- DAX), London (FTSE 100 Price Index – FTSE100) and Japan (Nikkei Stock Average Price Index 225 – Nikkei) in relation to Istanbul Stock Exchange (ISE National 100 Price Index – ISE). Monthly closing data for all five indices are obtained from DataStream database over the period beginning in January 1988 and ending in December 2010. When the stock exchanges were closed due to holidays or unexpected events, the index level was assumed to stay the same as that for the previous trading day.

The four major national stock markets experienced a dramatic fall over the 2007/2008 credit crunch, the largest drop in modern history of the global stock market. In order to account for the effects of the recent financial crisis on these markets, the selection of the starting date of the crisis is crucial but controversial. Many choose the date Lehman Brothers bank was filed for bankruptcy on September 15th, 2008 as a starting point for a

series of subsequent collapse of major banks and difficult time for financial system in US and other major markets over the world. To assure that Turkey is not being influenced by the other markets which are known to be the heart of the financial crisis, the next section will perform a cointegration test that was designed specially for this purpose and also use September 2008 as a crisis date, T_B. Once a market impervious to the 2008 financial crisis is found, the model performance can be fairly accessed without the need of including crisis effects or structural break(s). Section 2.6 earlier details the advantages of this approach compared to the conventional approach utilizing event studies theory.

2.3.3. Market selection

2.3.3.A. Unit-root test

A.1. Unit-root theories

In order to determine the cointegration between two market indices, it is necessary to first carry out the unit root test of whether each series is integrated of order one, *I(1)*.

A.1.1. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP)

The conventional Augmented Dickey-Fuller (1981) and Phillips and Perron (1988) regressions are used respectively when one thinks of testing for the stationarity or the presence of a unit in a series.

The ADF test which examines whether y_t is *I(0)* can be written as:

$$\Delta y_t = a_0 + a_1\, y_{t-1} + \sum_{i=1}^{p} (a_i\, \Delta y_{t-i}) + u_t \qquad (2.1)$$

where p is large enough to make u_t white noise. The series can also be subject to PP test:

$$y_t = b_0 + b_1\, y_{t-1} + \upsilon_t \qquad (2.2)$$

where υ_t is serially correlated.

A.1.2. Allowing multiple breaks

Although our interest remains to uncover the impact of crises on stock indices, it is important to rule out the likelihood that any unit-root found may have been the result of structural change in data (Perron 1989). The use of dummy variables in the specification allows this. Further literature by Zivot and Andrew (1992) and Perron (1997) has included an exogenous break-point in the equation. By allowing one breakpoint they have found more evidence against the unit root hypothesis than the Dickey and Fuller

(1981) method. To avoid bias toward the hypothesis, this chapter incorporates multiple unknown breaks in the testing process, as suggested by Lumsdaine and Papell (1997). In the chapter, we use their idea but employ the more recently developed procedure by Lee and Strazicich (2003), which allows for breaks not only under the null, but also under the alternative hypothesis. The test is general enough to allow for more than one crisis, which may not necessarily be the same across markets, and to ensure our evidence that the series are *I(1)* is unbiased. In addition, as break points are documented to be less inference sensitive than the assumptions about the number of breaks, we shall fix neither the number of breaks nor their dates using the Minimum Lagrange multiplier (LM) test proposed by Lee and Strazicich (2003)[4].

$$\Delta y_t = \mu + \beta t + \theta DU1_t + \gamma DT1_t + \omega DU2_t + \psi DT2_t + \alpha y_{t-1} + \sum_{j=1}^{k} (c_j \Delta y_{t-j}) + \varepsilon_t, \quad (2.3)$$

$t = 1,..., T$

where DUi_t are indicator dummy variables for a mean shift occurring at times $T_{i,}$ that equals 1 for $t > T_i$.

DTi_t are the corresponding trend shift variables, and are equal to $(t-T_i)$ when $t > T_i$.

A.2. Unit-root test results

In order to test the cointegration between markets, the series have to be integrated of order 1. First, the ADF and Phillips-Perron tests allowing no breaks are used and confirm that indeed they are *I(1)*. As can be seen in Panel A of Table 2.1, all five national indices have unit root in level, they are however stationary in the first differences. For ADF, the optimal lag length *p*, in parentheses, which should be large enough to make u_t white noise, is selected by Schwarz Information Criterion (SIC). In most of cases, *p* equals to zero except for Germany in level. The test statistics are much larger and statistically significant in the first difference. For example, for S&P500 index, the statistics value is -15.31 (significant at 1% level) in the first difference while it is -1.5 (insignificant) in level. The results are also hold under PP tests.

Taking one step further, a more recent method developed by Lee and Strazicich (2003) has ensured the selected indices are *I(1)* even after accounting for possible structural

[4] We thank Junsoo Lee for generously providing the coding for the test in RATS

breaks caused by shocks and the recent financial crisis. Over a sample period of 23 years, it is appropriate to allow a maximum of two breaks. This not only reflects the real economic movements but also take advantages of multiple break unit-root tests. The Lee and Strazicich's test results two break dates, TB_1 and TB_2, that the shocks are most likely to occur but not necessary to take place. The results in panel A of table 2.1 show that the recent 2007/2008 financial crisis tends to have some effects on all selected markets except Japan which experienced heavily damage from its own crisis during 1991-1994. Moreover, Japanese stock returns are known to have different risk pattern to the world price of risk under the CAPM (Harvey 1991). Therefore, Japan does not seem to be an appropriate candidate for this study's testing sample. The remaining question of which market(s) is qualified will be addressed in the next section.

Accounting for two structural breaks, the LM τ-statistics for unit root hypothesis cannot be rejected at the 5% significant level for all series implies that they contain a unit root. In short, the minimum LM test reassured that all national indices are *I(1)* with or without breaks and we can proceed to the next step of independence tests, cointegration tests.

2.3.3.B. Cointegration Tests

B.1. Cointegration

Although the concepts of Engle-Granger and Johansen tests can be found in many sources, it is worth to briefly summarise their main arguments and show how we augment the traditional tests to account for the 2008 financial shock. For symmetric reasons, it is important to ensure that the results remain robust after the structural changes are taken into account like they do in unit root tests.

B.1.1. Engle and Granger

Now the test of cointegration can be taken once each series is found to have one unit root, when test statistics are derived from residuals of the following regression:

$$Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 t + e_t \quad (2.4)$$

where Y_t and X_t are the regressand and regressor, respectively and t is a trend

If the series are cointegrated, the ADF test shall examine whether e_t is I(0):

$$\Delta e_t = \alpha_0 e_{t-1} + \sum_{j=1}^{q} (\phi \Delta e_{t-j}) + \nu_t \quad (2.5)$$

where q is large enough to make ν_t white noise. The estimated residuals are also subject to PP test:

$$e_t = \beta_0 + \beta_1 e_{t-1} + \gamma_t \quad (2.6)$$

where γ_t is serially correlated.

Two series are said to be cointegrated when there exists a stationary linear combination of the two. In terms of inter-market efficiency, cointegration implies that the markets are linked even if they are non-stationary. If one denotes $z_t = y_t - \theta x_t$, where x_t, $y_t \sim I(1)$ and z_t is stationary and invertible Autoregression and Moving Average models (ARMA), then the two series x_t and y_t are cointegrated if and only if $E(z_t) = \delta_z$ and $Var(z_t) = \sigma^2 < \infty$.

B.1.2. Johansen

Johansen's maximum likelihood method suggests testing cointegration using dynamic VAR(*k*) specification of vector X_t, of the size *n* x*1*, consisting of I(1) variables, to construct common stochastic trends:

$$X_t = \mu + A_1 X_{t-1} + \ldots + A_k X_{t-k} + \varepsilon_t \quad (2.7)$$

where ε_t is assumed to be an *i.i.d.* Gaussian process

Next, denote $\Delta \equiv 1 - L$ where *L* is the lag operator.

The model above is rewritten as followed

$$\Delta X_t = \mu + \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi \Delta X_{t-k} + \varepsilon_t \quad (2.8)$$

where

$$\Gamma_i = -(I - A_1 - \ldots - Ai), \qquad i = 1, \ldots, k-1$$

$$\Pi = -(I - A_1 - \ldots - A_k)$$

The benefit of this is that it allows all long-run information of X_t to be recapitulated by 'long-run impact matrix', Π, whose rank shall determine the cointegrating vectors number.

If the coefficient matrix, Π, has rank of $r < n$, then there exist *n* x *r* matrices φ and ψ each with rank such that $\Pi = \varphi \psi'$ and $\psi' X_t$ is I(0).

The analysis of these matrices can be referred to in Johansen (1991, 1995) for details.

In summary, the strength of Johansen approach lays in his assumptions which allow the Maximum Likelihood estimation to be incorporated with cointegration issue and its testing framework.

B.1.3. Cointegration with a structural break

We contribute a method to test whether, after including a break, the cointegration still exists. Developing from the cointegrating regression (2.4), if there is an exogenous structural break in the level occurring at time $1< T_B < T$, the equation is followed.

$$Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 D(T_B)_t + \alpha_3 D(T_B)_t X_t + \alpha_4 t + e_t \quad (2.9)$$

where $D(T_B)_t = 1$ if $T_B + 1 \leq t \leq T$ and equals to 0 otherwise.

A rejection of the null hypothesis implies that the series are cointegrated with an exogenous change in the level at time T_B.

In this analysis, the cointegration test includes a break at the recent financial crisis, commonly chosen at September 2008, but does not include a break in trend function, which appears to be appropriate for recent effects caused by the current financial crisis.

One possible approach is the LM test proposed by Westerlund (2006 p.101), which allows "for unknown number of breaks to be located at different dates and for different individual, endogenous regressors as well as serial correlation". The test is however designed and more suitable for a panel cointegration check between a number of series across markets, which is beyond the interest of this thesis and thus will be useful for other research.

B.2. Cointegration test results

Results of the test of cointegration between markets are given in Panel B of Table 2.1. Choosing Turkey as the base index, the null hypothesis of no cointegration between the ISE100 and each of the other indices cannot be rejected by Engle-Granger and Phillips-Ouliaris methods. Both the τ-statistics and *z*-statistics cannot reject the null at 5% significant level.

At this stage, we continue to double-check the analysis of their interdependence by Johansen's (1991, 1995) dynamic method. For all cointegrating vectors, Johansen test confirms the previous results through the common stochastic trends that we cannot reject the null hypothesis. For each pair of national indices where the ISE100 is the base index (n=2), the test results a maximum rank order, r, of one. As can be seen from panel

B of Table 2.1, the null of no cointegration cannot be rejected under ranks r= 0 and $r \leq 1$ by both Trace statistics (λ_{trace}) and Max-Eigen statistics (λ_{max}).

Taking a step further, the Engle-Granger test is augmented with a dummy variable which stands for a structural change at the recent financial crisis, T_B. The tests of whether T_B is in fact a structural break in the time series indices show significant coefficients associated with the dummy variable, $D(T_B)$. This implies that the break has an important role in the cointegration tests. In addition, Panel C of Table 2.1 provides strong evidence that the ISE bears no relationship to the rest of the markets. Both τ-statistics and z-statistics are not significant using Mac Kinnon (1996) critical values. Thus, the Turkish market has immaterial effects from the four markets, which have been heavily attacked by the 2007/2008 shock.

2.3.3.C. Conclusion

The results from independence tests suggest that each of the five index series contains a unit root but becomes stationary in the first difference. Since being I(1), the national indices of Turkey, Germany, Japan, UK and U.S are eligible for cointegration tests to ensure if Turkey is an isolated market relative to the other leading markets. Both the conventional cointegration tests, such as the Engle-Granger and Johansen tests, and an augmented method which allows for a structural break cannot reject the null hypothesis of no cointegration between the ISE100 and the rest. We therefore can safely conclude on the independence of the Turkish stock market in the long run.

2.3.4. Conclusion

The results of various cointegration tests show that the U.S stock market has no significant linkage to the Turkish market. Over the 2007/2008 credit crunch, while the four major markets are strongly linked, the Turkish market appears to be substantially independent from all of the four leading national stock markets. The finding is robust after adjusting for structural breaks. It therefore suggests that Turkey is a suitable candidate for assessing the performance of asset pricing models without having to worry about possible effects caused by the structural changes on the model performance. The next sections will examine the behaviour of different asset pricing models in the Turkish stock market, which is expected to provide a relatively fair view of model performance.

2.4. Data and Methodology for testing value anomaly in Turkey

2.4.1 Data

Data are obtained from DataStream Thomson Reuters database and cover the period from July 1989 to December 2010, 258 months, for non-financial firms. Bond and bill rates in treasury auctions are obtained from the Central Bank's record. Variables are monthly data for most parts, however, default spread is based on annual data because the accounting reports are available at the yearly frequency. The sample excludes financial firms since the meaning of these firms' variables differs from that of non-financial firms. For example, a high leverage in financial firms is common, while it normally refers to a distress situation in non-financial firms. This can be clearly seen in Table 2.1 which describes the sample in comparison to the population. Financial firms generally have negative working capital regardless their financial status. Checking a sub-sample in section 2.5.2.D shows that the exclusion of financial firms does not materially distort our results[5].

As mentioned earlier, previous studies exploring the value premium in Turkey tend to cover a rather short span of time. Moreover, aside from their limited time horizon, these studies are potentially subject to at least two problems. Firstly, it is typical for most of databases including DataStream to leave out delisted firms. Previous works in the ISE, therefore, might suffer from survivorship bias. Second, in those studies, it is lack of sufficient diagnostic tests for the model goodness of fit in explaining value anomaly.

In this study's estimation, by including delisted companies in year(s) they were listed, it hopes to eliminate potential survivorship bias in the dataset[6]. Also, as this study takes into account distress risk and bankruptcy risk, there is a need to include poor performing firms, especially those went bankrupt, in the analysis. Since DataStream only reports data of active trading firms, while there are firms that used to be listed and satisfied the selection criteria, we also collect data on those delisted firms in the ISE main website. This study also cross-references different sources to confirm the delisted firms' identity, and forms its own portfolios. Further advantages of this method are discussed in Kothari,

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[5] Barber and Lyon (1997) also found a strong relationship between stock returns, size and B/M in both financial and nonfinancial firms in the U.S.

[6] Delisted firms are defined as firms go bankrupt, engage in merger and acquisitions or be disqualified. We also perform the check if exclusion of dead firms changes the performance of each pair of portfolios and found it statistically and economically impacts the market anomalies test.

Shanken and Sloan (1995). The present research also performs a range of robustness check over a 21 year sample period. It confirms that the results are robust to the choice of classifying criteria and estimating methods.

In order to be included in year *t* of the sample, a stock must have sufficient data on return index from July of year *t-1* to June of year *t*, and on market value of equity as at 30th, June of year *t-1*. To mirror the real investment environment, negative B/M, negative E/P and zero DY stocks, which are rare during the sample period, are excluded from B/M, E/P and DY portfolios, respectively. The thesis, however, finds no reason to exclude them in other portfolios formed in the later sections which aim to assess the effects of changes in investment opportunities.

Table 2.2 presents the sample description. It reports the descriptive statistics of various variables, including number of employees, net sales, total cash flow, total working capital, total assets, and market value across all firms after the screening process and in the ISE National All-share index as at the end of December, 2010. The sample covers majority of listed firms and spreads from small firms with the number of employees as little as 3 to more than 34,000 staff, from zero revenue to more than 26,218 trillion Turkish Lira (TRY) firm. It also well represents the market with more than 90% of total market capitalisation in the ISE.

One might notice an extremely negative revenue firm in the National All-share but the outlier should not be a concern. It is Torunlar Real Estate Investment Company, the only firm that suffered negative sales of –TRY 36,719 million because the firm is mainly working with construction projects, which is normally ongoing at the year end. However, the firm is not included in the sample due to being less-than-a-year listed.

2.4.2 Methodology

2.4.2.A. Portfolio formation

Value and Growth portfolios are classified based on B/M, and also on E/P and DY for robustness check purposes. Accordingly, stocks are allocated to three quantiles with a breakpoint of 30%, 40% and 30%. This is a conventional way of grouping portfolios[7] to examine the performance of value portfolios (top 30%) versus growth portfolios (bottom 30%). Unlike many studies, the chapter does not consider individual stocks in a

[7] Suggested by pioneer studies, such as Fama and French (1992, 1993, 2004), Abhyankar, Ho and Zhao (2008).

portfolio equally, but uses value weighted return approach in order to take the effect of firm size into account[8]. The weights of stocks in each portfolio in year *t+1* are based on their market value of equity at the end of June, year *t*, one month before taking a long or a short position in the portfolio. This method of weighting individual elements of a portfolio will also be applied for any subsequent variables that are portfolio-based factors in this thesis's analysis.

Forming in December year *t-1*, the portfolios are held from July year *t* to June year *t+1* (called as year *t+1*) and rebalancing annually with assumption of no transaction costs. Six month lag is allowed to ensure all accounting information is known. This gap between fiscal year-end and returns tests is "conservative" due to delay of financial report announcement (Fama and French 1992a, p.429). Indeed, although Turkish listed firms are required to publish financial statements quarterly, like any other markets, Akdeniz et al. (2000) notice that the delay in report of audited statements also appears to be common in the Turkey. About 97% of listed companies in Turkey[9] have a fiscal year end on December 31st and practically, Turkish firms tend to release their financial statements within three months after the end of their fiscal year.

In June of each year t, stocks are split into Small and Big portfolios using the median as a breakpoint. The portfolios also employ the buy-and-hold strategy on an annual basis and positive excess monthly value weighted returns of the small over the big will imply the existence of size premium. Despite the similarity in the number of stocks in small and big portfolios, the total market capitalisation of the small group is far less than half of the total (about 5% in 2010). Thus, it is interesting to see if small stocks could outperform big stocks as documented in other markets.

Finally, a proxy for the market factor is the excess return between the market portfolio, R_m, and return on the risk free asset, R_f, where R_m is the value-weighted portfolio of all stocks in B/M and size portfolios plus negative B/M stocks and R_f is the 1-month London Interbank Offered Rate (LIBOR).

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[8] Since returns on equal-weighted portfolio are affected more by small stocks (Fama and French 1989), weighting portfolio based on size (value-weighted) appears to be closer to the investment behaviour of rational investors.

[9] Calculation based on data provided by DataStream.

2.4.2.B. The explanatory variables

Explanatory variables in the time-series and panel regressions include the three stock market factors proposed by Fama and French (1993) and a number of common risk factors that have dominated recent discussion in the literature about value anomaly, which have motivated their use in this chapter.

Besides the market factor that has been discussed in previous section, Fama and French's HML and SMB are mimicking portfolios for size and B/M factors in returns. For example, HML is the return differentials between stocks with high B/M and low B/M at 30th June year t, the average returns are calculated from 31st July year t to 30th June year t+1 and weighted using their market value at 30th June year t. At this point, it is worth noticed that, the forming date of the high B/M and the low B/M portfolios, which build the HML factor, is only one month before their returns are computed and the HML factor is formed, while it is 6 month lag for Value and Growth portfolios. This difference in the forming date is to ensure that the two pairs are not identical and that no bias caused by possible correlation between dependent and independent variables in a model[10]. Likewise, SMB factor in relation to Small and Big portfolios is constructed using a similar method to avoid problems likely raised from the asymmetric way of treating HML and SMB.

Recently, there are a series of other fundamental variables that are meant to proxy for common risk factors which have not been unobservable by the CAPM. Among them, liquidity factor (suggested by Pastor and Stambaugh 2003), winner-minus-loser (recently brought to value anomaly discussion in 2006 by Avramov and Chordia), dividend yield, short-term treasury bill rate, default spread and term spread (proposed by Petkova 2006), and changes in default and in term spread (supported by Hahn and Lee 2006) seem to draw a great deal of attention. Studies by Petkova (2006) and Hahn and Lee (2006) are among the recent surge in interest in the impact of bond factors and interest rates on stock returns. Although Fama and French (1993) have mentioned the explanatory power of default spread and term spread in bond returns but revealed that the roles of these bond-market factors in explaining common variation in stock returns are fully captured by the market factor. In other words, the powers of these variables as

[10] We thank Fabrizio Adriani for raising the possibility that there might exist a linear relation between B/M portfolio returns and the HML factor.

alternative factors in explaining stock returns, that are strongly supported by Petkova (2006) and Hahn and Lee (2006), are called into question.

The thesis, therefore, will examine the possible explanatory abilities of those dominant factors at once and discuss some econometric problems in building risk factor of previous studies as well as propose an alternative method to avoid the problems. The purpose of this thesis is not to re-examine the results of published studies but rather to put all main arguments together in one encompassing framework to verify the variable validity and explanatory power of models in capturing value anomaly.

First of all, when taking into accounting size effect, small firms - known to be relatively illiquidity in most markets - tend to gain higher profits than larger cap companies. Moreover, numerous studies have shown the explanatory ability of liquidity factor in predicting stock returns[11]. Hence, it is natural to expect that liquidity factor will help to further understand the anomaly. The proxy for liquidity factor varies dependent on the goals. Two recent measurements are Pastor and Stambaugh (2003) non-traded liquidity factor measuring the impact of liquidity risk in association with daily price changes; and Avramov and Chordia's (2006) measurement focusing on the stock sensitivity to the liquidity factor. However, Avramov and Chordia document that neither of the two measurements can capture the impact of turnover on expected returns. This study employs monthly turnover ratio to act as an indicator for the purpose of capturing liquidity effect on monthly portfolio returns. Turnover, *TURN*, proxy for liquidity factor, is a mimicking portfolio that takes a long position in low turnover stocks and a short position in high turnover ratio stocks. Turnover ratio is defined as trading volume divided by the number of shares outstanding.

Secondly, other academics, such as Asness (1997) and Daniel and Titman (1999) also examined the relation between past return (i.e. the momentum) and value effects and suggested that other investment strategies could improve the performance of value strategy. This chapter therefore will also examine the interaction between momentum effect and value effect in explaining value abnormal returns. The momentum effect is measured by Winner-minus-Loser, *WML*, based on the Jegadeesh and Titman (1993) momentum strategy of buying stocks with high 11-month past returns and selling those

[11] Amihud and Mendelson (1986) document the impact of bid-ask spread as proxy for liquidity on the cross-section returns. Subsequently, forming different proxies, Chordia, Roll and Subrahmanyam (2000) and Pastor and Stambaugh (2003) find strong correlation between their liquidity factors and stock returns.

with low 11-month past returns, lagged 1 month. Next, *DIV* stands for the one-year aggregate dividend yield. It is the sum of value-weighted dividend yield of individual stocks from July of one year until June of the following year.

In addition, the short-term Treasury bill variable, *STBill*, is a monthly rate of the 3-month T-Bill. Term spread, *TERM*, is the difference between monthly long-term government bond rate and the short-term T-Bill rate[12].

Moreover, two widely cited bond-market factors, namely default spread and term spread, will be also included. Default spread is a universal proxy for the risk of change in credit market conditions. Increases in DEF signal the market's anticipation for bad credit market state and vice versa. Term spread, on the other hand aims to capture change in interest rates. However, this study differs from previous studies in the way that we do not use correlated regressors within our analysis. For example, Petkova (2006) defines default spread, DEF, as differential in returns between Long-term Corporate Baa Bond and Long-term Government Bond; TERM as 10-year government bond minus 1-year government bond, where using the FRED® database long-term government used is the 10-year bond. Clearly, the two variables are correlated.

Hahn and Lee (2006) propose the usage of ΔDEF and ΔTERM as an alternative set of variables to capture the value effect. They define DEF as the yield spread between Baa corporate bond index (Bond Index) and 10-year Treasury constant maturity (10yTbill), and TERM as the spread between 10yTbill and one-year Treasury bill (1yTbill) rates, we have by definition and rearrangement:

$$\Delta DEF_t = -[(\text{Bond Index}_t - 10yTbill_t) - (\text{Bond Index}_{t-1} - 10yTbill_{t-1})] \quad (2.9)$$
$$= -(\text{Bond Index}_t - \text{Bond Index}_{t-1}) + (10yTbill_t - 10yTbill_{t-1})$$

$$\Delta TERM_t = (10yTbill_t - 1yTbilll_t) - (10yTbill_{t-1} - 1yTbill_{t-1}) \quad (2.10)$$
$$= (10yTbill_t - 10yTbill_{t-1}) - (1yTbilll_t - 1yTbill_{t-1})$$

The term $(10yTbill_t - 10yTbill_{t-1})$ appears in the construction of both variables. While the dependence between them resulting a multicollinearity problem does not invalidate the model as a whole, high correlation between regressors, especially in OLS estimation,

[12] The classification of long and short maturity of these government securities in each year depends upon the availability of the bonds and bills in the year. Accordingly, long-term Government bonds are bond with maturity from 12 months to 121 months, and from 3 months to 6 months for short-term bonds (1-month Government bonds are rare during the sample period).

will call off the predictability power of each correlated individual predictor, and regarding which predictor are redundant with respect to others.

Two points rise to attention. The first is that high correlation between independent variables can damage the accuracy with which each of the variables' slopes is measured (Pastor and Stambaugh 2003). The second issue being that no conclusion on the significance of each regressor can be made. Petkova (2006) furthermore documents the need of a variable to be significant to be important. Unable to determine the significance implies this would mislead many interpretations, such as each factor's role to the regression. For example: to examine the relationship between *SMB* and *ΔDEF* and *HML* and *ΔTERM* in a view to counteract Fama-French factors, Hahn and Lee (2006) document the following 2 regressions:

$$SMB_t = a_1 + b_1 R_{m,t} + c_1 \Delta DEF_t + d_1 \Delta TERM_t + e_{1,t} \quad (2.11)$$

$$HML_t = a_2 + b_2 R_{m,t} + c_2 \Delta DEF_t + d_2 \Delta TERM_t + e_{2,t} \quad (2.12)$$

Next, they interpreted the c_1 coefficient as significant while d_1 is not in order to conclude that the *ΔDEF* regressor can replace *SMB*, but we have been given that its respective regressors *ΔDEF* and *ΔTERM* are correlated, hence it is difficult to obtain such interpretations. The regression (2.12) experiences a similar issue that would leads to bias conclusions.

The approach this present research uses could potentially avoid these econometric problems. In the previous works, default spread variable, which is the differential in returns between Long-term Corporate Baa Bond and Long-term Government Bond, means to proxy for the probability a firm going bankruptcy according to its credit rating. We notice other measurements that are also widely used as a proxy for the bankruptcy probability and not collinear with TERM variable. These measurements are O-score proposed by Ohlson (1980) and Z-score proposed by Altaman (1968), both using a wide range of firms' financial fundamental information and macroeconomic ratios. There has been growing evidence that they can predict the default probability. The usage of the O-score as a good proxy for default risk is also in the context of Griffin and Lemmon (2002) uses and Dichev (1998), in which Dichev finds that O-score predicts delisting cases in the Center for Research in Security Prices (CRSP) delisting list better than an alternative measurement of bankruptcy risk Z-score. This thesis, therefore, proposes using O-score in constructing factor loadings as proxy for default risk. In line with other variables, the default spread factor is also formed on portfolio basis. The O-score is calculated based on accounting information from annual financial statements and the

GDP price-level index. The formula to computer O-score of each firm in year *t* is followed[13].

$$\text{O-score}_t = -1.32 - 0.407 \log\left(\frac{\text{total assets}_t}{\text{GNP price-level index}_t}\right) + 6.03\left(\frac{\text{total liabilities}_t}{\text{total assets}_t}\right) - 1.43\left(\frac{\text{working capital}_t}{\text{total assets}_t}\right) + 0.076\left(\frac{\text{current liabilities}_t}{\text{current assets}_t}\right) - 1.72\, D_{debt} - 2.37\left(\frac{\text{net income}_t}{\text{total assets}_t} - 1.83\left(\frac{\text{funds from operations}_t}{\text{total liabilities}_t}\right) + 0.285\, D_{loss} - 0.521\left(\frac{\text{net income}_t - \text{net income}_{t-1}}{|\text{net income}_t| + |\text{net income}_{t-1}|}\right) \quad (2.13)$$

where the dummy variable, D_{debt}, equals to 1 if total liabilities greater than total assets, and equals to 0 otherwise, and D_{loss} takes the value of 1 if the firm has net loss for the last two years (i.e. year *t-1* and year *y-2*), and equals to 0 otherwise.

Using the above measurement of default probability, the default spread, *DEF*, is defined as the difference in returns between firms with the highest probability of bankruptcy, measured by Ohlson's (1980) O-score, and firms with the lowest O-score. Based on portfolio excess returns, the DEF factors in this study has another advantage of being able to capture the corresponding risk premia, which are compensations for investing in firms with high default risk.

Followers of risk-based models tend to capture abnormal returns through evaluating the kind of risk that concerns their assets, and hence models capturing more risk or explain the most risk compensation are considered to be more successful in bringing explanatory power. Different methods would be needed to go around this problem, if otherwise. Supporting this view, Fama and French (1993) also use portfolio formation method to construct their DEF factor but not to the TERM factor. This is natural as the TERM factor captures the change in market interest rate, thus it is unreflective to build a portfolio around it. Therefore, the method of forming variables mostly on a portfolio basis allows this analysis to capture relatively well the time-varying risk premia under changes in investment opportunities.

For those that are formed on the basis of portfolio return differentials, namely DEF, WML and TURN, the analysis uses one breakpoint consistently throughout the chapter. Similar to the way Fama and French (1993) built HML factor, to mimic the risk loadings in each factor in which higher risk assets are assumed to yield higher returns,

[13] Appendix 4 supplies codes written in Excel VBA to calculate O-score from individual firms' accounting figures.

DEF (and WML) is value-weighted return differentials between the top 30% and bottom 30% O-score (and past return) stocks while TURN is the difference in returns between the lowest 30% and the highest 30% turnover ratio.

Finally, it is worth noticing that leverage, a variable suggested by Bhandari (1988) to capture an important dimension of firms' distress risks, is *not* included for collinearity reasons. Since liabilities and O-score are interdependent (derived from formula 2.13) and the meaning behind leverage such as probability of financial distress and default should be captured by O-score, the exclusion of leverage does not likely to lead to omitting necessary variables in risk-based models.

2.4.2.C. Econometric approaches

Time-series analysis

First, the OLS time-series and panel analyses in this study assume that returns are generated by a linear regression of a k-factor model.

$$R_{it} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \sum_{k=1}^{n} \gamma_{ki} U_{kt} + \varepsilon_{it}, \text{ for any } i = 1 \dots N \quad (2.14)$$

where R_i is the excess return on portfolio i, R_m is the market portfolio, R_f is the risk-free asset, and U_k is factor loadings of factor k^{th}, and n is the number of factors added in the CAPM.

Panel regressions

Besides time-varying analysis, the thesis also assesses the cross-sectional variation of average stock returns. Equation (2.14) can be rewritten as follows:

$$R_{it} = \varphi_i + \mu_i (R_{mt} - R_{ft}) + \sum_{k=1}^{n} (\psi_{ki} U_{kt}) + \upsilon_{it}, \quad t = 1 \dots T \quad (2.15)$$

The same description as in equation (2.14) is applied.

Panel regressions on *N* assets over a *T* period length analyse is a combination of equations (2.14) and (2.15). R_i is the vector *T x N* of excess returns on portfolio i, R_m is the vector *T x 1* of the market portfolio, R_f is the risk-free asset (*T x 1)*, and U_k is factor loadings of factor k^{th}, and n is the number of risk factors a part from the market beta in the CAPM.

To assess the goodness of fit of the model, the chapter uses three measurements: the R^2 and standard errors adjusted for degrees of freedom, and the pricing error, which is the square root of time-series average of pricing errors squared in order to avoid cancelling out (formula is followed).

$u_n = 1/(T-1)\sqrt{\sum_{t=1}^{T} u_{t,n}^2}$ (2.16)

2.5. Empirical Results

2.5.1. Market anomalies

Table 2.2 reports the average monthly premium from three main market strategies namely, value, size and momentum. Within the scope of this work, we pay a particular attention on value anomaly; the size and momentum effects are examined from their potential abilities in explaining value premium in subsequent sections.

2.5.1.A. Value premium

The most commonly used indicator of value stocks is the Book-to-Market ratio. This study first follows this conventional approach and will later return to this point to discuss further robustness checks (see section 2.5.2.D). Figure 2.3 visually plots the annual value weighted returns on the Value-over-Growth portfolio (i.e. the value premium). From the figure, we can see the positive premium indicated by the dash line distance above the zero line.

In addition, it also shows the variation of the premium in the ISE over the years. The performance of value strategy is very volatile over the early years in the market, and tends to stabilise in the later years. Apart from an outlier in the first year, when the number of listed firms was small, the peaks of the value premium tended to fall into the end of two downturn periods i.e. in 1995 and 2000. In 1994, Turkey fell into its greatest crisis; in 2001 the stock market crashed after a poor economic performance in the previous year. In 2000, the Turkish public finances experienced an alarmingly high level of debt, although by then Turkey had started to sell many major state-owned industries. By November, the IMF provided the Turkish government with $11.4 billion loan, following the country's high unemployment rate and lack of basic medicinal supply, but even that amount of money did not seem to be sufficient. There was thus a tendency to observe higher value premium in bad times, when the price of risk was high. This result differs from what had been documented in the U.S, where no value premium was observed during economic downturns (Abhyankar et al. 2008) although in bad times value stocks become riskier (Zhang 2005). This suggests the need for further investigations on whether the higher return of value stocks over growth stocks in Turkey is simply a compensation for bearing a higher risk. The results presented below

show that the value stocks are indeed riskier than the growth stocks but perhaps this is not the only reason.

Table 2.4 presents summary statistics of all three market anomalies. Regarding the value anomaly, the numerical result confirms the visual plotting that overall value stocks are riskier growth stocks with a standard deviation of 0.344 in contrast to 0.168 of growth stocks. Both value and growth stocks seem to be riskier than the well-diversified portfolio (the market) and the risk-free asset.

The risk-free asset unsurprisingly has the lowest standard deviation of 0.003 per month. Its return is however significantly lower than all the other portfolios. More specifically, the return is only 49 basis points per month while other portfolios yield about at least ten times higher. The results in this chapter appear to strongly support the positive risk-return relation documented in the literature.

Overall, as can be seen from Table 2.4, high book-to-market equity stocks outperform both low book-to-market and the market portfolio. In other words, value premium does exist in the ISE and value strategy is even more profitable than a well-diversify strategy. On average, value stocks could gain higher earnings by 2.14%/month compared to their counterpart and about 2% per month higher than a portfolio consisting of the whole market. These findings confirm the success of value strategy in Turkey, similarly to what has been observed in major developed and many other emerging countries[14]. Interestingly, while growth stocks seem to be riskier that the market portfolio, they generate lower monthly returns (4.89% compared to 5.04% respectively). This implies that the risk level may not be the only underlying reason for the success of value strategy, and that motivates further tests of asset pricing models in subsequent sections to seek for other factors.

Another important point is that although the value premium is high in absolute term, it is statistically insignificant (*t*-statistic is 1.22). An implication of these results is that although value strategies could generate abnormal returns in the long run, value investors might face uncertainty and temporally losses. One may argue that the insignificant return differential is due to the limited number of firms in Turkey at the

[14] See studies by Fama and French (1998) and Chan, Hamao and Lakonishok (1991) for comprehensive examples.

early years, but from Figure 2.1, it can be seen that the early period actually saw a significant value premium.

There are at least three recent works on the Turkish market, namely Gonenc and Karan (2003) who strongly reject the value premium; Akdeniz, Altay-Salih and Aydogan (2000) and Aksu and Onder (2003) who support a significant value premium. Their results are inconsistent, this is perhaps due to the testing samples were only from 5 to 7 years in length. According to Davis, Fama and French (2000), a longer period will allow further enhancement to asset pricing models, especially in testing performance of value premium as within a 5 year period, firm fundamental values are unlikely to change. Therefore, the present thesis testing for value premium over 21 years, starting when data are available on DataStream, hopes to gain a higher accuracy.

2.5.1.B. Size premium

Also seen from table 2.4, in the ISE, size premium exists at 0.84% per month (*t*-statistic is 1.41) which is statistically insignificant. On average, small stocks could yield 5.75% while large-cap stocks generate slightly lower returns at 4.91% per month. Their standard deviation difference is immaterial. Comparing to the market portfolio, the small-cap stocks perform slightly better whereas the large-cap stocks earn a similar rate of returns to the market.

Figure 2.4 also confirms the above result of a positive size premium. Similar to value strategies, size strategies experience a high volatility. There are significant higher returns on the small portfolio over the big portfolio in the earlier half of the sample period. In the second half, the difference in returns between the small and big stocks tends to narrow down.

This results are consistent to those in many earlier studies. Akdeniz et. al. (2000), for example, reveals the significant excess returns of small stocks over the big over the first period of 1992 and 1995, but notices that the abnormal returns disappeared during 1995 and 1998. In addition, Aksu and Onder (2003) see higher size effects in Turkish market between 1993 and 1997.

On the other hand, a study by Gonenc and Karan (2003) over a similar sample period argues that the unstable economic and political environment with high inflation and systematic risks could lead to a shorter investment perspective. Both foreign and institutional investors, therefore, tend to prefer large and strong firms in Turkey. The

results imply that large capitalisation firms seem to outperform small and medium firms. However, their result might only hold for a short sample period covering 5 years including the 1994 crisis.

2.5.1.C. Momentum

Momentum strategies indicate a long position in past successors in returns and a short position in the past poor performers for the previous 11 months of portfolio formation. Rationally, investors should prefer recent well-performing stocks by looking at, at least, the previous year's financial statements.

However, surprisingly the results in Table 2.4 imply quite the opposite. The winners gain a positive 4.64% per month while the losers yield 5.88% per month on average. This shows that the momentum strategy seems to fail in the ISE. Also, not only outperforming the past winners, the past poor performing stocks seem to surpass the market portfolio. Surprisingly, the winner group brings smaller return while carrying higher risks. Their standard deviation is at 0.180, higher than the market's standard deviation of 0.166. However, the return differentials are statistically insignificant.

Supporting these findings, Figure 2.5 shows that the losers perform much better than the winner group over the last 21 years. On average, momentum strategies generate a loss of -0.31 annually. It is worth noticing that at the two Turkish economic downturns in 1994 and 2000, the return differentials reached the lowest points. This corresponds to the performance of value strategy documented in section 2.5.2.A and Figure 2.3. Also, it confirms that risky stocks tend to get riskier while also being compensated by higher returns during bad times. In this case, during economic downturns, the poor past performing stocks generated much higher returns when carrying higher risks. One reason could be that value stocks tend to be the losers. A cross checking between the two portfolios seems to yield a mixture result. The most plausible reason is that no momentum implies a success of contrarian strategies, which works in a similar basis to value strategies.

Additionally, Figure 2.5 notes that in the second half of the sample, momentum performance tends to be less volatile than during the first half. This tendency appears to be very similar to the experience of size and value strategists. The first explanation is the possibility of learning effects, which refer to the failure of a strategy after almost all investors have learnt about the strategy and fully applied it. If it was the case, the three market anomalies would have disappeared shortly while in fact they still worked for the following 10 years in the ISE. The second possible reason is that the market has

developed and its investors became well-educated. The abnormal returns are therefore getting lower in a more stable environment. This is supported by Antoniou, Ergul and Holmes (1997) who gave a spectrum of market improvements in Turkey. For examples: the market was inefficient at the beginning period, companies used to not have their financial statements audited, possible deterring of foreign capital, low illiquidity and trading volume.

2.5.1.D. Robustness check

The present section will revisit the results regarding the presence of value premium from three different angles. It will check if these results are sensitive to the choice of indicators, with the exclusion of financial firms or the presence of de-listed firms in the sample.

First, to ensure the success of value strategy in the ISE, table 2.4 reports the abnormal returns on portfolios sorted by three most commonly used indicators, B/M, E/P and DY. From table 2.4, high B/M (high E/P) stocks yield higher returns than low B/M (low E/P) group, however they are statistically insignificant. On average, high B/M (E/P) stocks generate 2.14% (0.14%) return higher than low B/M (E/P) stocks per month. The conventional risk measurement, standard deviation, also seems to confirm that the value firms are riskier than the growth, which supports the risk-based theory.

However, unlike B/M and E/P measurements, DY shows no positive return premium between value (high DY) comparing to growth (low DY) stocks. As can be seen from table 2.4, while high DY portfolio generates 4.58% monthly on average, low DY portfolio earns slightly higher, 4.93%. It is not a surprising outcome. Previous studies, such as Fama and French (1998) who study thirteen markets across regions found that value premium presents in twelve over thirteen markets when B/M and E/P were used as the classifying ratio, the number is however squeezed to ten when DY was employed. In addition, it is worth notice that Vivian (2007) points out that dividend yield might be heavily affected by executive judgments and corporate dividend policy and thus other measurements relating to earnings growth seems to be more precise indicator to estimate firm expected returns.

Next, it is also important to ensure the results are not sensitive to the data selecting process. Potential data bias is normally raised when one sets inherent selection rules in constructing samples rather than in a random basis. In finance, there are two main sources of selection bias, ex-ante and ex-post. Ex-ante selection bias is a statistical problem occurring when a research limits its sample in a particular group with similar

characteristics or involves a large fraction of missing data. However, the most damning data selection bias is ex-post, caused by selecting observations based on information that was not available. It is when an analyst assumes that investors have full information of firm performances at the year-end despite the general delay in releasing firm financial statements. By allowing a 6 month lag after the year-end, the thesis can safely avoid falling into this problem. Another common mistake that could lead to ex-post bias is when data downloaded are available for only survivor firms. For example, if a firm was delisted before the data collection date, it will not be considered even though in practice, it might be qualified to be included in the period it was listed. Scanning through all possible sources of those biases, a remaining uncertainty rests in the exclusion of financial firms in our sample, that may involves an ex-ante bias.

This section will therefore check if the results still hold after correcting for possible bias caused by the exclusion of financial firms and also reveal whether the effort of including delisted firms is worthwhile.

Regarding the first concern, a check is based on the more commonly used indicator B/M only, and a new set of portfolios is formed on all firms that have sufficient data[15]. Accordingly, the data set consists of all sectors, financial and non-financial firms, and all trading status, active and delisted firms. Value (growth) portfolio consists of the top (bottom) 30% B/M stocks where negative B/M stocks are not included for practical reasons. Interestingly, most of financial firms are added in value group in the earlier years while they switch to growth group in subsequent year. This practice reflects the actual fast growing of the Turkish financial sector after the 2001 economic reform, of which banking reform was the central of the reform.

Table 2.5 compares the return differentials between value and growth portfolios before and after including non-financial firms in the sample. The table provides strong evidence confirming that value premium does exist in Turkish stock market. The inclusion of financial firms leads to an abnormal return of 1.50% per month while it is slightly higher at 2.14% within non-financial firms. Although the value premium of 1.50% is lower than 2.14% in value, it is now statistically significant at 10% level. The changes in significance level imply a higher volatility of value strategy when applying on a sample of all sectors and the dissimilarity should come from the financial firms. As

[15] Firms excluded because of data unavailability reasons are rare in our sample, therefore, although the analysis might suffer from selection bias, its effects are expected to be immaterial.

discussed in section 2.4.1, since high (or low) B/M ratios in financial firms have different meaning to these in non-financial firms, it seems to generate higher standard errors when including financial sector in strategies using the B/M indicator. It is because financial firms usually have a high ratio of leverage which is normally interpreted as being riskier in non-financial firms. In other words, inclusion of financial firms in a portfolio would be riskier or more volatility in returns if based on the B/M measurement. The above result is, therefore, anticipated and being the reason behind the exclusion of financial firms in this chapter analysis.

To sum up, there is value anomaly in Turkish National index and the results are robust to the industrial characteristics. Hence, regarding value anomaly, from this section onward, all tests will focus on analysing non-financial firms.

To respond to the second concern regarding survivorship bias, another check on two sub-sets of samples is reported in table 2.6. Panel A of table 2.6 shows value premium while panel B compares size premium before and after taking account of de-listed firms in the time they were traded in the ISE.

As can be seen from table 2.6, overall, value stocks still earn higher returns than growth stocks. It is, however, worth noticing that an exclusion of de-listed firms does make material differences in returns especially among groups of stocks with high B/M or high E/P. When using E/P as an indicator for classifying value versus growth stocks, including only survivor firms generates a value premium of 0.58% while it is in fact 0.14% per month. The return differential mainly comes from the high E/P group (5.26% compared to 4.92% respectively). Perhaps, firms with consistently low market prices relative to earnings (i.e. high E/P firms) are more likely to remain out-of-favour by investors. Those which could not overcome financial difficulties might experience a long period of low returns before going default.

In contrast, high B/M stocks appear to attract more optimistic investors and they could be a good investment in the short run. Excluding de-listed value stocks therefore tends to squeeze the abnormal returns generated by value strategy. The results in panel A of table 2.6 show the value premium (columns shaded in grey) is only 1.57% per month when including only survivor high B/M firms while it should have been 2.14% when de-listed firms are taken into account. More importantly, although the 1.57% premium is smaller in terms of value, the return differential turns out to be significant at 10% level. This might be due to a higher volatility among the high B/M group, especially those who are under distress. The findings provide further evidence that value strategy

rewards investors for bearing a higher risk. It is believed that high book equity value relative to market prices is signals of distress firms and they are more likely to fail into the list of de-listed firms. Although not all of them would, most of the de-listed firms in the ISE were high B/M firms. They were riskier assets but could be a profitable short-term investment for risk lovers before being delisted. As a result, an exclusion of delisted firms tends to undervalue value premium.

A similar finding is observed in robustness checking for size premium. Although it seems that size premium does not extensively differ between the two cases, taking into account only survivor firms also means ignoring a number of small firms. Those are firms that are more likely to go default or be targeted in mergers and acquisitions but could be a profitable investment in the short run. On average, investing in those firms yields about 0.1% higher returns per month (5.75% compared to 5.66%), which leads to a size premium of 0.84% instead of 0.72% per month. In summary, the conclusion on overall performance of value and size strategies remains valid. However, an exclusion of de-listed firms does not only distort the real investment situation but also underestimate both investment strategies.

Studies in the U.S. also find that although data selection bias are material in Compustat (Banz and Breen 1986, and Kothari et al. 1995), it does not necessarily lead to different conclusions in the presence of value anomaly or the reasons behind it (Barber and Lyon 1997). Even though an exclusion of de-listed firms does not seem to significantly affect the success of value strategy, it is more meaningful to include them. Since value firms appear to be associated with being under financial distress, they are more likely to go bankrupt. In contrast, growth firms can involve mergers and acquisitions which also lead to a change in their trading status, most likely under another name. Hence, while delisted firms do not seem to play a key role so far, it is both economically and statistically worthwhile to take account of de-listed firms in subsequent tests on performance of value and growth stocks.

2.5.1.E. Conclusion

Overall, value stocks are more profitable than growth stocks and the return differential tends to be widened during bad times, when the price of risk is high. The higher volatility of value strategy during economy downturn periods and the higher risk bearings of value versus growth portfolios provide further supporting evidence for a risk-based explanation of the value anomaly in Turkey. Although being a riskier asset, value portfolio seems to outperform the market, which implies that value oriented

investors may earn even higher returns than those who perfectly diversify their portfolios. A robustness check also confirms that the value premium found in the ISE is not sensitive to the choice of indicators or restrictions, and not a result of data bias.

In addition, unlike previous studies in Turkey, we find evidence of size effects in the ISE after correcting for the data selection bias although the return differential is statistically insignificant. A longer vision perhaps could explain these different findings and reveals that small firms are still in favour, especially during riskier periods. Unlike value and size investment strategies, momentum strategy does not yield a positive return. Indeed, holding winner stocks is safer but less profitable. The failure of momentum also implies a success of contrarian strategies, which works similar to the basis of value strategies. The results again confirm the presence of value premium in the testing market.

It is also important to emphasize that the tightened return premia of the three investing strategies in subsequent years are not because those strategies have become well known but because of the quick development of investment environment and better market participants in Turkey. In a mature market, one could expect any market anomalies to be well captured by a well-developed asset pricing model. The next sections will examine different asset pricing models for the purpose of explaining value premium in Turkey.

2.5.2. The CAPM and augmented risk-based models

The present chapter aims to provide a comprehensive analysis on performance of various asset pricing models from both time-series and panel approaches. The widely used panel estimation method would enable this analysis to capture the cross-sectional variance in stock average returns and allow the results to be comparable with studies in other markets. In addition, it is also very advantageous to use time-series approach to consider data with extreme outliers which most markets potentially are subjected to. The method has its capacity to inspect each factor loading's ability in capturing the risk pattern it proxies for over a time-span. Supporting this view, Dimson, Nagel and Quigley (2003) favour the time-series approach while Fama and French (1992, 1993) employ both techniques. This study employs both methods in order to ensure an inclusive view of testing model explanatory ability.

2.5.2.A The CAPM

The CAPM is the foundation on which most recent contemporary models are based. The risk-based CAPM shaped the way market participants think of the relation between

risk and return. In the following CAPM regression, if portfolio returns are fully captured by its explanatory variables, the intercept should be statistically insignificant from zero.

Model 1: $R_{i,t} - R_{f,t} = \alpha + \beta_m[R_m - R_f] + e_{i,t}$

where R_i is the asset return on asset i and R_f is the risk-free rate of return, then the portfolio's excess return is denoted by $[R_i - R_f]$. Similarly, $[R_m - R_f]$ and β_m is the market excess return and its beta capturing un-diversifiable risks.

In time-series analysis, Table 2.7 provided one panel for each portfolio. The estimated intercepts of the regression, α, indicate that the model somehow explains the average returns on value and growth portfolios. The two intercept values are both statistically and practically insignificant (0.0032 and 0.0026 respectively). All the CAPM intercepts for value and growth portfolios are far less than 3.4 standard errors from zero. This means the hypothesis of a zero intercept can be safely accepted.

According to Fama and French (1998), if CAPM has the ability to explain higher returns in value stocks, then the regression should have a large market beta. Also, if CAPM can explain a lower return pattern in growth stocks, its beta should be less than one. Table 2.7 shows evidence that the CAPM does not entirely fail in these respects. From panel A, it can be seen that the slope for value portfolio is slightly greater than one while in panel B the market slope for growth stocks is smaller than unity. As the market betas are statistically significant at 1% degree of freedom, the CAPM beta appears to play an important role in explaining expected stock returns in the ISE.

Moreover, the CAPM seems to capture more of the movement of growth stocks than it does with the variation in value returns. The CAPM captures nearly 80% of the movement of growth stock returns while a rather smaller percentage of the variation of value portfolio returns is explained by the market beta (73.12%). In addition, supporting the result a higher standard error is also found for the value group.

The findings differ to those observed in other markets, Fama and French (1998) and Capaul et al. (1993) for examples found the market beta(s) are larger than one for growth stocks and less than unity for value stocks in their global market portfolio consisting of 13 developed markets. This could link to the fact that the Turkish market is highly volatile with less sophisticated financial tools, typical characteristics of emerging and developing markets, that make the market risks count.

In panel data analysis (Table 2.8), estimated results reaffirm the existing literature that the market beta factor plays an important role in explaining the variation in average stock returns. The market slope is found greater than one at 1.1376, strongly significant, and with a large *t*-statistic value of 22.0. This is expected in a market which has a value premium like Turkey. Supporting the argument, the constant term is relatively closed to zero, further suggesting a strong explanatory power of the CAPM beta.

On the other hand, according to Fama and French (1992, 1993), an asset pricing model including the market beta only is not sufficient, leaving room for size and book-to-market explanations. When the excess market return is the only variable in the cross section regressions, the adjusted R^2 is found rather low at 79.47%, the lowest across all models. The following section will consider these two factor loadings and find this has enhanced the CAPM considerably.

2.5.2.B. Fama and French models

In a well-known study in 1993, Fama and French proposed three models, namely a two-factor model consisting of the beta and a size factor, another two-factor model using the beta and a B/M factor, and a three-factor model consisting of the beta and both factors. The objective is to test the explanatory power of HML factor (standing for B/M effects) and SMB factor (standing for size effects) individually and jointly. The Fama and French three factor model (presented below) is highlighted in **bold** in all tables for comparison purposes.

Model 2: $R_{i,t} - R_{f,t} = \alpha + \beta_m [R_m - R_f] + \beta_{HML} HML + \beta_{SMB} SMB + e_{i,t}$

From a time-series approach (table 2.7), regressions on the excess returns of value stocks always have positive HML and negative SMB slopes. This implies that the HML factor positively correlates to value stock returns while the size effects are negatively correlated. While the Fama and French two-factor model including the HML variable is proved to be the better of the 4 asset pricing models tested so far with an adjusted R^2 of 78.4%, the Fama and French three factor is not far off at 78.3%. The SMB factor when added into the two-factor model appears to lower the explanation power of the risk factors related to the market and B/M. All efforts to improve the model later on show that the insignificant role of the size factor will persist.

The opposite is true for growth firms. While size effects do not play a significant role in the CAPM and Fama and French models, it starts to contribute to explaining the

variance of growth stock returns when more factors are added. Even though the Fama and French three factor model is now a better of the four models, it does not appear to be as successful as Petkova's model in explaining growth stock returns, which will be discussed in the next section.

Additionally, although Fama and French (1996) concludes that size and B/M within a risk-based multifactor model can explain value anomaly but have no roles in explaining momentum, the results in the ISE indicate that they can do so for both value and momentum anomalies. Table 2.9 shows further investigation on the association between those factors and the anomalies. While size effects play a more important role in capturing the time-series variation in the winner portfolio, both the HML and SMB factors are statistically significant at 1% confidence level in explaining the loser portfolio returns. Adjusted R^2 values in Table 2.9 are of 87.2% and 78.4% for the winner and the loser, respectively, and the intercepts are indistinguishable from zero, implying a well-specified asset pricing model. While the model seems to miss the continuation of portfolio returns in the U.S with strong intercept values, it does not seem to be the case in Turkey. Perhaps, this is because unlike the U.S, the losers and winners do not focus on either SMB or HML group. In other words, there is no tendency of the losers (winners) towards small distress (big growth) firms or *vice versa*.

In terms of panel analysis, results in table 2.8 show that the Fama and French three factor model appears to outperform the traditional CAPM, in which HML effects seem to be the main driven force. Despite the success of HML and SMB, Fama and French (1992) admit that both of their factors have no theoretical basis to be chosen as proxies for systematic risks that have not been captured by the CAPM. That leaves room for subsequent studies. Among them, this thesis is interested in examining two recent studies that propose a complete replacement of the two variables, which are Petkova (2006) and Hahn and Lee (2006), as well as performing an experiment with two most commonly discussed risk factor loadings, TURN and WML in its analysis.

2.5.2.C. Three augmented Fama and French models

From an investors' point of view, it is natural to relate today's stock prices with yesterday's prices and with the current trading volume. This will give a quick picture of how attractive an underlying asset is. To proxy for these characteristics, past return (WML) and liquidity level (TURN) are among the most prominent factors in the literature in explaining common variation in stock returns. This leads to the possibility

that adding them could enable the augmented models to capture the time-varying and cross-sectional patterns in stock price movement that has not been covered by the three factors. The purpose of this experiment is not to test all possible risk-based models, but rather to check the robustness of the validity of Fama and French and its counterparts. The augmented models are:

Model 3: $R_{i,t} - R_{f,t} = \alpha + \beta_m [R_m - R_f] + \beta_{HML} HML + \beta_{SMB} SMB + \beta_{TURN} TURN + e_{i,t}$

Model 4: $R_{i,t} - R_{f,t} = \alpha + \beta_m [R_m - R_f] + \beta_{HML} HML + \beta_{SMB} SMB + \beta_{WML} WML + e_{i,t}$

Model 5: $R_{i,t} - R_{f,t} = \alpha + \beta_m [R_m - R_f] + \beta_{HML} HML + \beta_{SMB} SMB + \beta_{TURN} TURN + \beta_{WML} WML + e_{i,t}$

Panel A of Table 2.7 suggests that for value portfolio, the inclusion of a liquidity factor, TURN, does not improve the model ability in capturing the time-series returns, while WML seems to add a considerable explanatory power. The insignificant coefficient associated with TURN in model 3 indicates that adding the liquidity factor alone does not improve the model performance. This is perhaps due to the fact that in the ISE, the majority of low liquidity firms are also high B/M stocks. The risk of holding a low liquidity stock is therefore included mostly in the systematic risks proxied by the B/M factor. On the other hand, past returns factor has significant negative impacts on time-varying returns of value stocks. Model 4 indicates that WML variable contributes to boost the adjusted R^2 to 79.81%, the highest level among all efforts to capture the movement of average value stock returns. The improvement is however immaterial comparing to, for example 78.28% in the Fama and French three factor model. It is unsurprising that in model 5, adding a redundant variable such as TURN into model 4 has reduced the model explanatory power.

Unlike in the case of value portfolio, TURN and WML share the same pattern in capturing the time-series movement of returns on growth stocks. It can be seen from panel B of Table 2.7 that both variables appear to be individually and jointly significant. Although the coefficients associated with those factors are smaller than their counterparts in panel A in absolute values, they are statistically higher. This implies that the estimation of growth stock returns appears to bear lower standard errors. However, it is worth noticing that in the presence of other factors (in model 9), the two variables are superfluous in explaining time-varying movement of growth stock returns. The explanatory power of WML in capturing the returns of value stocks mentioned earlier is also diminished. Additionally, the adjusted R^2s are slightly higher than this of the Fama and French model. In short, models 3, 4 and 5 show no evidence of a significant

improvement comparing to the Fama and French model in capturing the common variation in stock returns.

Supporting this view, table 2.8 which presents panel regression results confirms that the average premiums which TURN and WML contribute in explaining the cross-section of average return on stocks are relatively modest. Indeed, models 3 to 5 have adjusted R^2s and other goodness of fit measurements at the same values as the Fama and French model, giving no additional explanatory ability to the conventional model. Although it is believed that liquidity and prior returns could play an important role in predicting future returns (Chordia et al. 2000, and Jegadeesh and Titman 1993), the results in this section however support findings in more recent studies such as Avramov and Chordia (2006) who find that the Fama and French factors dominate liquidity and past returns in explaining stock returns.

2.5.2.D. Petkova (2006) and Augmented Petkova models

Model 6: $R_{i,t} - R_{f,t} = \alpha + \beta_m[R_m - R_f] + \beta_{DIV}DIV + \beta_{TERM}TERM + \beta_{DEF}DEF + \beta_{STBill}\,STBill + e_{i,t}$

Petkova (2006, p.581) documented "a better model than the Fama-French model" and that Fama and French factors lost their power in explaining stock returns. This section will re-examine the arguments by testing individual and joint effects of her explanatory variables from both time-series and cross-sectional approaches and also challenge the model with two most discussed factors, TURN and WML. If the model is good enough, adding more variables should not improve the model in anyway. The regression results provide strong evidence that overall, it is not the case.

In time-series analysis, Petkova's model (model 6) is clearly not a leader in explaining value stocks returns on the ISE. Her proposed variables did not seem to improve the traditional CAPM. Moreover, the Petkova's four new factors have neither individual nor jointly significant effects on the variation of high B/M stocks. The F-test result on a jointly significance of the four factors has a value of 0.143 (p-value is large at 0.966), showing that the null hypothesis of no jointly effect cannot be rejected.

On the other hand, an augmented version of the Petkova's model consisting of DIV, TERM, DEF and STbill together with the Fama and French's existing three factors (model 8) appears to be the best in capturing the variation of average returns of low B/M stocks. In particular, the DEF variable is found to have a great individual ability in explaining the movement of growth stocks. Its sensitivity coefficient is statistically

significant. A further F-test testing for any possible jointly effect of the three remaining factors fails to reject the null.

In summary, Petkova's model shows a greater explanatory power in explaining growth stocks in the ISE, where DEF is a more important factor but it does not seem to be the case for value stocks. It arises from the fact that in Turkey, growth firms tend to dominate a business group. Although this apparently helps to reduce asymmetric information and risk sharing among members, the practice also leaves a loophole for capital transferring from smaller members to the larger and sometimes sacrifices the benefits of well performing firms to serve the Board's objectives, and as a result, less favour firms will face a higher default risk.

In panel examination, among the five factors, only the traditional market beta is statistically significant with an estimated coefficient of 1.2194. The R^2 value is only better than that of the CAPM. Although the standard errors and pricing errors appear to be smaller than those in all models tested earlier, the difference is insignificant. This confirms that the model suggested by Petkova is not dominant over others, regardless of which testing method is used.

In another attempt to improve the model, once again, turnover and momentum factors are added individually and jointly (model 6b, 6c and 6d). It seems that only the momentum effect, WML, is statistically significant. Adding the WML alone generates an estimated coefficient associated with the momentum of -0.1392 (significant at 10%) and joining with the TURN factor leads to an immaterial difference both in terms of coefficients and the level of confidence. Also, the adjusted R^2s and other goodness of fit measurements show no significant changes, confirming that they seem to be redundant variables.

2.5.2.E. Hahn and Lee (2006) and Augmented Hahn and Lee models

Hahn and Lee (2006) propose a model consisting of the conventional market beta, the changes in default spread (ΔDEF) and the changes in term spread ($\Delta TERM$). The two variables are claimed to strongly correlate with Fama and French's SMB and HML factors respectively, and thus can replace them. More specifically, they believe that ΔDEF can capture most of the common risks proxied by SMB and ΔTERM can capture most of the common risks proxied by HML. For presentation purposes, in the first column of tables 2.7 to 2.12, the terms DEF and TERM will be also used to denote the

changes in default spread (ΔDEF) and changes in term spread (ΔTERM) exclusively in models 7 and its augmented forms (7b, 7c, 7d). The Hahn and Lee's model is presented as follows.

Model 7: $R_{i,t} - R_{f,t} = \alpha + \beta_m[R_m - R_f] + \beta_{\Delta TERM}\,\Delta TERM + \beta_{\Delta DEF}\,\Delta DEF + e_{it}$

From a time-series approach, the Hahn and Lee's model (model 7 in Table 2.7) explains the value stock returns just as well as the Petkova's model does with an adjusted R^2 of about 72%. Among the three regressors, only the market beta keeps playing a key role in capturing the movement of value stock returns. The coefficient associated with the market factor is economically and statistically significant while those of the other two variables, ΔTERM and ΔDEF, are insignificant. That implies a failure of the alternative model in replacing the Fama and French model. In explaining the variation of growth portfolio returns, Hahn and Lee's model appears to show the same pattern that is observed earlier in value stocks.

It is worth to notice that when comparing to the performance of Fama and French three factor model and augmented Fama and French models, Hahn and Lee's model behaves similarly to Petkova's. One possible reason for this similarity is that perhaps their proxies for systematic risks may contain most of the pricing implications in Petkova's factors. This is because fundamentally, all alternative variables proposed in those two models aim to capture the time-varying risk premia under changing investment opportunities within firms (through changes in dividend policy and default possibility) as well as from outside firms (through changes in interest rates).

Similar to the time-series approach, Hahn and Lee's model does not seem to perform differently comparing to Petkova's model does in explaining the cross-sectional pattern of average returns on stocks. As can be seen from table 2.8, model proposed by Hahn and Lee (model 7) and their augmented patterns (models 7b, 7c and 7d) explain around 81% of the movements of stock returns. Moreover, these models show no sign of a superior performance comparing to the Fama and French model according to all three measurements of model's goodness of fit. Similar results are found in the case of Petkova's model and its augmented versions. Overall, the Fama and French three factor model is still valid against the recent efforts to replace it with a model consisting of variables which are more theoretically supported.

Since the performance of Hahn and Lee's factors (i.e. ΔDEF and ΔTERM) appears to be similar to their counterparts, DEF and TERM, in Petkova's model, for the sake of

brevity, from model 8 onwards, we use DEF and TERM proposed by Petkova as proxies for default spread and term spread risks, respectively.

2.5.2.F. Other models

Some final experiments will involve examining the roles of TURN and WML in the same playing field with other explanatory variables discussed so far. Since they are augmented versions developing from model 8, they are numbered as models 8b and 8c, and model 9 will consist of all variables. For the sake of brevity, this section only discusses the cross-section performance of these models when assessing the explanatory ability of these two proxy risk factors in capturing the cross-sectional pattern of the average stock returns[16].

In panel B of table 2.8, models 8b and 8c show a similar performance comparing to model 8 and model 9 in panel A when all factors come to play. In general, the R^2s are around 80.8%, being rather lower than this of the Fama and French model (82.5%). It is also worth mentioning that apart from the market beta, in these three regressions, none of the regressors plays a significant role in explaining the stock returns cross-sectionally. Although including redundant variables is apparently not as risky as omitting essential variables, when many unnecessary factors are included in a model, models 8b, 8c and 9 witness a clear decrease in the explanatory ability of not only important variables but also of the model as a whole. Take model 9 as an example, an inclusion of all variables even diminishes the explanatory power of the HML effects that have been strongly and consistently perform well under the Fama and French model. Model 9 also sees its adjusted R^2 falls into the lowest R^2 group.

To summarise, the simple but powerful Fama and French model seems to capture most of the movement of common stock returns and new factors that were believed to replace the Fama and French three factors do not seem to outperform them. Adding TURN and WML factors could improve the model performance but the difference is immaterial. The next section aims to ensure that these findings are not sensitive to the choice of indicators nor to the regression methods used.

[16] The time-series analysis of these models draws similar results to the based model and therefore is dismissed.

2.5.3. Robustness tests

2.5.3.A. E/P and DY portfolios

As mentioned earlier, value and growth stocks can be classified based on a number of fundamental values, such as B/M, E/P, DY and C/P. Although B/M is the most commonly used and influential indicator, other measurements of stock value may carry different patterns that are not yet captured by the B/M. Tables 2.10 and 2.11 present the estimation results of panel regressions on average returns of E/P and DY portfolios, respectively[17]. Value firms are classified as firms with high book equity value, high earnings and/or paying high dividends in relation to their market prices. All stocks are split into value and growth portfolios accordingly using the same breakpoints to ensure the consistency in forming portfolios. More specifically, the value portfolio consists of the top 30% E/P (DY) and the growth stocks are the bottom 30% E/P (DY) stocks.

Overall, tables 2.10 and 2.11 provide strong evidence confirming that the newly proposed variables, DIV, TERM, DEF and STbill, are not likely to replace the Fama and French three factors in capturing systematic risks in common stock returns. Taking model 6 as an example, Petkova's model does not seem to express substantial explanatory power over other models. Although some of the Petkova's factors are statistically significant, overall the model is among the poorest performance group together with the CAPM. Thus, one can safely conclude that the counter arguments against the Fama and French model do not seem to valid in the ISE.

Unlike for portfolios sorted by B/M, some improvement from the Fama and French model in explaining cross-sectional average returns of the E/P and DY portfolios is found and mainly comes from TURN factor. The liquidity effects play a consistent role both individually and jointly with other factors. In contrast, while B/M portfolios can be somewhat further explained by past returns factor previously, the WML does not seem to contribute its part in explaining E/P and DY portfolio returns. The outstanding ability in explaining returns of the portfolios based on these two indicators rests in model 9 where all factors are included.

Since each fundamental captures a different aspect of value, it is interesting to look how they explain and predict the expected returns of common equities. In general, dividend yield depends heavily on dividend policy of firms and can vary from year to year.

[17] The test disregards the less common Cash-flows/Price due to inadequate data.

Although market prices can reflect these changes, it is unlikely that stock prices react correspondingly to changes in dividend payout. Announcements on earnings on the other hand can be quickly seen in stock price movement. For a young market like Turkey, the domestic investors tend to base their decisions on solid evidence such as a positive earnings announcement or attractive dividend policies. Thus, firms with high earnings or dividends relative to market value could expect a shorter turnover. It is perhaps the underlying reason for TURN factor to mirror more changes in E/P and DY portfolios than it does for B/M portfolios.

2.5.3.B. Vector AutoRegressive (VAR) approach

As discussed earlier, Petkova (2006) argues that four factor loadings associated to DIV, DEF, TERM and STbill can replace HML and SMB proposed by Fama and French (1993). However, since not all of risk proxies are portfolio-based factors, in order to estimate risk premia, Petkova admits that using a dynamic VAR approach instead of a static approach is an alternative option. The way risk factor loadings are formed in this chapter, however, can avoid such substitution. Moreover, its simple approach described earlier allows our analysis to be comparable to the results in previous studies that mainly use actual portfolio returns to build their factor loadings. However, since the Petkova's argument over the Fama and French model uses a dynamic estimation method, for the robustness check purpose, this section will also re-examine the validity of Fama and French model against the Petkova's in the dynamic context.

Table 2.12 presents the estimation results of two main models, which are Fama and French (1993), Petkova (2006) models, and only augmented models that show an improvement. Since both studies base their analysis on B/M portfolios, the test for robustness will focus on this indicator to make the test consistent.

Similar to Petkova (2006, p.581), estimated factor loadings, or "innovations", are generated using a VAR approach by Campbell (1996). For every set of variables, a VAR progress is specified as follows.

Firstly, all variables in the state vector are demeaned. This is equivalent to specifying lags (1 2) in the VAR system. The first-order VAR is

$$\begin{Bmatrix} R_{m,t} \\ HML_t \\ SMB_t \\ DIV_t \\ STBill_t \\ TERM_t \\ DEF_t \\ TURN_t \\ WML_t \end{Bmatrix} = A \begin{Bmatrix} R_{m,t-1} \\ HML_{t-1} \\ SMB_{t-1} \\ DIV_{t-1} \\ STBill_{t-1} \\ TERM_{t-1} \\ DEF_{t-1} \\ TURN_{t-1} \\ WML_{t-1} \end{Bmatrix} + u_t \qquad (2.17)$$

where u_t represents an innovation vector, from u_t Fama –MacBeth two-stage procedure is applied to extract innovations that mean to proxy for risk factors correspond to those variables.

To begin with, for each asset, time-series regressions are estimated

$$R_{i,t} = \alpha_i + \beta_{i,m} R_{m,t} + (\beta_{i,}\hat{u}^{HML})\,\hat{u}_t^{HML} + (\beta_{i,}\hat{u}^{SMB})\,\hat{u}_t^{SMB} + (\beta_{i,}\hat{u}^{DIV})\,\hat{u}_t^{DIV} + (\beta_{i,}\hat{u}^{STBill})\,\hat{u}_t^{STBill} + (\beta_{i,}\hat{u}^{TERM})\,\hat{u}_t^{TERM} + (\beta_{i,}\hat{u}^{DEF})\,\hat{u}_t^{DEF} + (\beta_{i,}\hat{u}^{TURN})\,\hat{u}_t^{TURN} + (\beta_{i,}\hat{u}^{WML})\,\hat{u}_t^{WML} + \varepsilon_{i,t} \qquad (2.18)$$

The second step involves running panel regressions on the average excess returns of all assets to the estimated beta(s) derived from equation (2.18).

$$R_{i,t} = \gamma_0 + \gamma_m\,\hat{\beta}_{i,m} + (\gamma_{\hat{u}}^{HML})\,\hat{\beta}_{i,}\hat{u}^{HML} + (\gamma_{\hat{u}}^{SMB})\,\hat{\beta}_{i,}\hat{u}^{SMB} + (\gamma_{\hat{u}}^{DIV})\,\hat{\beta}_{i,}\hat{u}^{DIV} + (\gamma_{\hat{u}}^{STBill})\,\hat{\beta}_{i,}\hat{u}^{STBill} + (\gamma_{\hat{u}}^{TERM})\,\hat{\beta}_{i,}\hat{u}^{TERM} + (\gamma_{\hat{u}}^{DEF})\,\hat{\beta}_{i,}\hat{u}^{DEF} + (\gamma_{\hat{u}}^{TURN})\,\hat{\beta}_{i,}\hat{u}^{TURN} + (\gamma_{\hat{u}}^{WML})\,\hat{\beta}_{i,}\hat{u}^{WML} + e_{i,t} \qquad (2.19)$$

where the γ terms stand for the prices of risk for innovations in each variable and if the factor loadings associated with the risk factors are important in explaining asset returns, their corresponding γ(s) should be significant. More details of estimating procedure for each factor loadings from the VAR system can be referred to section I in Petkova (2006, pp. 583-588).

While other models are also re-examined, only Fama and French three factor (model 2), model 6 proposed by Petkova (2006) and those showing some improvement are reported for the sake of brevity.

As can be seen from table 2.12, the time-series VAR estimations confirm the results by the OLS method for both value and growth stock excess returns. The signs of coefficients associated with HML and SMB also remain unchanged comparing to those in the static regressions (in table 2.7). In addition, the results in table 2.12 confirm the Fama and French's (1993) findings on the positive (negative) relation between B/M (size) and average return. Among other regressors, the market beta and the HML effect are still strongly significant implying their key roles in explaining stock average returns.

For the value portfolio, Petkova's model does not seem to capture more movement of value stock returns than the Fama and French model does. While the former explains about 80% the variation of average returns, the latter could capture more than 84%. Although the coefficient associated with WML effects is statistically significant, adding WML factor seems to only slightly improve the model (84.85%). Overall, using VAR system or OLS method does not seem to significantly affect the findings that the model proposed by Petkova performs no better than the conventional Fama and French three factor model and that some augmentation on the Fama and French model can be done, for example by adding TURN and WML, but the improvement is immaterial.

Regarding growth portfolio, model 6 consisting of factors proposed by Fama and French, and Petkova appears to outperform the rest. Although all regressors might be jointly significant, a strong individual explanatory power rests in the market beta, HML and DEF factors. These results are similar to those in table 2.7, it is therefore rather likely that a cross-sectional analysis may reveal a similar finding to those in table 2.8. The chapter, however, does not perform cross-section estimation. This is because while VAR system is designed for estimating on vectors of multiple dimensions, this thesis aims to look at value strategy on a portfolio basis. Since the number of VAR dimensions is limited in portfolio analysis, it is likely that VAR regressions with two dimensions will be similar to static regressions. Petkova (2006) also indicates that using the innovations on risk factors derived from a VAR system or using the actual returns does not change her results in both time-series and cross-section analysis.

2.5.4. Conclusions

Empirical evidence reveals the presence of value premium in the ISE, and its close link to the economic conditions strongly supports the risk-based theory. On average, value stocks appear to outperform growth stocks and the return differentials tend to be larger during market downturn periods when the price of risk is high. A further investigation on the underlying reasons for the success of value strategy finds that the market beta does play an important role in explaining both time-series and cross-sectional movements of value and growth portfolio returns. Moreover, the HML effects add significant explanatory power to the CAPM model while SMB does not seem to be a crucial overall factor but it does show some contribution in explaining the average return on growth stocks. In summary, the three factors proposed by Fama and French (1993) jointly have a strong explanatory ability to capture asset returns. The three-factor model which has set a milestone in the asset pricing literature even shows an ability to

explain momentum effects in Turkish stock market, which has not been seen in other markets such as the U.S.

Recently, in an effort to seek for a better asset pricing model consisting of factors that have more theoretical supports, a range of risk factor loadings have been proposed. Some have claimed to have the ability to replace the Fama and French model. Among them, the chapter focuses on the most discussed factors to examine the validity of the three-factor model under an unbiased condition. They are liquidity, momentum factors, and those proposed by Petkova (2006), and Hahn and Lee (2006).

It is natural to link liquidity and past returns factors to future stock prices since the stocks' recent trading conditions and prices somewhat indicate the attractiveness of these stocks in the investors' view. Some experiments relating to these two factors, however, provide a different result from what is normally observed in developed markets. While liquidity does not seem to make any improvement during the experiment, past return effect, WML, seems to add a small contribution. Although the risk exposure on WML alone can be significant, the factor starts to lose its ability in the presence of more explanatory variables. Its overall contribution to the models is not a clear cut. One exception is when WML is added in the Fama and French three-factor model, a small improvement is seen in the regression explaining value portfolio returns, that makes the resulting model the best. However, it is worth noting that there is no such improvement in panel analysis. This suggests that when the cross-section relation with other factors is taken into account, the factor could not stand out.

Regarding some counterarguments in Petkova (2006) and Hahn and Lee (2006) proposing alternatives for the Fama and French model, neither seems to display a superior performance over the Fama and French model cross-sectionally when the economic shock has been taken into account. In time-series analysis, only Petkova's model appears to have the ability to capture more of the movement of growth portfolio. These findings are relatively free from bias and robust regardless of the choice of indicators and of the estimation method used.

In summary, the simple but efficient Fama and French three-factor model seems to remain as a dominant model in capturing average stock returns.

2.6. Conclusions and suggestions for further research

This chapter investigates the underlying reasons behind value anomaly while being able to eliminate potential bias caused by economic shocks, such as the recent 2007/2008 credit crunch. In doing this, the chapter aims to address how financial crises can be taken into account in financial modelling.

Structural breaks around extreme events such as financial crises tend to cause substantial forecasting errors and damage the reliability of an econometric model. Previous studies in asset pricing models have noticed the difference in risk bearing level of stocks during recessions but few have made adjustments for the crisis effects. A case in point is a study by Petkova (2006) which documents that the Fama and French (1993) three-factor model is losing its explanatory power but which does not accounted for an economic shock occurring during her sample period. The present chapter argues that failure to take into account crises in assessing model performance could potentially lead to erroneous conclusions on the validity of the asset pricing model.

The chapter contributes to the asset allocation literature in several ways. First of all, the new approach of assessing model performance proposed in the chapter could take into account the shock while remaining relatively unbiased via cointegration tests. The independence tests are known to have the ability to identify a market little affected by the shock in the long run. The results show that Turkey appears to have no significant linkage to the U.S and other leading markets, which have been the centre the recent crisis. Both the conventional and newly developed methods of unit root and cointegration tests with structural breaks confirm the validity of this choice.

Moreover, this chapter seems to resolve contradictory results on value anomaly in Turkey from previous studies. It suggests that the different conclusions on the performance of value strategy are due to their rather short sample periods (five to seven years). By testing over a 21-year time horizon, the chapter finds that on average value stocks yield higher returns than their growth counterparts, especially during downturn periods. In other words, value strategy can deliver abnormal profits and an arbitrage opportunity for risk takers during bad times. The results are robust to the choice of indicators and data selection procedures.

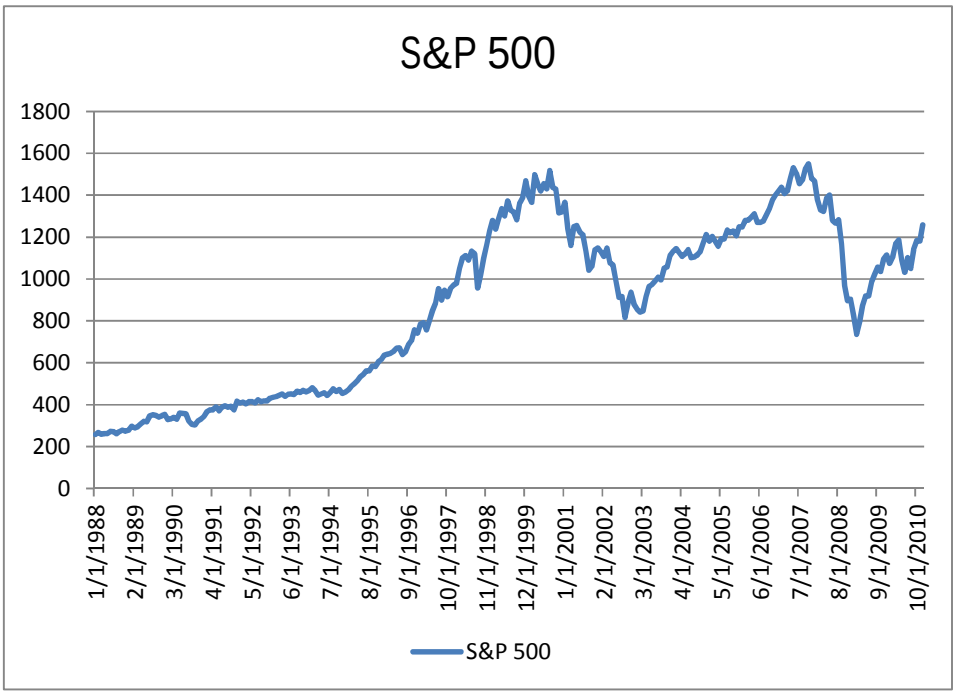
Furthermore, the chapter points out some critical econometric issues in two recent studies criticising Fama and French three-factor model. More specifically, studies by

Petkova (2006) and Hahn and Lee (2006) proposed alternative models but did not account for multicollinearity problems that could limit the studies from drawing a fair conclusion relating to the explanatory power of independent variables individually. By resolving these problems, the chapter suggests a different result to those reported in the original works.

Finally, the experimental analysis performed in this chapter provides persuasive evidence about the validity of the Fama and French model as well as on the underlying reasons behind the success of value strategy. The chapter finds strong support for the dominant role of the three-factor risk model in capturing time-series and cross-sectional movements of stock returns. It finds no evidence suggesting that the recent alternative models have a superior explanatory ability. Occasionally, benefits of adding other risk factor loadings can be seen but the improvement is immaterial and the Fama and French model remains valid. The results are robust to different methods of variable construction and methods of estimation.

For further research, it is possible that testing on a wide range of markets would provide a more comprehensive view. In addition, a longer sample period covering different levels of economic crises and booms could potentially provide stronger evidence for the arguments.

Figure 2.1: The US stock market movements (1988-2010)



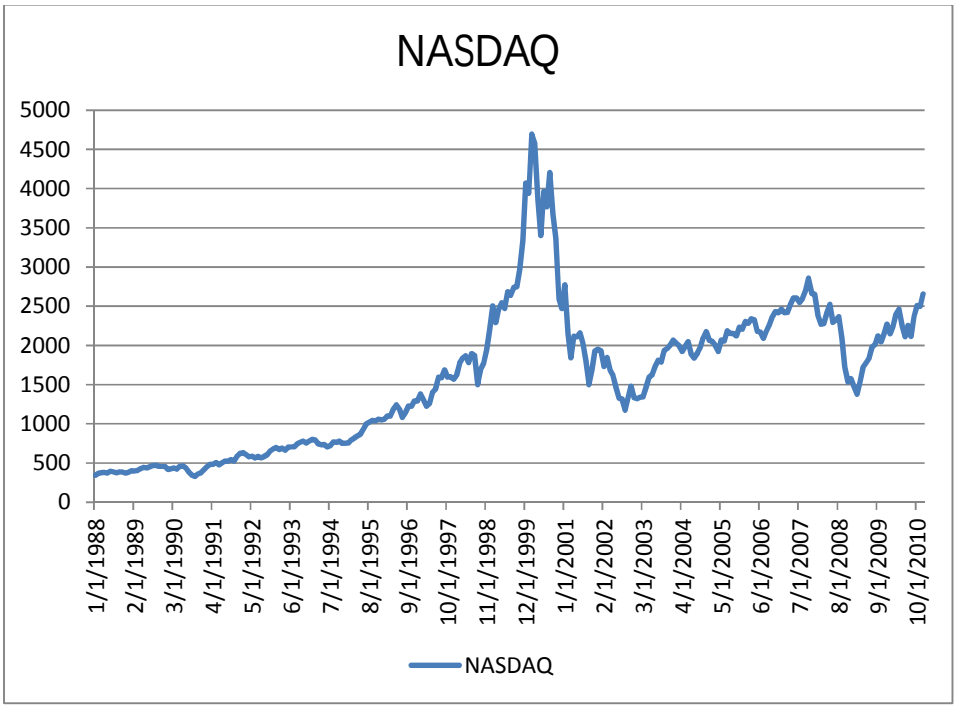


Figure 2.2: Main stock market indices movements (2001-2010)

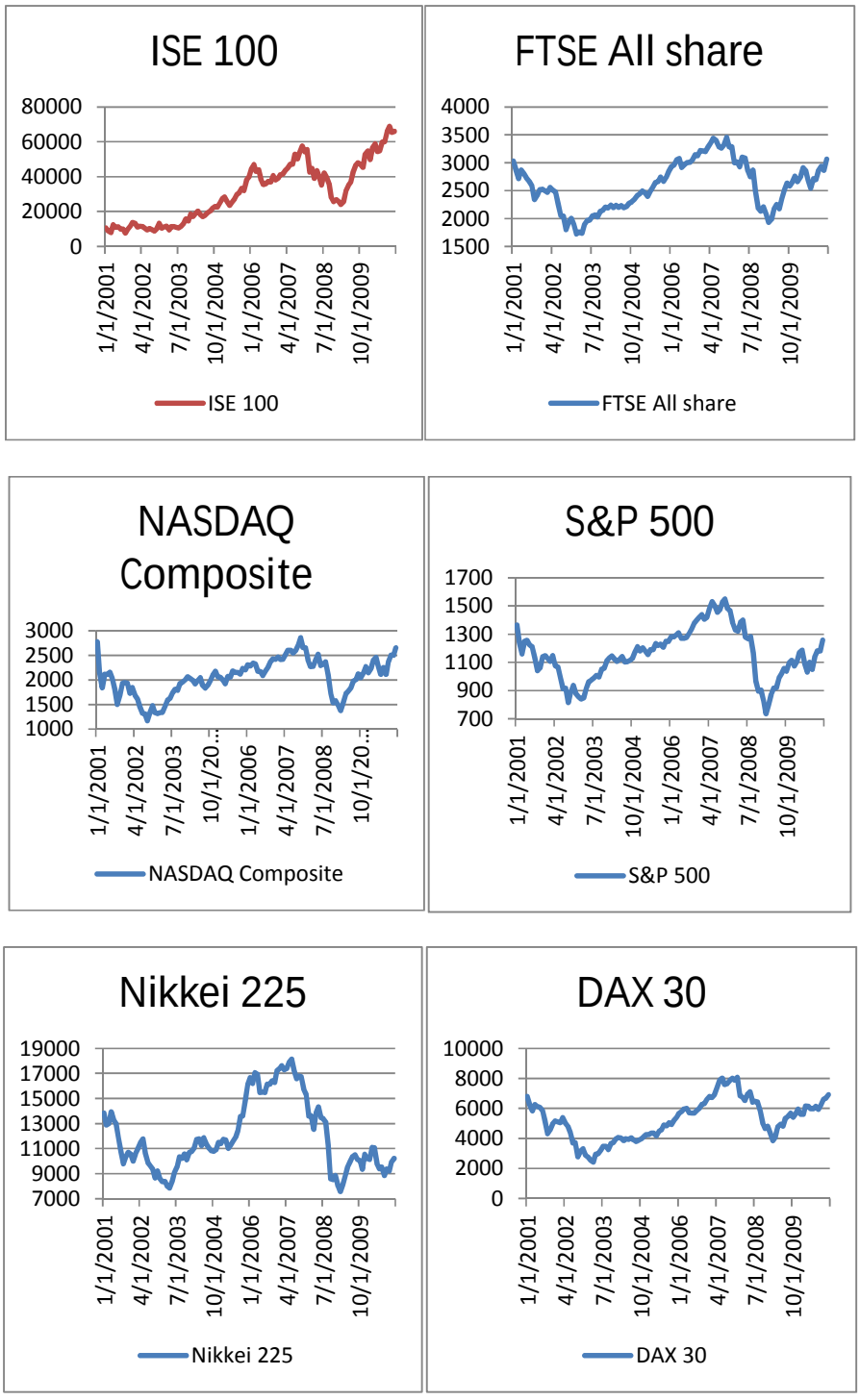


Table 2.1: Independence Tests

Panel A: Unit-root tests

The panel presents the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) tests and multiple structural breaks tests proposed by Lee and Strazicich (2003) for unit roots. Indices are obtained from Turkey (Istanbul Stock Exchange National 100 Price Index – ISE), New York (Standard and Poor's 500 Composite – S&P), Frankfurt (DAX 30 Performance- DAX), London (FTSE 100 Price Index – FTSE100) and Japan (Nikkei Stock Average Price Index 225 – Nikkei). Monthly closing data for all indices are obtained from January 1988 to December 2010.

The first 2 conventional tests are on the autoregressive representations of the five stock indices and on the first differences. For ADF, numbers in parentheses are optimal lag length estimated by Schwarz Information Criterion (SIC). For PP, these are automatic bandwidth based on Newey-West bandwidth selection method and Bartlett kernel. Lee and Strazicich two unknown breaks, TB_1 and TB_2 in constant and trend, employs the Lagrange Multiplier (LMτ) test, in which the lag lengths are selected using Akaike information criteria and critical values reported in Lee and Strazicich (2003).

	Test on Index level		Test on First differences		Lee and Strazicich (2003)			
Country	ADF	PP	ADF	PP	Lags	TB_1	TB_2	t-LMτ (n)
Turkey	-1.3 (0)	-1.51 (7)	-17.52* (0)	-17.50* (6)	4	2004:05	2008:06	-5.39
Germany	-2.17 (1)	-2.34 (7)	-14.34* (0)	-14.48* (6)	7	2001:02	2007:12	-4.92
Japan	-2.52 (0)	-2.75 (8)	-16.17* (0)	-16.17* (7)	8	1991:03	1993:10	-5.29
UK	-1.8 (0)	-1.93 (8)	-16.12* (0)	-16.13* (7)	3	2003:03	2008:04	-4.34
US	-1.50 (0)	-1.83 (9)	-15.31* (0)	-15.48* (9)	5	2002:10	2007:10	-4.42

Note:

The asterisk indicates statistical significant at the 1 percent level. Critical values are from MacKinnon (1996).

Table 2.1 - Continued

Panel B: Cointegration tests without structural breaks

The Panel displays the static Engle-Granger, Phillips-Ouliaris, the dynamic Johansen tests and most importantly an augmented test for cointegration from Engle-Granger allowing for an unknown number of breaks in both level and trend.

	Engle-Granger		Phillips-Ouliaris			Johansen						
Country	τ-statistic	z-statistic	τ -statistic	z-statistic	Ho: r (rank)	Lag order[a]	Trace[b] (λ_{trace})	Max Eigen[c] (λ_{max})	Ho: r (rank)	Trace[b] (λ_{trace})	Max Eigen[c] (λ_{max})
Germany	-1.59	-4.46	-1.63	-4.74	r ≤ 1	2	1.72	1.72	r =0	5.29	3.57
Japan	-1.97	-7.58	-2.11	-8.77		1	0.91	0.91		4.99	4.08
UK	-1.6	-3.92	-1.57	-3.74		2	1.42	1.42		5.69	4.27
US	-1.16	-2.55	-1.15	-2.49		2	0.74	0.74		6.03	5.29

[a] :Lag order determined by Akaike Information Criteria (AIC)

[b] :Trace critical value in MacKinnon-Haug-Michelis (1999) at 5% level are 3.8415 and 15.4947 for r ≤1 and r=0, respectively

[c] :Max-Eigen critical value in MacKinnon-Haug-Michelis (1999) at 5% level are 3.8415 and 14.2646 for r ≤1 and r=0, respectively.

Table 2.1 - Continued

Panel C: Cointegration tests with a structural break

	Augmented Engle-Granger		
Country	Dummy	τ-statistic	z-statistic
Germany	Yes	-2.13	-9.03
Japan	Yes	-1.20	-8.14
UK	Yes	-2.08	-8.22
US	Yes	-1.85	-5.66

Figure 2.3: Annual value-weighted Value-minus-Growth returns in Turkey

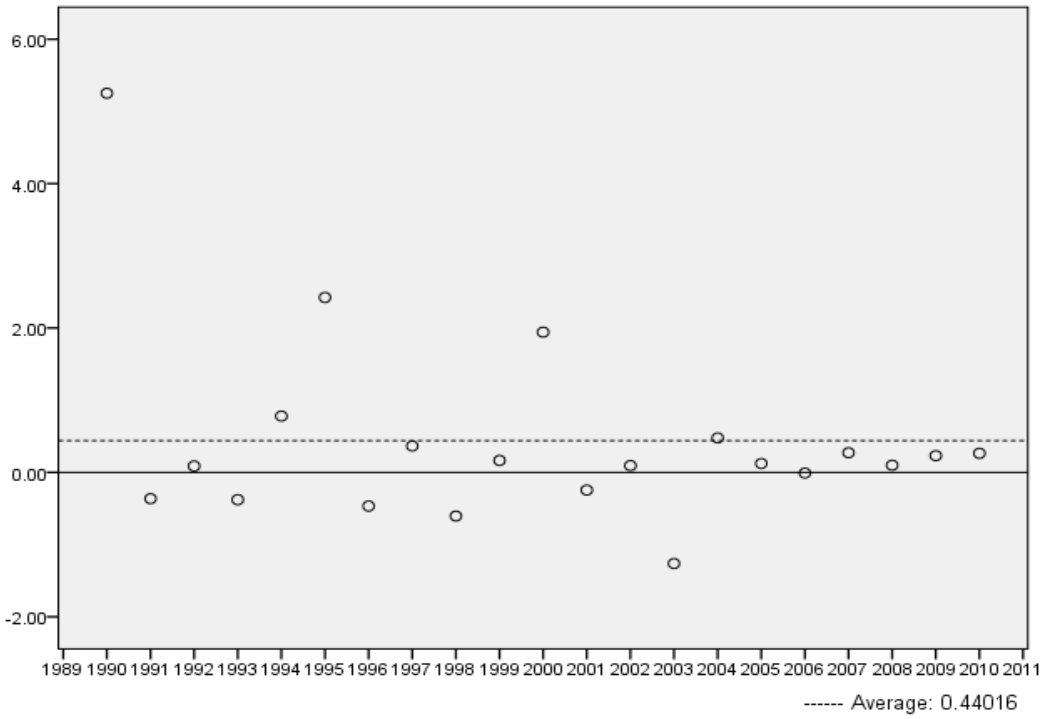


Figure 2.4: Annual value-weighted Small-minus-Big returns in Turkey

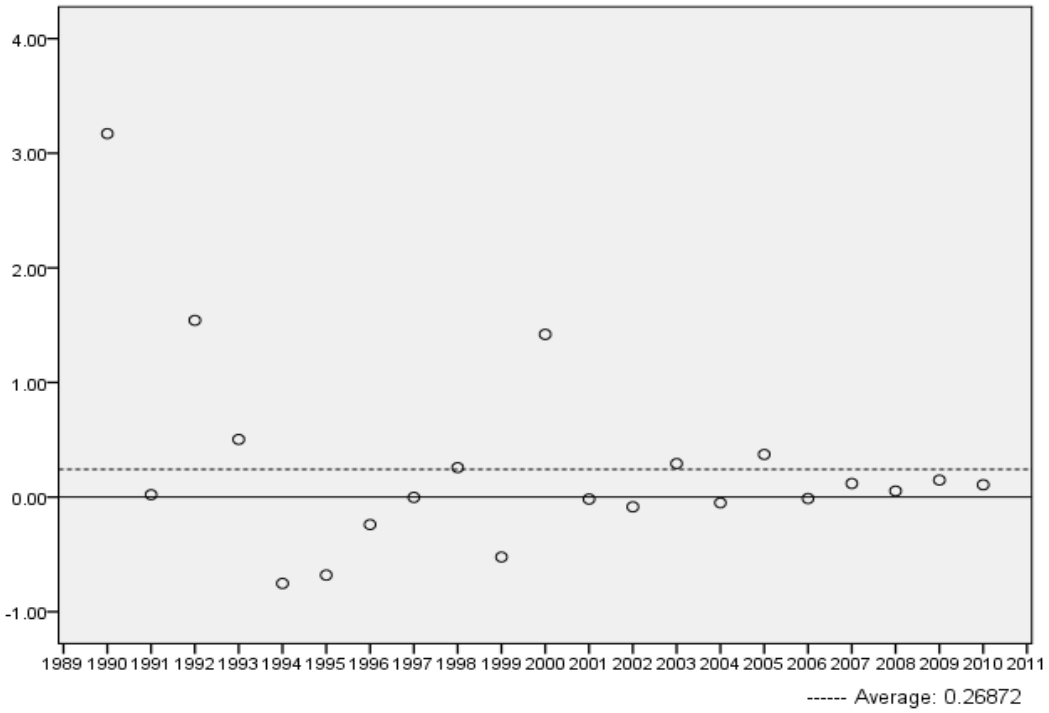


Figure 2.5: Annual value-weighted Winner-minus-Loser returns in Turkey

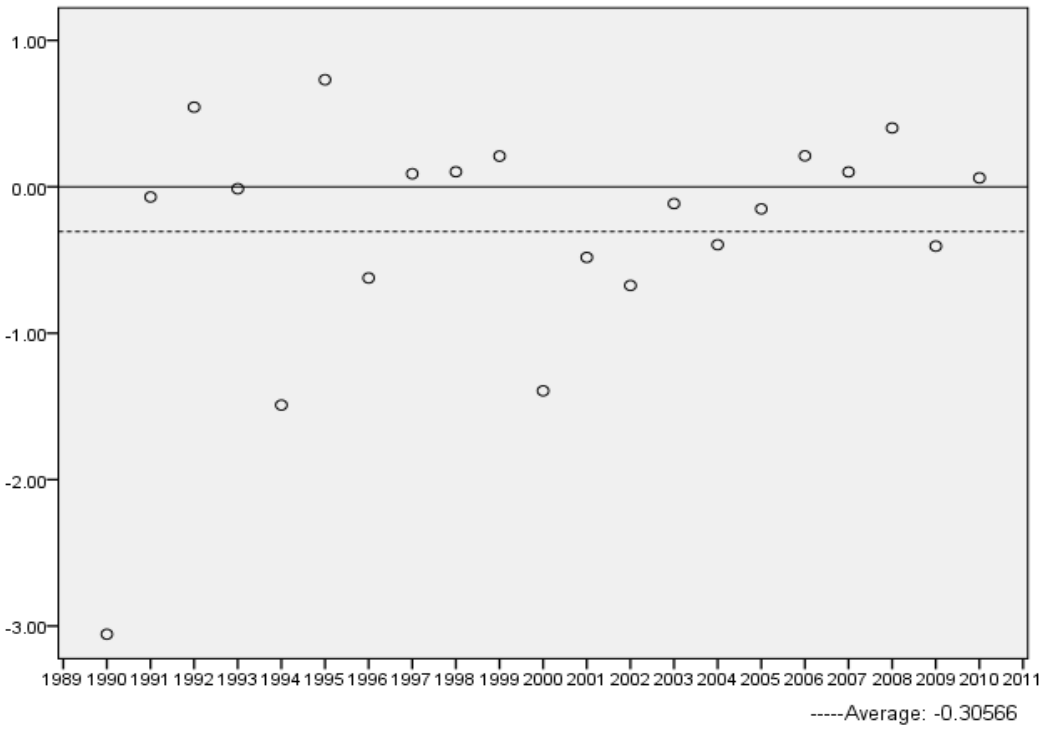


Table 2.2: Sample description

The table describes characteristics of the sample in comparison with the ISE National All-share index at 31st December 2010. Except for the number of employees in unit, other variables are displayed in million Turkish Liras. It reports means, standard deviations (Std), median, minimum and maximum values of the variables.

As at 31st December 2010,in Millions TRY.*

	Sample					National All-share				
	Mean	Std	Median	Min	Max	Mean	Std	Median	Min	Max
Employees	2,513.92	4,737.40	701	3	34,138	2,677.54	7,118.34	424	3	73,063
Sales	1,256,917.74	2,929,323.60	290,677	0	26,218,720	1,543,039.54	5,144,554.46	209,935	-36,719	53,812,436
Cash flow	188,952.84	573,559.25	29,778	-1,196,536	4,396,336	1,073,205.48	5,072,637.48	23,612	-1,196,536	42,019,432
Working capital	205,560.41	552,821.27	62,907	-1,108,264	4,046,906	-44,598.98	2,757,650.48	44,101	-40,486,868	4,046,906
Total Asset	1,369,595.94	2,698,579.98	373,511	8,790	15,097,801	4,496,123.63	18,040,159.27	322,092	4,596	135,523,866
Market capitalisation	1,248.35	3,021.60	322	12.41	23,210.00	1,604.74	4,462.48	232	8.41	34,320.00

(*): Except the Number of employees is in persons.

Table 2.3: Explanatory variables

N is the number of month tested across variables; every variable have a 258 month horizon except DEF has 234 months due to unavailability of accounting data to computer O-score. The mean is presented in percentages. Std is the standard deviations. *t*-statistics is the mean divided by its time-series standard error.

The excess market returns, R_m-R_f, is the return differential between market portfolio and 1-month LIBOR which stands for the risk-free asset. The High-minus-Low, HML, and Small-minus-Big, SMB, portfolios meant to mimic the risk factor in returns associated with B/M and with size, respectively, with 1-month lag. The short-term Treasury bill variable, STBill, is a monthly rate of the 3-month Turkish T-Bill and DIV is the one-year aggregate dividend yield. Term spread, TERM, is the difference between monthly long-term government bond rate and the short-term T-Bill rate. Default spread, DEF, is the difference in returns between firms with the highest probability of bankruptcy, measured by Ohlson's (1980) O-score and firms with the lowest O-score. The length of DEF time-series is 24 months shorter due to accounting data inadequacy. For each month n, $\Delta TERM_n$ (ΔDEF_n) is constructed in accordance to Hahn and Lee (2006) as the difference between the term spread (minus default spread) of month n and this of the prior month. The momentum factor is Winner-minus-Loser, WML, based on the Jegadeesh and Titman (1993) momentum strategy of buying high 11-month past returns and selling low 11-month past returns, lagged 1 month. Turnover, TURN, proxy for liquidity factor, is a mimicking portfolio that long in low turnover stocks and short in high turnover ratio stocks. Turnover ratio is defined as trading volume divided by number of shares outstanding.

Explanatory returns	N	Mean	Std	*t*-statistics
R_m-R_f	258	0.0455***	0.1658	4.41
HML	258	0.0269***	0.1501	2.88
SMB	258	0.0178***	0.1076	2.65
DIV	258	0.0410***	0.0252	26.1
STBill	258	0.0342***	0.0184	29.9
TERM	258	0.0097***	0.0137	11.3
DEF	234	0.0164*	0.1483	1.69
ΔTERM	258	0.0001	0.0064	0.01
Δ DEF	234	-0.0000	0.2098	-0.00
TURN	258	0.0007	0.1470	0.08
WML	258	-0.0124	0.1377	-1.45

: significant at 10% level **: significant at 5% level *: significant at 1% level*

Table 2.4: Descriptive statistics

At the end of June of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their B/M at the end of December of each year *t-1*. This allows 6 months for investors to absorb information and avoid report delays biases. Top 30% B/M stocks are value stocks, bottom 30% are growth. Included stocks are all non-financial firms in the ISE National All-share index that have sufficient data to form portfolio and calculate returns. Firms with negative B/M, negative E/P or zero DY are excluded. Winners are separated from losers using the same breakpoints of 11-month past returns ranking, lagged 1 month. The sample is also separately split into two groups, small and big portfolios based on their market capitalisation in December year *t-1*, using the median.

The market return (R_m) is the value-weighted return on a portfolio including all stocks in the value, growth, small and big portfolios plus the previously excluded negative B/M firms. LIBOR 1-month rate is used to proxy for the risk free asset (R_f). Value-weighted monthly portfolios returns are computed from July to the following June and the portfolios are rebalanced annually. N is the total number of firms over time, the time-series mean is presented in percentages. Std is the standard deviations. *t*-statistics is the mean divided by its time-series standard error. **: significant at 10% level **: significant at 5% level ***: significant at 1% level*

Portfolios formed on B/M					Portfolios formed on E/P					Portfolios formed on DY				
	N	Mean	Std	*t*-stat		N	Mean	Std	*t*-stat		N	Mean	Std	*t*-stat
Value	532	7.03***	0.344	3.28		753	4.92***	0.169	4.44		564	4.58***	0.168	4.28
Growth	530	4.89***	0.168	4.68		750	4.78***	0.156	4.68		562	4.93***	0.165	4.68
Value premium		2.14	0.282	1.22			0.14	0.123	0.17			-0.35	0.125	-0.45
Portfolios formed on Size					**Portfolios formed on Past returns**					**Benchmark portfolios**				
Small	883	5.75***	0.173	5.32	Winner	541	4.64***	0.180	4.14	R_m	1837	5.04***	0.166	4.88
Big	883	4.91***	0.168	4.69	Loser	541	5.88***	0.194	4.86	R_f	258	0.49***	0.003	30.10
Size premium		0.84	0.096	1.41	Momentum		-1.24	0.138	-1.45					

Table 2.5: Inclusion versus exclusion of financial firms

At the end of June of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their B/M at the end of December of each year *t-1*. This allows 6 months for investors to absorb information and avoid report delays biases. Top 30% B/M stocks are value stocks, bottom 30% are growth. The first part reports value premium among all firms in the ISE National All-share index that have sufficient data to form portfolio and calculate returns and the second part shows it among non-financial firms only. Firms with negative B/M are excluded.

Value-weighted monthly portfolios returns are computed from July to the following June and the portfolios are rebalanced annually. N is the total number of firms over time, the time-series mean is presented in percentages. Std is the standard deviations and *t*-statistics is the mean divided by its time-series standard error.

	Financial and non-financial firms				Non-financial firms			
	N	Mean	Std	*t*-stat	N	Mean	Std	*t*-stat
Value	694	6.66***	0.213	5.01	532	7.03***	0.344	3.28
Growth	642	5.16***	0.172	4.81	530	4.89***	0.168	4.68
Value premium		1.50*	0.138	1.75		2.14	0.282	1.22

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.6: Currently traded firms versus actual traded firms

Panel A: Average monthly value premium

The panel reports average monthly return differentials between value and growth portfolios. The first sub-table is for firms that are currently traded at the end of sample period while the second sub-table shows not only results on the survivor firms but also firms that were delisted (included in the sample during the years they were active). The later, thus, represents the actual traded firms. Shaded columns present value premium.

At the end of June of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their B/M (E/P or DY) at the end of December of each year *t-1*. This allows 6 months for investors to absorb information and avoid report delays biases. Value portfolios (indicated with a leading H, for high) includes firms whose ratios (B/M, E/P or DY) is among the top 30%. Growth portfolios (indicated with a leading L, for low) includes firms among the bottom 30%. H-L is the return differentials between the high and the low, or the value premium. Included stocks are all non-financial firms in the ISE National All-share index that have sufficient data to form portfolio and calculate returns. Firms with negative B/M, negative E/P or zero DY are excluded. Value-weighted monthly portfolios returns are computed from July to the following June and the portfolios are rebalanced annually. The time-series mean is presented in percentages. Std is the standard deviations and *t*-statistics is the mean divided by its time-series standard error.

Currently traded firms

	H B/M	L B/M	H-L B/M	H E/P	L E/P	H-L E/P	H DY	L DY	H-L DY
Mean	6.46***	4.88***	1.57*	5.26***	4.68***	0.58	4.58***	4.97***	-0.39
Std	0.218	0.168	0.148	0.171	0.161	0.126	0.172	0.170	0.134
t-statistics	4.77	4.66	1.71	4.72	4.45	0.71	4.17	4.60	-0.46

Table 2.6 - Continued

Actual traded firms

	H B/M	L B/M	H-L B/M	H E/P	L E/P	H-L E/P	H DY	L DY	H-L DY
Mean	7.03***	4.89***	2.14	4.92***	4.78***	0.14	4.58***	4.93***	-0.35
Std	0.344	0.168	0.282	0.169	0.156	0.123	0.168	0.165	0.125
t-statistics	3.28	4.68	1.22	4.44	4.68	0.17	4.28	4.68	-0.45

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Panel B: Average monthly size premium

The sample is separately split into two groups, small and big portfolios based on their market capitalization at the end of December, using the median. The market portfolio, R_m, consists of all stocks in the value, growth, small and big portfolios plus the previously excluded negative B/M firms. Value-weighted monthly portfolios returns are computed from July to the following June to allow for a 6-month lag and the portfolios are rebalanced annually. The time-series mean is presented in percentages. Std is the standard deviations and *t*-statistics is the mean divided by its time-series standard error.

	Currently traded firms				Actual traded firms			
	R_m	Small	Big	Size premium	R_m	Small	Big	Size premium
Mean	5.14***	5.66***	4.93***	0.72	5.04***	5.75***	4.91***	0.84
Std	0.169	0.172	0.170	0.100	0.166	0.173	0.168	0.096
t-statistics	4.88	5.30	4.66	1.16	4.88	5.32	4.69	1.41

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.7: Regression estimates on Excess Returns of Value and Growth Portfolios

The table shows time-series results of excess returns on value (Panel A) and growth portfolios (Panel B). Regressors are listed in the first column, subsequent columns report estimation results for each models. The models numbered in the table are respectively: [1] CAPM, [1b,1c,**2**] Fama-French (1993)'s 2 and 3 factor (in **bold**), [3,4,5] Fama-French model augmented by TURN, by WML factor, and by the both factors, [6] model proposed by Petkova (2006), [7] model by Hahn and Lee (2006), [8] model containing Fama-French and Petkova's factors, and [9] model combining all factors so far. For the sake of brevity, in the Hahn and Lee's (model 7), TERM and DEF represent for ΔTERM and ΔDEF. Estimated coefficients, *t*-statistics (in parentheses) are presented. R^2 (in percentage) and standard errors (s.e.) are adjusted for degrees of freedom. F-statistics and their p-value test the joint significance of the corresponding loadings. Adjusted R^2s and Pricing errors are reported in percentage form. For presentation purposes, this table inserts asterisks indicating statistical significant level next to *t*-statistics. See notes to Table 2.3 for explanations of variables.

Table 2.7 – Continued

Panel A: Value portfolio

	[1]	[1b]	[1c]	**[2]**	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Constant	0.0032	-0.0056	0.0038	**-0.0035**	-0.0039	-0.0046	-0.0049	0.0275	-0.0029	0.0127	0.0120
	(0.19)	(-0.35)	(0.22)	**(-0.21)**	(-0.24)	(-0.28)	(-0.30)	(0.69)	(-0.17)	(0.32)	(0.31)
R_m-R_f	1.3669	1.2295	1.364	**1.2173**	1.2456	1.2373	1.2588	1.4992	1.4672	1.3845	1.3571
	(14.0***)	(12.7***)	(13.7***)	**(12.3***)**	(12.1***)	(12.6***)	(12.3***)	(12.9***)	(13.1***)	(11.5***)	(10.7***)
HML		0.5572		**0.5636**	0.5059	0.4727	0.4305			0.4487	0.3289
		(5.22***)		**(5.25***)**	(4.11***)	(4.12***)	(3.37***)			(3.18***)	(2.07**)
SMB			-0.0259	**-0.0957**	-0.0622	-0.1299	-0.1023			-0.1933	-0.2202
			(-0.17)	**(-0.65)**	(-0.41)	(-0.89)	(-0.68)			(-1.18)	(-1.33)
DIV								-0.2123		0.0893	0.0581
								(-0.30)		(0.13)	(0.08)
TERM								0.3895	-2.5834	0.0172	0.6340
								(0.29)	(-0.98)	(0.02)	(0.46)
DEF								-0.0075	-0.0258	-0.0207	-0.0203
								(-0.06)	(-0.32)	(-0.18)	(-0.18)
STBill								-0.7627		-0.6476	-0.7445
								(-0.83)		(-0.72)	(-0.82)
TURN					0.118		0.0927				-0.1174
					(0.96)		(0.76)				(-0.72)
WML						-0.2603	-0.2511				-0.3145
						(-2.15**)	(-2.06**)				(-1.90*)
Adj R^2	73.12	78.40	72.90	**78.28**	78.27	79.81	78.93	72.11	72.64	74.17	74.57
s.e.	0.2797	0.2473	0.2602	**0.2476**	0.2476	0.2458	0.2461	0.2553	0.2541	0.2507	0.2498
F-stat	195.8	121.5	97.54	**80.98**	60.95	62.77	50.24	34.89	58.74	27.33	21.81
p-value	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.7 – Continued

Panel B: Growth portfolio

	[1]	[1b]	[1c]	**[2]**	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Constant	0.0026	0.0047	0.0015	**0.0032**	0.003	0.0024	0.0022	-0.0047	-0.0011	0.0048	0.0049
	(0.55)	(1.01)	(0.31)	**(0.69)**	(0.64)	(0.55)	(0.51)	(-0.63)	(-0.34)	(0.85)	(0.87)
R_m-R_f	0.9084	0.9407	0.9138	**0.9491**	0.9687	0.9645	0.9791	0.9396	0.9363	1.0023	1.0001
	(32.9***)	(33.9***)	(32.6***)	**(33.6***)**	(33.2***)	(36.5***)	(35.8***)	(43.4***)	(44.3***)	(58.3***)	(54.5***)
HML		-0.1312		**-0.1356**	-0.1756	-0.2064	-0.2346			-0.2651	-0.2567
		(-4.27***)		**(-4.4***)**	(-5.03***)	(-6.7***)	(-6.9***)			(-13.1***)	(-11.2***)
SMB			0.0489	**0.0657**	0.0889	0.0391	0.0575			0.0522	0.0517
			(1.13)	**(1.57)**	(2.08**)	(0.99)	(1.43)			(2.22**)	(2.17**)
DIV								0.0928		-0.0894	-0.0861
								(0.72)		(-0.90)	(-0.87)
TERM								-0.2960	0.0162	-0.0678	-0.0995
								(-1.18)	(0.03)	(-0.35)	(-0.50)
DEF								-0.06529	0.0231	-0.0566	-0.0571
								(-3.05***)	(1.53)	(-3.49***)	(-3.50***)
STBill								0.0973		0.0445	0.0468
								(0.57)		(0.34)	(0.36)
TURN					0.0817		0.0619				-0.0071
					(2.35**)		(1.89*)				(-0.30)
WML						-0.2028	-0.1966				0.0154
						(-6.2***)	(-6.1***)				(0.64)
Adj R^2	79.78	81.99	80.80	**82.10**	82.41	84.42	84.58	89.70	89.38	94.10	94.07
s.e.	0.2734	0.0711	0.0734	**0.0709**	0.0703	0.0661	0.0658	0.0474	0.0482	0.0359	0.036
F-stat	108.1	586.1	541.8	**393.8**	302	349.1	282.9	406.9	654.6	532.0	411.4
p-value	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.8: Panel regressions

Panel A:

Panel regression of excess returns on the 10 regressors (incl. intercept) listed in the first column, subsequent columns report estimation results for each models. The models numbered in the table are respectively: [1] the CAPM, [2] Fama-French (1993)'s (in **bold**), [3,4,5] Fama-French model augmented by TURN, by WML factor, and by both factors, [6] model proposed by Petkova (2006), [7] model suggested by Hahn and Lee (2006), and [9] model combining all factors so far. For the sake of brevity, in the Hahn and Lee's (model 7), TERM and DEF represent for ΔTERM and ΔDEF. Estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom. F-statistics and their p-value test the joint significance of the corresponding loadings. Adjusted R^2s and Pricing errors are reported in percentage form. For presentation purposes, this table inserts asterisks indicating statistical significant level next to *t*-statistics. See notes to Table 2.3 for explanations of variables.

Table 2.8 – Panel A - Continued

	[1]	**[2]**	[3]	[4]	[5]	[6]	[7]	[9]
Constant	0.0029	**-0.0001**	-0.0005	-0.0011	-0.0013	0.0114	-0.0020	0.0085
	(0.01)	**(-0.01)**	(-0.05)	(-0.12)	(-0.14)	(0.55)	(-0.22)	(0.41)
R_m-R_f	1.1376	**1.0832**	1.1071	1.1001	1.1189	1.2194	1.2018	1.1786
	(22.0***)	**(20.0***)**	(19.6***)	(20.5***)	(20.0***)	(20.2***)	(20.7***)	(17.5***)
HML		**0.2140**	0.1652	0.1331	0.0979			0.0361
		(3.6*)**	(2.4**)	(2.1**)	(1.40)			(0.43)
SMB		**-0.0150**	0.0134	-0.0454	-0.0224			-0.0842
		(-0.19)	(0.16)	(-0.56)	(-0.27)			(-0.96)
DIV						-0.0598		-0.0140
						(-0.17)		(-0.04)
TERM						0.0467	-1.2836	0.2672
						(0.07)	(-0.94)	(0.37)
DEF						-0.0364	-0.0013	-0.0387
						(-0.61)	(-0.03)	(-0.65)
STBill						-0.3327		-0.3489
						(-0.70)		(-0.73)
TURN			0.0998		0.0773			-0.0623
			(1.48)		(1.16)			(-0.72)
WML				-0.2315	-0.2239			-0.1496
				(-3.5***)	(-3.4***)			(-1.70*)
Adj R^2	79.47	**82.47**	82.49	82.47	82.49	80.71	80.92	80.80
s.e.	0.1745	**0.0924**	0.0922	0.0903	0.0903	0.0874	0.0870	0.0872
Pricing error	1.84	**1.84**	1.83	1.80	1.79	1.74	1.74	1.72
F-statistics	383.5	**269.1**	227.7	232.6	206.5	186.2	244.2	148.5
p-value	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.8 - Continued

Panel B: Augmented models

The models numbered in the table are respectively: [1b, 1c] Fama-French (1993)'s 2 factor model, [8] Fama-French three factors plus Perkova's factors, [8b, 8c] are augmented versions of model 8 by TURN, and then by WML factor, [6b, 6c, 6d] model 6 augmented by TURN, by WML factor and by both factors, [7b, 7c, 7d] model 7 augmented by TURN, by WML factor and by both factors. For the sake of brevity, in the Hahn and Lee's augmented models (models 7b, 7c, 7d), TERM and DEF represent for ΔTERM and ΔDEF. Estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom, and F-tests report the joint significance. Adjusted R^2s and Pricing errors are reported in percentage form. For presentation purposes, this table inserts asterisks indicating statistical significant level next to *t*-statistics. See notes to Table 2.3 for explanations of variables.

	[1b]	[1c]	[6b]	[6c]	[6d]	[7b]	[7c]	[7d]	[8]	[8b]	[8c]
Constant	-0.0005	0.0026	0.0114	0.0083	0.0086	-0.0021	-0.0030	-0.0028	0.0088	0.0089	0.0081
	(-0.05)	(0.29)	(0.55)	(0.34)	(0.42)	(-0.23)	(-0.33)	(-0.31)	(0.42)	(0.43)	(0.39)
R_m-R_f	1.0851	1.1389	1.2207	1.2079	1.1962	1.2042	1.1898	1.1799	1.1934	1.1877	1.1952
	(20.4***)	(21.67***)	(19.4***)	(19.9***)	(18.7***)	(19.8***)	(20.4***)	(18.9***)	(18.8***)	(17.6***)	(18.9***)
HML	0.2130								0.0918	0.0959	0.0318
	(3.6***)								(1.23)	(1.25)	(0.38)
SMB		0.0115							-0.0705	-0.0735	-0.0748
		(0.14)							(-0.81)	(-0.84)	(-0.86)
DIV			-0.0599	-0.0364	-0.0333				-0.0001	0.0029	-0.0201
			(-0.17)	(-0.10)	(-0.09)				(-0.00)	(0.01)	(-0.06)
TERM			0.0465	0.2694	0.2943	-1.2840	-0.9823	-0.9539	-0.0253	-0.0279	0.2396
			(0.07)	(0.38)	(0.41)	(-0.94)	(-0.71)	(-0.69)	(-0.04)	(-0.04)	(0.33)
DEF			-0.0362	-0.0368	-0.0382	-0.0014	-0.0080	-0.0083	-0.0387	-0.039	-0.0369
			(-0.60)	(-0.62)	(-0.64)	(-0.03)	(-0.19)	(-0.20)	(-0.65)	(-0.66)	(-0.62)
STBill			-0.3313	-0.3575	-0.3724				-0.3016	-0.3055	-0.3330
			(-0.69)	(-0.75)	(-0.78)				(-0.63)	(-0.64)	(-0.70)
TURN			0.0059		-0.0487	0.0108		-0.0392		-0.0210	
			(0.07)		(-0.57)	(0.13)		(-0.45)		(-0.25)	
WML				-0.1392	-0.1538		-0.1301	-0.1417			-0.1320
				(-1.87*)	(-1.95*)		(-1.76*)	(-1.81*)			(-1.56)

Table 2.8 – Panel B - Continued

	[1b]	[1c]	[6b]	[6c]	[6d]	[7b]	[7c]	[7d]	[8]	[8b]	[8c]
Adj R^2	82.57	81.27	80.60	80.99	80.92	80.81	81.16	81.07	80.70	80.59	80.86
s.e.	0.1922	0.1947	0.1877	0.1869	0.187	0.1872	0.1866	0.1868	0.1874	0.1876	0.1871
Pr. Error	1.80	1.72	1.74	1.72	1.72	1.74	1.73	1.73	1.74	1.75	1.74
F-stat	254.1	241.3	71.7	72.8	62.4	107.96	109.44	87.45	61.8	54.0	54.6
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.9: Explaining Momentum returns

Panel A**:** Fama-French 3 factor Time-series Regression Estimates on Excess Returns of Winner and of Loser Portfolios.

The two portfolios are constructed in accordance to study of Jegadeesh and Titman (1993). The 11-month past returns are used to distinguish the winners from the losers. More specifically, the top 30% stocks (the bottom 30% stocks) are classified as the winners (the losers). The monthly portfolio returns are calculated at July, year *t* with 1-month lag and value weighted by the market value at the end of June, year *t* and the portfolios are rebalanced annually. *t*-statistics are in parentheses. R^2 and standard errors (s.e.) are adjusted for degrees of freedom, and F-stat and their *p*-value testing the joint significance of corresponding factors. Adjusted R^2s are reported in percentage form.

	a	b	HML	SMB	*Adj* R^2	s.e.	F-stat
Winner-R_f	-0.0027	1.0355***	-0.1050***	-0.0081	87.66	0.0631	609.5
	(-0.65)	(41.23)	(-3.84)	(-0.22)			0.00
Loser-R_f	0.0014	0.9587***	0.2445***	0.1231**	77.51	0.0920	296.3
	(0.23)	(26.2)	(6.13)	(2.26)			0.00

Panel B: Fama-French 3 factor Panel Regression Estimation on momentum return

	a	b	HML	SMB	*Adj* R^2	s.e.	F-stat
Estimate	-0.0006	0.9971***	0.0697***	0.0575*	80.14	0.0833	693.9
t-statistics	(-0.17)	(42.53)	(2.73)	(1.65)			0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.10: Panel regressions on E/P portfolios

Panel regression of excess returns on the 10 regressors (incl. intercept) listed in the first column, subsequent columns report estimation results for each models. See notes to Table 2.3 for explanations of variables and to Table 2.8 for model description. Accordingly, estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom, and F-tests report the joint significance. Adjusted R^2s are reported in percentage form. For presentation purposes, this table inserts asterisks indicating statistical significant level next to *t*-statistics.

	[1]	[1b]	[1c]	[2]	[3]	[4]	[5]	[6]	[8]	[8b]	[8c]	[9]
Constant	0.0052	0.0050	0.0028	0.0028	0.0037	0.0028	0.0038	0.0043	0.0035	0.0046	0.0034	0.0044
	(1.29)	(1.22)	(0.68)	(0.69)	(0.92)	(0.69)	(0.93)	(0.47)	(0.37)	(0.50)	(0.36)	(0.48)
R_m-R_f	0.9289	0.9254	0.9391	0.9405	0.8992	0.9405	0.8960	0.9313	0.9465	0.9072	0.9469	0.9030
	(35.2***)	(34.0***)	(35.8***)	(34.5***)	(31.3***)	(34.5***)	(31.0***)	(34.1***)	(33.4***)	(30.6***)	(33.3***)	(30.4***)
HML		0.0170		-0.0063	0.0223	-0.0056	0.0063		-0.0181	0.0105	-0.0285	-0.0172
		(0.52)		(-0.19)	(0.67)	(-0.15)	(0.17)		(-0.54)	(0.31)	(-0.76)	(-0.45)
SMB			0.1346	0.1361	0.1147	0.1361	0.1116		0.1355	0.1148	0.1347	0.1099
			(3.5***)	(3.5***)	(3.0***)	(3.5***)	(2.9***)		(3.5***)	(3.0***)	(3.5***)	(2.5***)
DIV								-0.2745	-0.2785	-0.2580	-0.2820	-0.2659
								(-1.68*)	(-1.70*)	(-1.60)	(-1.7*)	(-1.65*)
TERM								0.8802	0.8782	0.8603	0.9242	0.9972
								(2.8***)	(2.8***)	(2.8***)	(2.8***)	(3.1***)
DEF								0.0071	0.0059	0.0011	0.0062	0.0014
								(0.26)	(0.22)	(0.04)	(0.23)	(0.05)
STBill								0.1198	0.0838	0.0566	0.0783	0.0365
								(0.55)	(0.39)	(0.27)	(0.37)	(0.17)
TURN					-0.1486		-0.1603			-0.1453		-0.1645
					(-4.0***)		(-4.2***)			(-3.9***)		(-4.3***)
WML						0.0015	-0.0418				-0.0229	-0.0694
						(0.04)	(-1.11)				(-0.61)	(-1.79*)

Table 2.10 - Continued

	[1]	[1b]	[1c]	[2]	[3]	[4]	[5]	[6]	[8]	[8b]	[8c]	[9]
Adj R^2	72.64	72.60	73.30	73.24	74.09	73.19	74.11	72.95	73.53	74.35	73.50	74.47
s.e.	0.0852	0.0853	0.0842	0.0843	0.0829	0.0844	0.0829	0.0847	0.0838	0.0825	0.0839	0.0823
F-statistics	1241.0	619.7	642.0	427.1	334.9	319.6	268.3	252.9	186.3	170.0	162.9	152.4
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.11: Panel regressions on DY portfolios

Panel regression of excess returns on the 10 regressors (incl. intercept) listed in the first column, subsequent columns report estimation results for each models. See notes to Table 2.3 for explanations of variables and to Table 2.8 for model description. Accordingly, estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom, and F-tests report the joint significance. Adjusted R^2s are reported in percentage form. For presentation purposes, this table inserts asterisks indicating statistical significant level next to *t*-statistics.

	[1]	[1b]	[1c]	[2]	[3]	[4]	[5]	[6]	[8]	[8b]	[8c]	[9]
Constant	0.0065	0.0071	0.0046	0.0052	0.0056	0.0052	0.0056	0.0080	0.0096	0.0101	0.0096	0.0101
	(1.66*)	(1.80*)	(1.17)	(1.32)	(1.41)	(1.31)	(1.41)	(0.86)	(1.04)	(1.10)	(1.04)	(1.09)
R_m-R_f	0.9537	0.9636	0.9593	0.9724	0.9516	0.9724	0.9506	0.9531	0.9814	0.9635	0.9814	0.9620
	(37.6***)	(37.0***)	(38.0***)	(37.4***)	(34.2***)	(37.4***)	(34.1***)	(35.2***)	(35.0***)	(32.5***)	(35.0***)	(32.3***)
HML		-0.0310		-0.0641	-0.0488	-0.0641	-0.0535		-0.00811	-0.0681	-0.0831	-0.0781
		(-1.64)		(-2.1**)	(-1.53)	(-1.92*)	(-1.59)		(-2.5**)	(-2.0**)	(-2.2**)	(-2.1**)
SMB			0.1036	0.1141	0.1038	0.1141	0.1028		0.1253	0.1159	0.1251	0.1141
			(2.8***)	(3.1***)	(2.8***)	(3.1***)	(2.7***)		(3.3***)	(3.0***)	(3.3***)	(2.9***)
DIV								-0.2077	-0.2564	-0.2471	-0.2571	-0.2499
								(-1.28)	(-1.59)	(-1.53)	(-1.59)	(-1.55)
TERM								0.5273	0.5825	0.5744	0.5916	0.6240
								(1.68*)	(1.87*)	(1.84*)	(1.84*)	(1.95*)
DEF								-0.0037	-0.0026	-0.0047	-0.0025	-0.0046
								(-0.14)	(-0.10)	(-0.18)	(-0.09)	(-0.17)
STBill								0.1054	0.0624	0.0500	0.0613	0.0427
								(0.49)	(0.30)	(0.24)	(0.29)	(0.20)
TURN					-0.0750		-0.0783			-0.0661		-0.0730
					(-2.1**)		(-2.1**)			(-1.79*)		(-1.9*)
WML						-0.0001	-0.0148				-0.0045	-0.0251
						(-0.00)	(-0.43)				(-0.12)	(-0.64)

Table 2.11 - Continued

	[1]	[1b]	[1c]	[2]	[3]	[4]	[5]	[6]	[8]	[8b]	[8c]	[9]
Adj R^2	74.22	74.30	74.57	74.74	74.91	74.69	74.87	74.15	74.81	74.93	74.76	74.90
s.e.	0.0864	0.0845	0.0840	0.0838	0.0835	0.0839	0.0836	0.0839	0.0828	0.0826	0.0829	0.0826
F-statistics	1414.3	710.9	721.0	485.3	367.5	363.2	293.5	269.0	199.1	175.5	173.9	155.8
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 2.12: Vector AutoRegressive (VAR) Estimations

The table shows time-series VAR results of excess returns on value and growth portfolios. Exogenous variables are listed in the first column, subsequent columns report VAR estimation results with lags (1 2) for each models. The models numbered in the table are respectively: [**2**] Fama-French (1993)'s three-factor (in **bold**), [4] Fama-French model augmented by WML factor for value stocks, [6] model proposed by Petkova (2006), and [8] model combining the Fama-French's and Petkova's factors. Estimated coefficients, t-statistics (in parentheses) are presented. R^2 (in percentage) and standard errors (s.e.) are adjusted for degrees of freedom. *F*-statistics and their *p*-value test the joint significance of the corresponding loadings. See notes to Table 2.3 for explanations of variables.

	Excess return on Value portfolio				Excess return on Growth portfolio		
	[2]	[4]	[6]	[8]	**[2]**	[6]	[8]
Constant	**0.0218**	0.0209	0.0609	0.0451	**0.0039**	-0.0032	0.0055
	(1.37)	(1.32)	(1.63)	(1.22)	**(0.97)**	(-0.44)	(0.99)
R_m-R_f	**1.2440*** **	1.2553***	1.4286***	1.3155***	**0.9440*** **	0.9350***	0.9989***
	(12.9)	(13.0)	(13.1)	(11.8)	**(38.7)**	(43.6)	(59.1)
HML	**0.5934*** **	0.5027***		0.4687***	**-0.1234*** **		-0.2644***
	(5.9)	(4.57)		(3.6)	**(-4.8)**		(-13.3)
SMB	**-0.0687**	-0.0785		-0.1203	**0.0177**		0.0633
	(-0.49)	(-0.56)		(-0.79)	**(0.50)**		(2.71)
DIV			-0.9214	-0.6139		0.0517	-0.1109
			(-1.40)	(-0.94)		(0.40)	(-1.13)
TERM			0.9336	0.5468		-0.3253	-0.1022
			(0.74)	(0.44)		(-1.31)	(-0.54)
DEF			0.0446	0.0298		-0.0612***	-0.0533***
			(0.41)	(0.28)		(-2.89)	(-3.34)
STBill			-0.1823	-0.0745		0.1915	0.1027
			(-0.21)	(-0.09)		(1.10)	(0.78)
TURN							
WML		-0.2445**					
		(-2.00)					

Table 2.12 - Continued

	Excess return on Value portfolio				Excess return on Growth portfolio		
	[2]	[4]	[6]	[8]	**[2]**	[4]	[6]
Adj R^2	**84.31**	84.85	80.00	82.29	**85.83**	89.95	94.32
s.e.	**0.2313**	0.2299	0.2372	0.2317	**0.0584**	0.0469	0.0352
F-statistics	**61.6**	52.6	34.3	29.4	**309.9**	298.9	431.1
p-value	**0.00**	0.00	0.00	0.00	**0.01**	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

CHAPTER 3: FAMILY OWNERSHIP AND STOCK PERFORMANCE

3.1. Introduction

Family firms account for a significant proportion of many economies. For example, Faccio and Lang (2002) found that among 5,232 listed firms in 13 Western European countries, 44 percent are held by families. In the U.S., founding families own at least one third of the largest listed firms (Anderson and Reeb 2003a). There are two-third of French stock market that are family firms (Sraer and Thesmar 2007) and a similar proportion is observed in nine East Asian countries (Claessens, Djankov and Lang 2000). In Turkey, family firms also account for more than one third in number and one fifth in market capitalisation of the ISE.

The significant influence of large block shareholders on firm performance has been discussed widely in the literature while the interesting case where large shareholders are members of the same family has been unnoticed until very recently. Because of their very different characteristics from other large shareholdings, family ownership is documented to have a strong positive relation with the firm performance. Since the relation between firm performance and stock returns is well recognised, it is natural to ask if family ownership has any impact on the firm stock performance. A few studies have addressed the issue but from a relatively narrow approach. They tend to link the stock prices with the presence of the founders or founder/CEOs in the firms. Hence, a broader question of whether stock performance is also driven by the nature of family firm ownership seems to have been overlooked.

It is worth noticing that the majority of research concerning the subject was done in the U.S, with fewer studies looking at markets characterized by family-owned businesses, such as Hong Kong, Italy, Russia, South Korea, Thailand and Turkey. Among the latter studies, family firms in Continental Europe and East Asia were the main testing target. The present chapter shows that a Middle Eastern country with a long history of family ownership like Turkey can offer a fresh view of how their typical characteristics are reflected in the way market values them.

High concentrated ownership, excess cash flow rights (i.e. insider system) achieved through pyramid structures and complex business groups are common in many countries and especially prevalent in emerging markets, where investor protection and takeover markets are underdeveloped. Distinct advantages of the two types of structure

for affiliate members in terms of financing, payoffs and tax expenses make them potentially attractive; these systems however can potentially harm minority shareholders' interests. In an analysis of eighteen emerging markets including Turkey, Lins (2003) shows that highly concentrated ownership coincides with low investor protection and civil law system. In Turkey, a large proportion of firm shares concentrated in the hands of an individual or a family who prefers to retain their controls over the firm. If that culture really signals a low protection system over minority shareholders, it is natural to ask whether outside investors and the market view stocks of family firms in a different way from those of non-family firms and, if so, what the underlying reasons behind this divergence are.

This chapter contributes to the existing literature on family firm performance in the following main respects. Firstly, unlike most previous studies, beside direct ownership, indirect ownership is also identified and included. This is crucial for studying family firm behaviour, especially within the complex businesses which are commonly seen in civil law countries. Especially in Turkey, most family firms keep their indirect controls via holding firms. Thus, failure to taking indirect shareholdings into account may bias the results. Secondly, unlike previous studies, the chapter covers not only the largest firms but also small and medium size businesses which are how most family firms started. Moreover, studying only the largest companies could lead to favouritism toward family firms. This is because, in practice, many new businesses do not survive in the first five years of starting up and among the survivors, not all could carry on and grow to reach the top group. Hence, those which could achieve that level while still retain family control are usually exceptionally strong firms. Examining smaller firms will allow the performance of firms at all stages of business life cycle and scope to be revealed. Last but not least, although there has been a large amount of research done on family firms, few studies have looked at how the market views family firms in stock markets, and in particular whether outside investors are afraid of having little voice in the firm over-controlled by the owner family or they trust the family's strong commitment and simply imitate the insiders' investment behaviour.

The results of both univariate and multivariate analyses indicate that in Turkey stocks of family firms do not indeed outperform non-family stocks. Although the benefits of family ownership seem to exceed the costs and the potential issues relating to excess voting rights are less serious in Turkey, there is no evidence suggesting a market's

favouritism towards family firm stocks. The return differential between family firm stocks and their non-family firm counterparts is statistically insignificant. However, family ownership factor plays an important role in explaining the sensitivity of firm size and B/M with the ownership characteristics. Moreover, B/M effects seem to be stronger in large firms and the relations between firm age, recent stock prices and stock performance are positively significant only among small firms. The results are robust after controlling for possible endogeneity and non-spherical disturbances such as heteroskedasticity and serial correlation in the data.

The organisation of the rest of the chapter is as follows. Section 3.2 outlines typical characteristics of Turkish ownership system which have driven the choice of sample. Section 3.3 briefly reviews recent literature on the relation between stock returns and highly concentrated ownership structure. Data and methodology are described in section 3.4. Section 3.5 summarises and discusses the main findings while the final section offers concluding remarks.

3.2. The Turkish ownership system

This section will highlight some key characteristics of Turkish ownership structure that play an important role in understanding the stock market performance of publicly listed firms in the country. This is driven by a study of Doidge, Karolyi and Stulz (2007) who show that country-specific characteristics do capture more of the changes in firms' costs and benefits in improving corporate governance measurements than firm-level characteristics. Additionally, having an overview of the market will provide a better understanding of how the market operates, of the investors' behaviour and of level of risks priced in stock returns. It will also help motivate the choice of explanatory variables used later in this chapter in order to capture the stock price movement.

Being pervasive in Turkey, family firms are those generally characterised by high concentrated ownership retained over many generations. They also normally hold excess control rights via pyramid structure, complex business groups, and/or special voting rights. Apart from those common characteristics, in Turkey almost every business groups have their own banks and most private banks are under control of some of the wealthiest families. The next sections will describe the main characteristics of ownership system in Turkey and discuss how they may affect firm stock market performance.

3.2.1. High concentrated ownership

It is not unusual to have large shareholders present in a firm. Gursoy and Aydogan (2002) observe that most of public listed firms in Turkey are high concentrated ownership firms. They can be block shareholders, such as institutional or state shareholders. However, firm ownership concentrated in the hands of an individual or families exposes to different styles of corporate governance and risk taking which can lead to interesting behaviour, especially when it becomes a common phenomenon in an economy. This chapter therefore will study the impacts of large shareholders who are relatives in the same family.

Although the literature on family ownership is widespread, there has not been a standard definition of family firms. In general, family firms are those where the founders or their descendants keep ultimate control of the firms. Family firms, in particular, typically have a poorly diversified shareholding, a longer investment horizon, and often retain control at the senior management level.

In the early stage of the ISE establishment, during the 1990s, the government intervention on firm operations was significant, especially within key sectors such as banking, and oil and gas (Demirag and Serter 2003). This practice did not create an attractive enough environment for investors to set up their own businesses in industries that were left for private sector. After the major economic and banking reform which took place in 2001, the number of firms increased rapidly as a result of privatisation and a more liberal investment environment for private investors. Besides family firms with a very long history, such as Anadolu group found in 1950s by Yazici and Ozilhan families, the number of new family businesses was also growing and taking a dominant role in the economy during that blooming period. It is noticed that over the period of our analysis, the number of family firms has increased significantly, especially within the last decade. Family firms, moreover, account for a considerably large value of market capitalisation in the stock market and play a growing important role in the key sectors.

Figures 3.1 and 3.2 describe the market shares of family firms in the Turkish economy. As can be seen from Figure 3.1, in Turkey family firms account for about one third of almost every sector in number and are mostly present in the sectors of non-cyclical consumer goods, basic industries, general industries and financial services. It is also worth mentioning that family firms seem to monopolise cyclical services, such as repair and transportation services.

In terms of market capitalisation, the first impressions may not reflect the real picture. From Figure 3.2, it seems that families tend to own small and medium size businesses and with exception of non-cyclical consumer goods (e.g. food producers and pharmacy providers), financial sectors and basic industries. However, as mentioned earlier, business group system is a common mechanism of corporate governance in Turkey. Within business groups, a range of firms are connected in either a complicated web of affiliated members or are operating in different management levels, i.e. a pyramid structure. When families get involved in a business group, even though the owner family owns the ultimate control (i.e. voting rights or cash flow rights) over some key members only, it holds the central position in the board of the “parent company”. Technically, the family has no ultimate control over the rest of the business group. These firms will therefore be classified as non-family firms. However, the owner family practically has significant influences on those non-family firms of the group.

Take Dogan Group (registered under the name of Dogan Sirketler Grubu Holding A.S.) as an example. The original company was found in 1961 by Aydin Dogan who is also currently the president of the group. There are 139 subsidiary members[18] cross the border in which, 69 members are based in Turkey, and operating in six major business areas, which are oil and gas, auto parts, retail, real estate, tourism and media. Among the firms based in Turkey, only about 10 percent are recognised as family firms while in practice, they are mostly controlled by the Dogan family. The following section will discuss these structures in a deeper level.

Although it is difficult to distinguish such management influence of an owner family, it is possible to capture the impacts, if any, of family ownership in stock markets. In theory, in an efficient market, any influences should be appraised by the market and be fairly reflected in stock prices. It also raises the need of examining the actual roles of family firms in countries characterised by family ownership. This chapter, therefore, will address these questions in the case of Turkey.

It is worth noticing that unlike other concentrated ownership countries, in Turkey, many family firms were originally set up by the government and were later privatised. Thus, the founder's impacts do not seem to have the same meaning to these in other countries. Moreover, it is interesting that in Turkey majority of the first member of the family set up or took over a privatised firm and transformed it to family firm still remains in the board. It is therefore more sensible to address the potential impacts of family ownership on the firm than being limited in the founder/CEO relation.

From a legal prospective, Turkey is considered to have a weak minority investor protection system. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) notice that countries with common law legal origin seem to have better protection of minority shareholders than civil law countries, of which Turkey is a member. Although family ownership has advantages of eliminating conflicts of interest between management and ownership, we should be instead concerned about the interest conflicts between controlling shareholders and minority shareholders. These are considered to be the main

[18] They are firms whose the financial and operating policies the Dogan Group has the power to control because it holds more than 50% voting rights or in accordance to the firm policies. Data are from Dogan Group consolidated financial statements.

agency problems concerning family firms. Arguments on these problems will be discussed from both sides in section 3.3.1.

Technically, according to Turkish Company Law, firm fundamental decisions require approval of at least two-thirds of total voting rights and whoever holds one third of the voting rights will have the veto power. Since not all minority shareholders exercise their voting rights, owning a lower percentage could be enough to take control over the firm decision making process. Indeed, the system seems to show favour toward large shareholders. Although minority investors can intervene if they own at least 10 percent of total voting rights of the firm, there is however no official statistics on whether or not they actually exercise their rights in practice.

Another mechanism via which ultimate control can be hidden is using complicated firm business structure. It is a common practice in many countries with civil law origin that high concentrated ownership is not clearly seen in firm published reports. As mentioned earlier, the real ownership is preferred to be retained inside a complicated web of business groups or pyramid structure. The next section will introduce how the ultimate control of family firms can be spread out under these two structures.

3.2.2. Business groups and Pyramid structure

Let us first look at business groups which normally consist of a number of companies affiliated with each other around one holding firm. It is believed that the business group system prevalent in Turkey had played a special part in reduce negative impacts of high inflation and unstable economic condition during 1980s and 1990s (Yurtoglu 2000). With advantages of minimising asymmetric information and risk sharing among members, business groups are likely to be less affected by changes in market conditions than other entities. Supporting this view, Khanna and Palepu (1997, 1999) and Kim (2004), to name but a few, indicate that business groups can enhance firm values and fulfil the gap of missing labour market and/or financial market. The structure also allows money to be injected into poorer performing members when it is needed (Friedman, Johnson and Mitton 2003) and gain significant competition advantages from having “deep pockets” (Cestone and Fumagalli 2005, p.194).

Company members in business groups are related to each other in a couple of ways. They could be affiliated without a direct link in management. Firms could also be organised in a pyramid structure in which one firms controls a number of other firms

and those firms again control another groups of firms and so on. In this way, voting rights would be spread out in several levels of the pyramid but the ultimate control could remain in the hands of a few legal entities located at the top level. Figure 3.3 quoted from Yurtoglu's (2000) study provides examples of a complex web of ownership and a pyramid structure illustrating the two types of organising business groups in Turkey. These complicated structures of business groups allow large shareholders, especially families, to have low percentage of direct shareholdings but to remain as the ultimate owners because of their much greater proportion of indirect shareholdings. This practice is particularly common as Turkish law does not limit cross-ownership in corporate governance.

Figure 3.3 takes Hurriyet Gazetecilik, a publishing company, of Dogan group as an example. At the end of 1996, the firm had two largest shareholders, Dogan Yayin Holding and Iktisat Bank. Directly, Aydin Dogan, the founder of Dogan Holding, did not have control over Hurriyet Gazetecilik. He however owned 66% shares of Dogan Holding which had 71.24% of the total shares of Dogan Yayin Holding which again owned 68.2% shares of Hurriyet Gazetecilik. Thus, indirectly, Aydin Dogan held the ultimate control of Hurriyet Gazetecilik company although his cash flow rights was about 32% (equals to 68.2% multiplied by 71.24% and 66%). In this example, Dogan Holding was the firm on the top of Dogan group pyramid and through this structure, an individual who could have voting rights exceed cash flow rights in a firm at a lower level of the pyramid therefore held a significant control over the firm.

Another example is a structure with a complicated web of affiliates in Eczacibasi group, founded and controlled by Eczacibasi family. Let us start with Eczacibasi Ilac, a pharmaceutical company, as the centre of the web. The firm had two main shareholders, Finans Yatirim (28.26%) and Eczacibasi Yatirim Holding (21.62%). The second diagram of Figure 3.3 illustrates the complicated shareholding between members where the two-way ownership is common. Ultimately, Eczacibasi family used two holding firms, Eczacibasi Yatirim Holding and Eczacibasi Holding, to exercise their control rights over affiliated firms like Eczacibasi Ilac. Ultimately, they held about 78% of the firm voting rights.

Having considerable advantages, pyramid ownership structure in business groups is particularly popular and in some countries, it is even referred to a specific type of business, such as *oligarchs* in Russian or *chaebols* in Korea. A study by Burga (1994)

points out many benefits of pyramid structure for affiliated members including tax advantages and financial advantages. He argues that pyramid system could avoid double taxing on revenues one firm receives from its affiliates. Even after the benefit was removed in 1986, firms still can defer paying this tax to the following year. Moreover, organisations operating under pyramid structure have another advantage of transfer pricing between their legal entities of the same group, which could again benefit the firms in reducing significantly tax expenses. Furthermore, pyramid structure is an useful tool to minimise shares owned by controlling shareholders while maximising dilution of minority shareholders (Burkart, Groomb and Panunzi 1997), to limit owner family's liability (Barca 1995) and to enable them to easily share management roles (Khana and Palepu 1996). In terms of financing, Burga (1994) also indicates that holding firms could gain capital from the increase of their affiliated members' share capital after revaluation. In addition, it seems to be more flexible to reallocate capital within members which otherwise requires financial services from outside which service fees are required. It even becomes more convenient when banks are also affiliated in the pyramid, which is a common case in Turkish business groups.

In addition, a pyramid structure allows cash flow rights to be separated from voting rights, in other words, it is argued to create a higher level of separation between ownership and control within business groups. For instance, Claessens et al. (2000) provide a series of examples supporting such separation in nine East Asian companies. Nevertheless, Almeida and Wolfenzon (2006) show that the popularity of pyramidal business groups is not because the groups pursue this objective, but more importantly to benefit from the financial and cash flow advantages of the structure.

In Turkey, a pyramid structure is built by setting up holding firms which own majority shares of their affiliate members. It is common in Turkish business groups that large shareholders in the top level own a modest amount of shares in the parent company but hold a large proportion of shares of the holding firm that ultimately provides them with large indirect ownership over the affiliate members. As a result, the large shareholders in the business groups will benefit not only from common advantages of a pyramid system but also from the diversion of cash flows. These could explain the growing number of new holding companies in Turkey.

Another problem investors in Turkey might concern is that in contrast to common-law courts, civil-law countries do not have a strong minority shareholder protection system.

Studying several legal cases in both common-law and civil-law systems, Johnson, La Porta, Lopez-de-Silanes and Shleifer (2000) document the different views when courts dealing with tunneling- the transfer resources out of the firms to controlling shareholders- in the two legal regimes. They show that while in common-law system, self-dealing transactions which may lead to tunneling could be challenged by outside investors, in civil-law countries, if there are plausible business reasons, it is viewed as acceptable. Supporting this view, Yurtoglu (2000) argues that pyramid structure might put the minority shareholders' interests at risk in civil-law countries. Ugurlu (2000) also concerns that entrenchment problem is widespread in Turkish manufacturing sector. On the contrary, in common-law system, the burden of providing proof for transactions dealing within the management can be heavy and tends to favour toward small shareholders. Those concerns are perhaps the reasons why pyramidal group structure is rather rare in common-law countries, such as the U.S and the UK. These corporate governance issues will be discussed further in section 3.3 which however shows that these problems can also exist in developed markets (although less serious) as well as in less developed markets.

The next section introduces insider system which is common in civil-law legal regime where majority of country wealth is concentrated in the hands of a few.

3.2.3. Insider voting right system

A majority of Turkish firms do not follow the "one-share one-vote" principle. In other words, companies can issue shares with different cash flow rights and special voting rights. This allows family shareholders to have their voting rights exceeding their cash flow rights. Their control over the firms therefore does not necessary reflect their investment in the firms. More interestingly, Demirag and Serter (2003) point out that in Turkey, any decisions relating to issuing new shares with excess voting rights are required to be taken at any general shareholder meeting level while decisions of reducing special voting rights can only be taken upon an approval of the owners of the special shares themselves. In addition, the special voting right holders are not given a deadline to approve these voting right limit proposals. That means they can delay making decisions. The favouritism toward shareholders with special voting rights, who are normally family members, raises a concern over minority shareholder protection in family firms. Supporting this view, Yurtoglu (2000) agrees that outside investors do not

have much control or influence on the firm decision making process in an insider system of corporate governance.

Further adding to those characteristics, Demirag and Serter (2003, p.47) refer to Turkey as an "insider system country" where the country's wealthiest families are dominant shareholders. The term insider system refers to a corporate governance system with a smaller equity market, a less active market in corporate control, high concentrated ownership, less takeover activities and a complicated web of inter-corporate holding companies (Franks and Mayer 2001). This system is likely to mostly benefit the owner families in retaining their control and avoiding hostile takeovers[19]. Indeed, in 2013, a Family Business survey on Middle East region done by PwC, one of the four leading auditing firms, reports that Middle Eastern family firms are less concerned about investing on new technology or impacts of global economy but instead concerned about the probability of consolidation. In contrast, Fahlenbrach (2009) finds U.S. founder/CEOs in family firms actively search for merger and acquisition opportunities. This difference in attitude towards consolidation affects corporate governance and stock performance of family firms between those countries. It is therefore especially interesting to examine how Turkish family firms maintain a great wealth for the owners while still enjoy capital flows from outside investors who perhaps favour the richest family reputation.

In theory, the insider system may raise concerns that excess voting rights can lead to capital exploitation of outside investors. According to Barca (1995), excess voting rights allow owners of family firms to retain a significant control while limiting their liability obligation. The structure is also used to exploit as much funding from the outsiders as possible (Bianchi and Casavola 1996).

However, Demirag and Serter (2003) believe that the excess voting rights in relation to cash flow rights is less problematic in Turkey in comparison with other insider system countries. The cash flow and voting rights seem to be rather aligned. Thus, it might not be very useful to track voting rights and cash flow rights to identify ultimate control in Turkish firms. This instead can be done by tracking backward of the pyramid for indirect ownership, and that is the method this chapter will use.

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[19] Hostile takeovers are mergers or acquisitions in which bidders can take over a target firm whose managers and the company's board are not willing to accept the offer.

3.2.4. Conclusion

Family firms are particularly pervasive in Turkey. They are defined as firms which have high level of ownership concentration in the hands of individual or family members. In Turkey, family firms account for about one third of total firms in almost every sector but difficult to identify as the proportion of shares directly owned by family members are diluted in business groups. They are usually organised in a complicate web of firms or a pyramid structure. These structures are however a useful device to retain their ultimate ownership without showing it in the annual reports. Some advantages such as reducing tax expenses, payoff and financing have made business group structure a popular type in many civil-law countries including Turkey, and it appears to be particularly beneficial for family businesses.

On one hand, there are some common characteristics that Turkish family firms share with those in other countries where the wealthiest families dominate the economies. As a country with a civil-law origin, Turkey has a rather weak minority shareholder protection system. Therefore, the dominance of families in family firms over minority investors in the decision making process and benefit sharing is concerned. Moreover, the insider system may favour the large shareholders, especially with an absence of the "one-share one-vote" rule. Issues relating to the excess voting rights, however, seem to be less serious in Turkey since the relation between cash flow rights and voting rights is relatively aligned.

On the other hand, Turkish family firms have distinctive characteristics which may influence the way firms and stock prices perform. Firstly, most family firms were originally set up by the government and were then privatised. Thus, in Turkey, the founder's impacts do not seem to have the same meaning to those in other countries and will not be our main focus. Secondly, Middle Eastern family firms seem to be more concerned about being acquired or merged, so they tend to retain a high level of shares owned within family members and are not likely to diffuse the ownership. Last but not least, most of family firms in Turkey are under business groups. The complicated structure of those groups tends to spread out the actual ownership through a long chain of member companies. This raises the need of tracing out indirect ownership of individual firm members within a business group to avoid any misleading results.

Next, the chapter will provide a closer look at potential costs and benefits of family firms for the firms and investors as well as some recent discussions on the subjects.

3.3. Literature review

This section's main objective is to review the existing literature on potential impacts of large shareholders and the role of family ownership on firm related aspects, and to motivate our research questions. Recent studies tend to agree that firms with large shares concentrated among the founders and/or their successors generally perform better than non-family firms but at the same time concern about potential negative impacts of this structure toward minor shareholders. This section will start by briefly giving an overview of potential problems caused by such ownership structure.

3.3.1. The potential costs of family ownership

Firstly, with a substantial ownership of voting rights and cash-flow rights, large shareholders can use their controlling power to intervene in the firm decisions towards their benefits, which are not necessary in line with those of the firm. For example, Fama and Jensen (1983) show that the complex system of combining ownership and control creates an opportunity for large shareholders to exchange firm profits for private rents. In addition, Shleifer and Vishny (1997) suggest that the significant premium associated with superior voting rights and control rights induces large shareholders to seek to extract benefits of control from the firms. Perhaps most damning, Johnson et al. (2000) point out that controlling shareholders (including owner families) have incentives and power to transfer resources out of the firms, especially during crisis times. Firm resources could include but not limit to assets, firm profits, opportunities and financial advantages. This allows the controlling shareholders to benefit themselves at the expense of small investors and creditors. Through case studies, they show that this practice, known as "tunneling", legally occurs not only in emerging markets like Russia[20], but also in effective law countries, such as France, Italy and Belgium.

Secondly, Bebchuk, Kraakman and Triantis (2000) reveal that managerial agency problems between management and large (non-management) shareholders in emerging markets are larger in an order of magnitude than those in developed markets. There are several reasons for this issue. For example, the Economist Intelligence Unit (1998 cited

[20] Similar cases observed in Korea (Bae, Kang and Kim 2002) and India (Bertrand, Mehta and Mullainathan 2002).

in Lins 2003, p. 160) reports that in emerging economies, markets for mergers and acquisitions are underdeveloped. It therefore does not create an encouraging environment for ownership diversification. Moreover, since most firms in emerging markets have a relatively smaller size in comparison to those in developed countries, perhaps the need of attracting external capital are not large enough to compromise controlling powers. Furthermore, La Porta et al. (1998) indicate that emerging markets have weaker legal systems and lack of effective creditor and shareholder protection mechanisms. Lins (2003) also suggests that high concentrated ownership coincides with low investor protection system in emerging markets, and thus smaller investors tend to seek for high control rights as a tool of self-protection.

Another issue concerning family firms is agency problem but in different form. Under family ownership, one special case of large shareholdings, it is less likely to involve agency problems between management and ownership but potential raises a new type of agency issues, the conflicts of interests between large and minority shareholders. Indeed, Faccio, Lang and Young (2001) find that family ownership in East Asian firms causes numerous agency conflicts with other shareholders, these are costly for the firms as well as minority shareholders. They argue that large insiders can choose low or even negative return investments which provide them with expropriation opportunities in exchange. Also, corporations with a loose affiliate connection with business groups are likely to pay outside investors much lower dividends as they learn that the outsiders are less aware of the expropriation issues within such corporations. A series of earlier studies such as Demsetz and Lehn (1985) and DeAngelo and DeAngelo (2000) to name but a few, also describe individual cases where founding families influenced firm decisions to maximise their utility, but not firm growth or profits. This sometimes can lead to poor firm performance and stock returns in relative to non-family firms.

Thirdly, in terms of accounting profitability, some studies indicate that the positive impacts of family ownership on firm performance are far from certain. A case in point is the study by Denis and Denis (1994) who show that although most of majority-owned firms they studied are family firms, they do not find evidence of better performances. Supporting this view, Pedersen and Thomsen (1999) studying the largest firms in 12 European countries document that the association between ownership concentration and return on equity (ROE) is insignificant. They however point out that the institutional differences in country level as well as firm level do matter when testing the association.

Fourthly, economic and political intervention could be a problem in family countries. In a comprehensive study in 2005, Morck, Wolfenzon and Yeung observe that a significant proportion of many economies are ended up in the hands of a few families[21]. They argue that controlling large sectors of an economy (which excesses their cash-flow rights) allows extremely wealthy families in large corporations to influence economic growth and politics. This can raise problems of resource misallocation, less innovation, hence loss of external capital supply, and public policy distortion, which they denote as "economic entrenchment" problems.

Finally, in terms of human resources efficiency, Shleifer and Vishny (1997) show that keeping family control can be one of the biggest costs for a firm when the family members are not or no longer competent to actively run the business. It may also drive talents away. According to Anderson and Reeb (2003a), restriction of some executive positions among family members could lead to competitive disadvantages in terms of attracting qualified and talented professionals. They further use an example of Wang Laboratories, a high profitable firm under its founder but suffered serious losses under the management of his son, for illustration purposes[22]. In addition, Hamelin (2012) finds that family ownership affects inversely on firm growth in French small and medium firms due to their conservative behaviour when it comes to growth.

In summary, many studies seem to support that firms with large ownership and control diffused among family members can be less efficient comparing with dispersed ownership firms. However, if family owned firms involve such many problems, why they are still viable for generations, able to raise outside funds and pervasive in many markets. The next section is going to discuss recent findings on the benefits of family ownership structure for the firms as well as for their minority shareholders.

3.3.2. The potential benefits of family ownership

The first significant benefit of family ownership is reducing agency problems. Since large shareholders have greater incentives and power to monitor managers, it is likely

[21] Morck, Stangeland and Yeung (2000) compare the proportion of billionaire wealth in GDP around the world and point out that Turkey is among the top individual countries in which richest persons own nearly 30 million per billion dollars of GDP.

[22] Villalonga and Amit (2006) study Fortune-500 firms and also suggest that family ownership creates firm value only under the founders' power but not under the successors'.

that agency conflicts between ownership and control are mitigated. It is minimised especially when family members also serve as managers of the firms. For example, a study by Ang, Cole and Lin (2000) finds higher agency costs under outsider management and an inverse relation between agency costs and fraction of shares owned by the managers. Supporting this view, Anderson and Reeb (2003a) find strong evidence that when family members are also CEO firms perform better than with outsiders.

The notion that family members' main objective is to benefit themselves even with the costs of firm profitability is not a universal view. Fahlenbrach (2009) points out that to the founders, their firms are more like their life time achievement, which motivates them to look for optimal strategies to maximise shareholder value. Also, majority of family shareholders' wealth seems to be in their businesses, profits of the firms therefore largely affect theirs. Indeed, Anderson and Reeb (2003a) observe that on average, families in both Forbes' Wealthiest Americans Survey and the S&P 500 invest more than 69 percent of their wealth in their firms. Further evidence by Casson (1999) and Chami (1999) indicates that families do not consider their firms as wealth to enjoy but rather inheritances to pass on to their heirs.

Contrary to the belief that family shareholders seek to expropriate minority investors, Anderson and Reeb (2003a) show that minority shareholders are not negatively affected by family ownership. Their study in 2003b extends this argument and indicates that although family firms do not seek for low-risk investments, the founder families do not risk minority shareholders wealth with promising but risky investments. Moreover, Bianco, Bontempi, Golinelli and Pargi (2013) reveal that family firms are even more risk averse than non-family firms. Although minority shareholder expropriation can be a problem in some East Asian and Latin American family firms, Faccio et al. (2001) note that the presence of the family holdings in the firms is more beneficial for minority shareholders in well-regulated markets with a high level of transparency. In fact, countries with more effective law enforcement, such as the U.S. and the UK, can expect to see more of the bright side of family ownership.

Burkart, Panunzi and Shleifer (2003) further document that in developed countries, the presence of family members in the firm instead of selling out may even add competitive advantages to the firm. Supporting this view, Adams, Almeida and Ferreira (2009) and Fahlenbranch (2009) among others show that there is a significant positive causation

effect of family structure on firm value when the founders remain as CEOs of the firms. Moreover, Gomez-Mejia, Nunez-Nickel and Gutierrez (2001) indicate that when agency problems are under control, family members acting as firm executives will improve the firm survival length.

In addition, family firms tend to be under more pressure to enhance reputation since they want to pass on to their successors a good business. Anderson and Reeb (2003a) add a valuable point that with a good reputation, family firms can preserve loyalty and are also able to pass on their long-term connections, such as suppliers, creditors or governing bodies. Thanks to these they would have access to debts with lower costs comparing with non-family firms (Anderson, Mansi and Reeb 2003).

Moreover, the view that family ownership is less profitable than non-family is debatable. Despite the scepticism about agency conflicts and expropriation, a large number of recent studies have indicated that family firms are in fact more efficient than non-family firms in many countries. Anderson and Reeb (2003a) show that it is also the case in the U.S. Sraer and Thesmar (2007) find that family firms outperform their non-family counterparts in France while Barontini and Caprio (2006) confirm the results in 11 Continental European countries.

There are a number of explanations for the out-performance of family ownership. Demsetz and Lehn (1985) posit that family members (either the founder or his successors) have strong incentives to mitigate agency conflicts and to maximize firm value because their wealth is largely close to firm welfare. Interestingly, Villalonga and Amit (2006) observe that within Fortune-500 firms, when founders remain as CEOs, the agency conflict between family and other shareholders is far less than agency problems between managers and shareholders in non-family firms. Those firms also have better performance in comparison to their counterparts (Adams et al. 2009). In addition, Baghdasaryan and Cour (2013) imply that concentrated ownership is favoured over dispersed ownership as an effective ownership structure if competition level is high.

Furthermore, James (1999) points out that family shareholders have much a longer investment horizon and hence have superior investment efficiency. Besides the benefits of longer experience with the firms, longer horizon management enables the firms to invest in projects that normally firms with a shorter investment horizon possibly cannot. It is because of the agency conflicts between shareholders and managers that make

long-term investments less attractive in the firm financial statements. Supporting this view, Stein (1988, 1989) indicates that long investment horizon firms tend to experience less managerial myopia and less likely to exchange promising projects for short-term profits. In addition, thanks to their longer horizons, family firms are able to manage human resources more efficiently by offering more secured contracts with their employees in exchange for slimmer wages (Sraer and Thesmar 2007).

Regarding to labour restriction within family members, Anderson and Reeb (2003a) argue that family members contribute to the firms special skills and qualities, such as innovation, value-added expertise (Morks, Shleifer and Vishny 1988) and reputation effects (Anderson et al. 2003), that outsiders do not have. It is not unusual that some specialised knowledge and techniques may only be passed on within family members, especially in industries relating to special formula or recipes.

3.3.3. Family ownership and stock performance

This section however particularly addresses the relation between stock returns and the proportion of shares owned by owner families since their theoretical connection is not obvious, and it is also important to later examine the behaviour of stock prices concerning family firms.

Starting from agency theory, there is ground to believe that investors are more interested in family firms as they have the advantages is eliminating agency conflicts between managers and owners. By holding a significant amount of shares, family members retain both cash flow rights and control rights over the firm's major decisions. Even when the voting rights are not in accordance with the cash flow rights, managers are likely to be monitored more closely by the families than in non-family firms as family members have greater incentives to do so (Anderson et al. 2003). The issue of separation between ownership and control is therefore expected to be diminished in family businesses. With that advantage, the question is whether outside investors would prefer family firms to non-family firms?

Also, driven from the risk-return relation and Merton's (1987) model, Corstjens, Peyer and Heyden (2005) argue that family firms bear a higher risk and thus one should expect to gain an abnormal positive average returns on investing on those stocks. Moreover, if there is a link between whether a firm is a family firm and its operating performance, it is natural to ask if the firm ownership status also influences their stock

performance. It is because in a well-informed market, firm performance is expected to be fully reflected in the stock prices.

In addition, studying founder-CEO firms in comparison with successor-CEO firms, Fahlenbrach (2009) finds abnormal returns when taking a long position on the founder-CEO stocks and a short position on the descendant-CEO stocks. The excess returns are both economically and statistically significant and not explained by the characteristics differences between the two groups, such as past returns, size and B/M ratio. The results are also not affected by extraordinarily good performance of a few large or technology firms during their sample period. Hence, it appears that firm ownership does matter to outside investors.

Interestingly, it is widely documented that shares of higher concentrated firms are traded at higher prices (see Shleifer and Vishny 1997). Indeed, Gompers, Ishii and Metrick (2003) reveal that there is a strong correlation between the level of shareholder rights, measured by their Governance Index, and stock market returns. They further show that buying stocks of firms with highest shareholder rights and sell those with lowest shareholder rights would gain significant abnormal stock returns. The results support the earlier studies by Levy (1983), and Lease, McConnell and Mikkelson (1984) who found positive correlations between stock prices and voting rights. A more recent study by Mok, Lam and Cheung (1992 p.292) also shows that stocks of family firms tend to experience similar movements and together form "homogeneous groups" which behave differently from the non-family group. In particular, Claessens (1997) provide evidence that the higher level of ownership concentration, the higher share prices are. They are especially in favour when shares are concentrated in a single insider.

Although family firm performance has attracted much attention of recent studies, few have addressed their stock performance associated with their typical characteristics as family firms. Instead, they tend to link the stock prices with the presence of the founders or founder/CEOs in the firms. Although the link is not always clear-cut, a broader question of whether the stock performance is affected by the nature of family firm ownership seems to be diluted in studies on block or large shareholders.

This chapter, however, will not address these roles in Turkish firms in order to avoid misleading interpretation but will instead address the relation between family ownership and stock performance. It is because in 1930s, the Turkish government was the founder

and manager of most of banks and large firms operating in the key sectors. Those companies were later allocated to the private sector, of which many firms were taken over by families. In addition, as mentioned earlier, since the market is young, most of the founders still remain with the firms. Thus, the characteristics relating to the founders do not seem to be profound.

The chapter hopes to uncover the link between family ownership and stock market performance of firms in Turkey, one of the countries with a long history of family businesses but surprisingly very little research has been carried out on this topic. It is perhaps due to the data constraint on family ownership which is a slightly sensitive subject in the country. The work differs from previous studies in the way that its analysis does not only cover a longer period but also on both large and smaller businesses for the following reasons.

First of all, the practice that previous studies focusing on the largest listed firms in a short time frame could potentially cause bias. For the U.S. market, the largest stock groups such as S&P 500 and Fortune indices are the common testing objects[23]. For markets outside the U.S., Barontini and Caprio (2006), for example, focus merely on firms with total assets greater than 300 million euros in 11 European countries, La Porta, Lopez-de-Silanes, Shleifer and Vishny (2002) select 539 large firms from 27 wealthy countries worldwide, while among few studies in Turkey, Demirag and Serter's (2003) sample covers only the ISE 100 index. Additionally, the testing periods in any of those studies are not longer than seven years, Barontini and Caprio (2005) even focus on the year 1999 only in their study. A few other researches outside the U.S. may cover a slightly longer period but this is not a common theme.

However, studying only the largest companies could lead to favouritism toward family firms since about more than half of businesses do not survive in the first five years of starting up and among the survivors, not all could carry on and grow to reach the top group. Hence, those could achieve that level while still retaining family control are exceptionally strong firms. Examining smaller firms will allow the performance of firms at all stages of business life cycle to be revealed. In terms of testing horizons, looking at a longer period may avoid drawing misleading conclusions. If for some

[23] For examples, studies by Anderson and Reeb (2003a, 2003b, 2004), Villalonga, B. and Amit (2006) and Miller, Le Breton-Miller, Lester and Cannella Jr. (2007).

reasons, a firm performs unexpectedly well (or poorly) in one or two years, one should not conclude on its overall performance.

In addition, within the 27 richest economies, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) note that 30 percent in number and 25 percent in value of firms in the top 20 are owned by families. These numbers are even higher among smaller firms. There is also a possibility that family owners prefer to keep their businesses in a moderate size in order to maintain control more easily over generations. Therefore, it would not provide a fair view if we exclude small and medium firms in examining the family effects. Moreover, as being documented so far, examining how small stocks behave can be interesting, such as the abnormal returns they could yield in relative to their large stock counterparts. In short, inclusion of small and medium size firms promises reliable and interesting findings.

3.3.4. Conclusion

Although the topic of block shareholding has been at the centre of the 1990s debate on corporate governance, only recently has family ownership attracted both practitioners and scholars interests. Perhaps one of the reasons is that family businesses are no longer small and isolated companies, and have become an important part of the global economies. In many countries, family ownership is pervasive and the owner families even have high level of economic and political influences. It is therefore interesting to see how the market and outside investors view family firms in stock markets.

There have been a number of studies arguing that large percentage of shares owned by individuals or families can potentially be costly for the firms. The first and perhaps the most serious concern is tunneling by which large shareholders extract benefits and resources out of firms to serve their own narrow interests. In addition, although the conventional agency problems between management and ownership may be reduced under family control, another type of agency conflicts raised is those between large shareholders and minority shareholders, in which, expropriation outsider investors is the main concern. The problem can be serious in countries that have a poor investor protection system. Moreover, in some economies where the wealthiest families in large corporations have a considerable influence on the economic growth and politics, economic entrenchment such as resource misallocation can be costly for the countries.

Lastly, a common practice among family firms that owner families hold some of the key management positions might lead to human resource inefficiency.

In contrast, recent research tends to agree that family ownership can benefit firms in many ways. First of all, there is strong evidence supporting a better firm performance under family control in many countries. Also, as mentioned earlier, family ownership can reduce managerial conflicts. This is significant for firm operation and therefore for firm value. In addition, the concern about expropriation seems to reduce considerably in effective law enforcement. More importantly, as majority of the owners' wealth is in the firms, they have the incentive to maximise the firm value which in turn increases their wealth. Moreover, family firms tend to be passed on to the descendants, hence, a good business must be of their interests. They may also pass on their long-term connection and loyalty staffs to the next generations. Furthermore, with a longer investment horizon and special skills and qualities, family firm shareholders can benefit the firms as well as other investors.

For many years, the large literature on family firms seems to leave some areas untouched. It mainly looks at the potential effects of family ownership structure on firm operation among large-cap groups. Of which, few studies have considered the possible impacts of owner families on the firms reflected in stock markets. Furthermore, the discussion is limited on block shareholders whose long-term objectives are largely different to those of family firms. This chapter will, therefore, aim to explore whether family ownership has any impacts on stock performance in a slightly broader scale. The following section will describe in detail the data and methodology employed in the chapter.

3.4. Data and Methodology

3.4.1. Data

As discussed in section 3.3.3, although studying large cap stocks is of interests, there are no reasons to exclude smaller companies which are how most family businesses started and this can also avoid possible misleading conclusions caused by restricting the sample in a single group. Thus, this chapter will include all firms in the ISE National All-share index.

The sample consists of firms in the index with sufficient accounting data. Unlike the previous chapter, this chapter covers both financial and non-financial firms as it

addresses possible effects of family ownership rather than B/M effect. In addition, having a financial institution in a business group is a very common strategy to reduce transaction costs of Turkish corporations. Also, firms are required to consistently comply with requirements of publishing information on Public Disclosure Platform (*Kamuyu Aydinlatma Platformu* in Turkish), an official database managed by the ISE[24], to be included in the sample. The total number of firms resulting from the screening process is 221.

Stock prices, market value and other firm characteristics data are obtained from DataStream Thomson Reuters database and cover 210 months from July 1993, when more than a single family firm are identified, up to December 2010.

For the purpose of ensuring all complicated webs of ownership are properly analysed, both direct and indirect ownerships will be taken into account. As discussed earlier in this chapter, most Turkish firms run under control of business groups whose pyramid structural creates an inter-corporate shareholding system. In addition, it is particularly common in Turkey for family members to use holding firms as a mechanism through which their ultimate ownership is exercised. Inclusion of direct and indirect ownership will therefore enable the analysis to capture the real picture of the family's power.

The chapter compiles data on direct ownership following a number of steps. The process of collecting data begins with obtaining the number of firm insiders and the proportion of shares they own from Bloomberg databases. This gives the primary list of firms with a large part of shares directly held by the insiders. There is certainly a possibility that those large inside shareholders may not be members of the same family. Hence, for firms with two large insiders or more, we check their relationship on other sources, such as press and media. The results are then cross checked for accuracy against other sources which are firms' profiles and firms' annual reports published on the ISE main website. Those sources provide the list of the top shareholders and their shareholdings. Thus, they also can identify outside individuals or other members of the family directly hold a large proportion of the total shares outstanding. However, many of the firms' profiles and reports show the top shareholders are holding firms which are discussed earlier to be an effective device to achieve control rights via indirect

[24] Website: http://www.kap.gov.tr/yay/English/ek/index.aspx

ownership. The next objective is to trace out this indirect ownership for all firms that have not been in the primary family firm list.

Since there has not been any comprehensive databases recording the proportion of indirect shares owned, data on indirect ownership is hand-collected from firms' annual reports updated on the Public Disclosure Platform together with information on individual company websites, in which family members are recognised by their family names[25]. If the ultimate controllers of a given firm cannot be identified through the above procedures, which is rare in the sample, the firm will be classified as a non-family firm. One may concern about the potential data inconsistency between data sources. The chapter eliminate this risk by (i) identifying firms by their unique ticker symbols instead of company names or database codes when cross checking, (ii) using only one database, DataStream, to extract firm-level data once firms have been sorted into two groups.

Interestingly, Turkish firms do not display a tendency to change ownership over time. Indeed, Yurtoglu (2000) for example documents that during the period of 1987 to 1996, only one merger took place and only six state companies were privatised. The other firms did not change their ownership. Subsequently, ultimate owners of family firms tend to reduce their direct shareholdings but increase their indirect ownership via holding companies. The practice is considered as an effective way for families to retain their ultimate control over their firms. The ownership classification therefore does not change much over the testing period, however, due to the nature of portfolio formation and rebalancing process, the list of firms in each category will change accordingly.

As de-listed firms have no record on ownership, they are dismissed in this analysis. During the 2001 economic reform, majority of firms delisted were due to being forced to merge or acquired by better performers, which did not necessarily imply a problem with their ownership structure. Also, we notice that there were only a couple of firms being de-listed in every two years during the testing period. Thus, although there is possibility that our analysis may suffer from survivorship bias, there is no reason to expect this would materially affect its main findings.

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[25] There exists a probability that family members do not carry the founder's family name, and it is not possible to trace this information for each large shareholder. Fortunately, family firms tend to spread controls among a few family members, especially, in Turkey, they either hold a significant amount of shares or a nominal proportion. Thus, unidentified status of one member is not likely to affect the firm's classification.

3.4.2. Methodology

3.4.2.A. Dependent variables

In this thesis, a family firm is defined as a firm in which an individual or several members of the same family jointly own directly or indirectly at least 20 percent of the total shares outstanding. This allows family characteristics to be captured precisely and ultimate ownership in business groups via pyramid structure is also identified. Since scholars have not come to agree on an exact definition of family firms, the literature on family ownership uses different thresholds[26]. Unsurprisingly, studies in the U.S looking only at the largest firms, such as Fortune 500, S&P 500, unusually use a lower threshold at 10% shares, whereas studies outside the U.S. or on multiple markets tend to have a stronger definition of family ownership. That could ensure family members to have significant influence on the firm decisions. This is to distinguish their impacts as a family rather than just an ordinary large shareholder.

The chapter uses La Porta et al.'s (1999) 20 percent threshold instead of five or ten percent when it examines markets outside the developed world. This is to ensure that family members own enough shares to have ultimate control rights over the firms. It is particularly important for small and medium size firms whose each share tends to have a lower price per unit compared to big firms. Thus, it is likely that in those firms, holding 10 percent of total shares or less does not necessarily guarantee an ultimate control over the firms.

Moreover, under Turkish legal system, investors must own at least 10 percent of the total shares outstanding to be able to call for an extraordinary general meeting or to request an investigation (Yurtoglu 2000). In other words, investors with 10 percent shareholdings or slightly more are still considered as minority shareholders. This provides further support for the choice of a higher threshold used in this chapter.

In time-series analysis, stocks are split into two portfolios, family and non-family groups, based on their percentage of shares owned by family members. Family portfolio consists of firms whose shares concentrated in the hands of an individual or a multiple members of the same family with a minimum cash flow rights of 20 percent. Individuals representing for the shares owned by institutions or government are not considered as a

[26] See Miller et al. (2007) for a survey of different family firm definitions used in literature.

family firm owner. Private firms are not considered as family firms and not included since their stocks are not traded to the public. Firms which have shareholders owned less than the 20 percent threshold are classified as non-family firms even if successors of the founders are still with the firms. Value weighted and equally weighted portfolio returns are computed from July year *t* to June year *t+1* and the portfolios are reset each July. The weights of stocks in each portfolio are based on their market capitalisation at the end of June, year *t*, one month before taking a long or a short position.

In panel estimation analysis, stock return of individual firm is estimated in regressions with the same weight (equally-weighted) or weighted based on their market value one month prior to the formation date (value-weighted).

3.4.2.B. Control variables

The list of control variables can be found in Panel C of Table 3.1, in which, the chapter includes all firm characteristics identified by Brennan, Chordia and Subrahmanyam (1998) but some were altered with more appropriate proxies for Turkish firms. Turnover is employed to proxy for trading activities in Turkey while it is normally represented by NYSE-AMEX or NASDAQ volume in the U.S. market and WML stands for past return effects. It is based on the Jegadeesh and Titman (1993) momentum strategy of buying high 11-month past returns and selling low 11-month past returns also with a lag of 1 month. Dividend yield and share prices are constructed similarly to the way Brennan et al. (1998) do. More specifically, dividend yield is the sum of all dividends paid over the 12 month period divided by share price and Ln (1/P) is the natural logarithm of the reciprocal of the share price at month *t-2* (a proxy for immediate stock price changes). Following Fahlenbrach (2009), the Fama and French's (1993) three factors are also included in the stock performance analysis in which the excess market returns, R_m-R_f, is the return differential between the market portfolio and 1-month LIBOR which stands for the risk-free rate of return. The proxies for size and book-to-market value effects are SMB and HML respectively. The HML and SMB portfolios meant to mimic the risk factor in returns associated with B/M and size, respectively, with a 1-month lag.

Motivated by previous studies, such as Villalonga and Amit (2006), and Anderson and Reeb (2003a), who document that family businesses which perform well are younger family firms, the chapter also controls for firm age, Ln (Age), which is measured by the natural logarithm of the time passing since firms were first listed in the ISE (in months).

Also, a dummy variable, D_{Family}, is also included in panel regressions for the purpose of separately capturing family effects, if any. The binary variable equals to one when the firm is a family firm and equals to zero otherwise.

One may concern about possible misspecification caused by endogenous biases. For example, Claessens (1997) among others points out that if ownership structure is endogenous to firm value, a simple estimation on stock prices on ownership structure can be biased. Later in the chapter, section 3.5.3 will provide detail diagnostic analysis results on the tests for endogeneity.

3.4.2.C. Descriptive and Univariate statistics

Panels A, B and C of Table 3.1 provide descriptive data of the sample. Panel A summaries means, medians, standard deviations, maximum values and minimum values which describe the main characteristics of the sample. Panel B presents the stock market perform and results of a difference of means test on family firms in comparison with non-family firms. It is the two-sample t-statistics test on the null hypothesis that family firm and non-family firm groups have the same sample mean. Panel C reports a correlation matrix for all the variables in the regression analysis.

As can be seen from Panel A, Turkish market expresses a high level of diversity. The market consists of firms whose market value as small as TRY 2 million (equal to about GBP 710 thousand) as well as much larger firms of almost TRY 31 trillion (approximately GBP 11.12 trillion). In overall, Turkish firms are medium size of about TRY 184.8 million (about GBP 66.15 million). This provides further support to the inclusion of small and medium capitalisation companies in the sample testing on emerging or less developed markets.

Overall, Turkish firms seem to be at a mature stage of around 14 years in business. The a substantial economic reform in 2001 in Turkey, which involved a major privatisation programme and a large number of mergers and acquisitions, seemed to largely contribute to the significant change in business structure and market value of firms. For more details, section 3.5.2 of the chapter will give a closer look at the possible impact of that restructuring on the overall performance of stocks in the ISE.

From Panel A, it can also be seen that share prices are sometimes overvalued with unusually high P/E ratios. Even after taking out the outliers, the average value of P/E of Turkish firms are still relatively high compared to those in other countries of the similar size. A similar trend is observed for firm annual returns and 12-month revenues. These

might be presence of huge business groups and large scale firms which dominate the market operating along with much smaller independent businesses.

Panel B of table 3.1 presents results of difference of means tests between family and non-family firms. First of all, on average the total market value of family and this of non-family firms are not statistically different. Additionally, there is no evidence that Turkish family firms are much different from their non-family counterpart in terms of firm age, stock prices and revenue. The only exception is P/E ratio, which is statistically higher in non-family companies. It lends further support to an the interesting finding reported at the end of panel B that portfolios consisting of non-family stocks appear to outperform family firm portfolios. Both value-weighted portfolio formation method (which takes firm size into account) and equally-weighted method confirm the same results. More specifically, if one buys stocks of all non-family listed firms and sells stocks of all family firms, and rebalance his portfolios in July of every year, on average, he would gain a monthly return of 0.41% and 0.45%, respectively. The return differential between investing on family firms and on non-family firms in Turkey is however found to be statistically insignificant.

The results on stock market performance of family firms versus non-family firms are inconsistent with those observed in developed markets. As discussed in the literature review section, most studies find that family firms do better than non-family firms in terms of stock market performance. Among them, Corstjens et al. (2005) report significant abnormal returns received by investing on French family stocks in comparison with the benchmark portfolios and non-family firms while Fahlenbrach (2009) observes similar findings for founder/CEO firms in the U.S. market.

The difference in stock market performance of Turkish family firms in comparison with those in developed countries is perhaps driven by several factors. Firstly, as documented in section 3.2, the system to protect minority shareholders in Turkey is relatively weak and although the potential problems of family ownership are documented to be less serious, it still seems to drive outside investors away. For example, Lins (2003) assesses the relation between concentrated ownership and firm value across 18 emerging markets (including Turkey) and finds that investors discount firms with high concentrated ownership which may potentially involve entrenchment and agency problems. The study has further confirmed the negative relation between ownership and firm value is due to the weaker investor protection in those countries. Secondly, the nature of Middle Eastern firms could partly explain the difference since Middle Eastern family firms

seem to be more concerned about possibility of consolidation than family firms in other regions. They tend to retain high concentrated ownership to avoid hostile mergers and acquisitions. That perhaps makes their shares less attractive to outside investors. Finally, unlike in other countries, Turkish family firms tend to hold several key management positions over generations. As can be seen from Figure 3.4, it is common that key members of firm management also hold a large proportion of the firms' shares and this practice seems to be more popular among family firms. For non-family firms, that could give a positive signal to outsiders. It however may not necessarily be the case for family firms, since the high level of shares owned by those managers is expected and does not necessarily imply positive inside information on the firm performance.

Panel C of table 3.1 presents the correlation between explanatory variables used to assess stock performance of family firms in comparison with those of non-family firms. Family firm dummy appears to have a negative relation with most of the key variables. To some extent, this is explained by the fact that the majority of family firm equities are growth but low liquidity stocks. The negative relation between family ownership and firm age and firm size is expected and also observed in the U.S. by Anderson and Reeb (2003a). For a more in-depth analysis, the following sections will perform multivariate regressions on stock excess returns of family firms versus non-family firms.

3.4.2.D. Valuation methodology

To assess the relation between family ownership and performance of stock returns, the chapter uses basic OLS regressions in which stock excess returns on family and non-family firms are dependent variables and a range of control variables described earlier are independent variables. The regression equation the chapter employs takes the following form:

$$\text{Stock performance} = \delta_0 + \delta_1 D_{\text{Family}} + \sum_{i=1}^{8} \sigma_i X_i + \sum_{i=1}^{8} \theta_i D_{\text{Family}} X_i + \varepsilon \quad (3.1)$$

where stock performance is the monthly excess returns on each stock, family firm dummy, D_{Family}, takes the value of 1 when the firm is a family firm and the value of zero otherwise, and 8 control variables, X_i, are listed in Panel C of Table 3.1 with a full description in section 3.4.2.B).

The chapter estimates both equal- and value-weighted return regressions to investigate if extremely large firms influence the results. It also analyses the interaction between observations in time-series and cross-sectional dimensions.

The next section will presents the results of time-series regression using the Fama-French asset pricing model (Fama and French 1993) with a momentum control variable proposed by Jegadeesh and Titman (1993) and the panel regressions with some additional control variables that are identified by Brennan et al. (1998) and Anderson and Reeb (2003a) and are relevant to Turkish market. The chapter does not engage in the ongoing debate on the ability to proxy for the risk element in returns of these variables for family firms, it rather aims at answering the question whether the return differential between investing on stocks of family firms and on those of non-family firms is driven by the difference in the ownership structure. In order to take into account potential impacts of family structure on control variables, the chapter also includes (D_{Family} X_i) terms in the regressions. Once at a time, the experiment removes any insignificant impact, the final results reported in Table 3.4 will only show the significant effect (if any) of the dummy variable on the control variables.

In robustness tests, the chapter checks if the 2001 economic reform which has considerably changed the number of firms and firm ownership structure in Turkey could explain the results. It also performs diagnostic tests on the possible presence of endogeneity of firm ownership, heteroskedasticity and serial correlation in the analysis. The results are found to be statistically similar to those previously reported.

3.5. Multivariate analysis results

3.5.1. Time-series analysis

As shown in section 3.4.2.C, buying stocks of family firms and selling stocks of non-family firms does not seem to promise positive abnormal returns and the results hold after firm size has been taken into account in the portfolio allocation. In fact, non-family firms yield higher returns than family firms. This section will now seek the underlying reasons for the return differentials.

Table 3.2 presents the estimation results, in which the intercepts (δ_0) denote the extra returns received on top of what has been captured by Fama-French's and momentum factors. The first row of the table shows that after controlling for the four factors, the monthly δ_0 is -0.05 basis points (bps) for value-weighted family portfolio and is 0.31 bps for value-weighted non-family portfolio. They correspond to an annual rate of -0.60% and 3.72% respectively. The annual returns are -0.12% and 3.12% in equally weighted portfolio formation approach. These results provide further evidence supporting the

findings in previous studies that difference in ownership structure leads to variation in stock performance. However, unlike these studies, the results in this chapter show the outperformance of stocks issued by non-family firms over those of family firms in Turkey.

As can be seen from table 3.2, the factor loadings associated with the market systematic risk, B/M factor and size effects are statistically significant at a high level of confidence with an exception of the value-weighted non-family portfolio. Most of the coefficients associated with these factors are significant at 1% level, confirming their strong abilities to capture the time-series movement of stock returns.

It is also worth noting that momentum factor does not seem to add much weight in explaining the return differentials between the two groups. Both value-weighted and equal-weighted portfolio returns are negatively related to the past return effects. In other words, family firms do not seem to dominate the successful performer group. Interestingly, for non-family firms, the momentum factor is not significant for value-weighted portfolio but becomes significant at 1% level for equal-weighted portfolio and its factor loading changes sign. This means that the value-weighted strategy seems to put higher weight on high past return non-family firms while equal-weighted portfolio invests more in low past return firms.

Next, time-series analysis also considers the possible impacts of the 2001 economic reform on the components of both family and non-family portfolios in table 3.3. The economic reform started in the second half of 2001 in order to deal with Turkish 2000/2001 currency crisis when the market hit the trough on the "Black Wednesday", 19th February, 2001. The sample is split into two sub-samples with a cut-off point at June of 2001. Since the past return effects do not seem to play a significant role in explaining the difference in time-series returns between family and non-family stocks, the sub-period estimation does not include this factor in its analysis.

Controlling for Fama-French three factors, table 3.3 finds that the poorer performance of family firms is not a result of sample period specification. The significant change in number of firms and firm ownership during the 2001 economic restructuring does not seem to distort the firm stock performance in the market's view. The estimation results on two sub-periods of a similar sample length show that both value-weighted and equal-weighted non-family portfolios yield positive excess returns during the periods before

and after 2001. The opposite is true for family portfolios. The net average return of the two strategies is however statistically insignificant. This confirms the earlier results in univariate analysis.

To investigate the firm stock performance in a broader scale, beside the four factors, the exposures to the market, size, B/M and momentum, the chapter also controls for a number of other equity characteristics. They are firm age, current price, dividend yields and trading liquidity. The cross-sectional results are discussed in the following section.

3.5.2. Panel analysis results

Panel regressions are estimated for both value-weighted and equal-weighted stock returns on a number of firm-level and equity characteristics. Table 3.4 presents the results of the four-factor model (model 2 in this chapter) and of model with all relevant explanatory variables (model 3). The control variables are listed in the first column of the table and calculated as described in section 3.4.2.B.

In the first model, the coefficient on the family dummy has a value of -0.1139 for value-weighted returns and as low as 0.43 bps for equal-weighted returns. They are insignificant in both value and statistical terms. In most cases, the dummies have a negative effect on the overall portfolio returns. This implies that in terms of accounting performance and past returns, stocks of family firms tend to underperform those of other firms but the difference in returns is economically and statistically insignificant. The results again confirm the earlier findings reported in this chapter.

These findings seem to suggest that from the market's point of view, whether a firm is a family firm does not influence their stock returns but this can also be interpreted that family firm performance is more stable and more predictable than non-family firm, the profits from stock price changes in the secondary market therefore tend to be slimmer for safer investments. The absence of abnormal returns after controlling for a wider range of risk factors can also be interpreted that investors efficiently price stocks of family firms.

Nonetheless, the results are different from those in the previous studies in similar areas. For examples, earlier works suggest that there are abnormal stock returns on investing in excess voting right firms (Cremers and Nair 2005) or on founder/CEO firms (Fahlenbranch 2009) in comparison to their counterparts. Perhaps, the different research

objects could explain that results. It also implies that studying family ownership is not a subsection of those studies.

The extended model, however, sees an exception in the case of value weighted stock returns. The family dummy coefficient is statistically significant at 1% level. It is worth noticing that not only the dummy, some other factors such as HML, TURN and firm age also show a much higher level of significance comparing to those in equally weighted stock returns. These are driven from the fact that Turkish family firms are mostly old medium size businesses and less active in stock trading activities. As discussed earlier, although having been around for a much longer period, the family businesses prefer keeping the size of their business and the amount of stocks offering to the public at a moderate level for the purpose of retaining their family control over the firms. This trend is however difficult to see if firm size effects are overlooked.

Regarding to the CAPM factors, consistent with the theory, in Table 3.4, the market factor still plays a substantial role in capturing cross-section movement of stock returns. The betas are largely significant in absolute value as well as in statistical terms. The results are similar in both value-weighted and equally weighted approaches. Likewise, B/M effects are statistically significant except for the equally-weighted regression in model 3. This clearly indicates that the B/M effects appear to be stronger among large firms and giving equal weights to all firms could flatten the effects.

In contrast, the exposure to market capitalisation and dividend yield does not seem to contribute much in explaining the differential in returns between stocks of family firms and non-family firms. The coefficients associated with size effects range from -0.1087 to 0.0460 with less than 2 standard errors from zero. Similarly, the effects of dividend payment changes are economically and statistically insignificant. This implies that in terms of dividend policy for outside investors, the two ownership structures do not exhibit much difference.

On the other hand, the exposure to 11-month past returns and immediate stock prices is statistically significant regardless the weighting approach. The coefficients associated with WML effects are negative and slightly more significant in the equal-weighted method. They are from -6.61 bps (t-statistics -1.98) to -4.73 bps (t-statistics -1.39) from zero. It is in line with the findings in the previous chapter that the winner-minus-loser factor plays a significant role in explaining cross sectional stock returns. This is also

consistent with previous studies, such as Fahlenbranch (2009) who founds that the 7 to 12 month past returns could well capture the movement of stock returns at a high level of confidence. Similarly, the exposure to stock prices is consistently significant indicating a strong relation between recent trading prices of stocks and stock returns in Turkey.

Unlike any variables discussed so far, the combined effects of family dummies and exposure to other explanatory variables are much stronger in the case of traditional HML (growth prospects) and/or SMB (size prospects). Although the dummies have a negative effects on stock excess returns, in combination to the other two factors, they turn out to have significant positive impacts on the sensitivity of HML and SMB exposure in relation to the excess stock returns. As can be seen from Table 3.4, (D_{Family} x HML) plays an important role in explaining the excess returns on equally weighted regressions in model 2 and value-weighted approach in both models. Interestingly, the exposure on (D_{Family} x SMB) shows a strong explanatory power in explaining equally-weighted excess returns but does not appear to have any significant role in value-weighted regressions. The size effects, perhaps, have been well captured by the value weighting approach.

In terms of magnitude, take value-weighted approach in model 2 as an example, the exposure of growth prospects on non-family stock return is -0.42 but the interaction between the HML and family factor helps change the negative sign to +2.41. This means that within high B/M firms (i.e. low growth prospects), the exposure to family factor is about +1.99 (equals to -0.42 plus +2.41). Those interesting results show that although family ownership does not have significant impacts across the whole market, firms with certain characteristics react differently to the family effects. More specifically, within the group of firms with high growth prospects (i.e. low B/M equity), family firms tend to underperform non-family firms. The opposite is true among low growth prospects firms.

Similarly, firm characteristics as regards to their market capitalisation also show a different reaction to the family ownership. Accordingly, small firms witness a better performance among family firms over their non-family counterparts. As firms grow in size, non-family firms tend to outperform family firms. Unsurprisingly, this trend is only observed in the equally-weighted approach. When size effects have been taken into account in form of value-weighting returns, such combination effect is no longer shown.

Overall, the results so far in this chapter imply that the market seems to be concerned about issues associated with family ownership such as outside investor expropriation. Hence, the family firm title does not necessarily benefit firms in the stock market. However, analysing cross-section relation between the two groups provides a more comprehensive view. It appears that their typical characteristics regarding to ownership structure do play an important role in explaining the average stock returns. Although the matter of whether or not a firm is a family firm does not create significant differences on its own, its effects have, in fact, incorporated in other related factors. Some examples are book-to-market equity effects, turnover ratio, firm age, and the sensitivity of HML and SMB to whether a firm is a family owned business. Interestingly, among low growth prospects firms and/or small firms, family firms outperform non-family firms and as firms grow in size and growth prospects, non-family firms appear to perform better.

Perhaps the long presence of family firms in countries characterised by family ownership, like Turkey, has diluted investors' excitement, if any, for wealthy owners of family firm or their fears of expropriation. A fair view of family firm performance not their status is therefore fully incorporated into the share prices. Another valuable observation is that although it is common around the world for firms to start as a family or private firm and the ownership changes gradually as the firm grows, family firms in Middle East particularly concern about mergers and acquisition. In other words, they tend to act more caution when it comes to their shareholdings related issues to ensure their ownership over the firms is retained. The difference in culture and attitude towards consolidation is perhaps the main driving force of the different corporate governance and stock performance of family firms in Turkey.

To ensure the above results are not driven by statistical biases, the following section will perform several diagnostic tests on the same groups of regressions.

3.5.3. Diagnostic tests

3.5.3.A. Endogeneity and Heteroskedasticity

This section will first look at two main problems concerning ownership analysis, which are endogeneity and heteroskedasticity in regressions.

Regarding to the possibility of endogeneity, the analysis may suffer from the endogeneity problem if family ownership is in fact an endogenous factor. More

specifically, there is a possibility that ownership concentrated in the hands of families leads to poorer stock performances as a result of the market's concern over costly agency problems. However, there is also another explanation is that stock underperformance leads to stocks being less attractive to outside investors and since it is in line with the owner families' objectives, the concentrated ownership is maintained. Or, family shareholders retain their high shareholdings because of having positive insider information that could excite the market. Also as mentioned in section 3.2, Turkish family firms seem to concern more about the troubles of mergers and acquisitions and prefer to retain their large shareholdings, a poor stock performance may serve the purpose. It is especially convenient for extreme long-term investors like themselves when changes in stock prices are not a main source of income but dividends and cash flows generated by firm business operation are.

When there is an endogeneity between dependent variable and independent variables, it is difficult to make a causal inference of the relation. This problem can be approached with instrumental variable (IV) regressions which adjust for endogeneity when estimating the relation between concentrated ownership and firm stock returns (see examples of Himmelberg, Hubbard and Palia 1999, Demsetz and Villalonga 2001, and Lins 2003).

This section checks the robustness of the results using two-stage least squares instrumental variable (2SLS -IV) regressions to estimate equation (3.1). It regresses stock market excess returns on firm ownership, the excess market return, B/M factor, size and past return effects (model 2), and trading liquidity, dividend yield, firm age and price (model 3) with a selected set of instruments. Instruments in model 2 are all explanatory variables apart from the dummies and their combinations. Model 3 has some extra instruments which are the lags of those independent variables to ensure the number of instruments complies with 2SLS regression's rules. As a result, the 2SLS estimation procedure will capture the endogenous effects, if any, between firm ownership and changes in stock market prices.

In terms of heteroskedasticity, if there is, the problem could cause serious biases, especially in cross-sectional analysis. One of the key assumptions of OLS method is that error terms have a constant variance for all independent variables. If this assumption is violated, the error terms are heteroskedastic and there is a heteroskedasticity problem in the estimation. Although heteroskedasticity does not lead to bias in regression coefficients, it might cause at least two problems. First, the

regression estimators are no longer efficient estimates, in other words, they do not have minimum standard errors. The second is that bias standard errors can lead to incorrect conclusions about rejection or acceptance of null hypotheses. Since heteroskedasticity is largely a cross-section problem, it is important to correct biased standard errors in the analysis considering a large number of firms.

This section will estimate the 2SLS regressions controlling for possible heteroskedasticity using White cross-section method. The procedure corrects standard errors of the estimation and therefore the *t*-statistic values will differ from those reported earlier in table 3.4. Although there are several ways to control for heteroskedasticity, the correction method depends a great deal on whether the variances in error terms are positively or inversely related to the variable changes. The White cross-section method will allow both possibilities to be adjusted.

Table 3.5 summaries the estimation results of the 2SLS-IV regression following White cross-section method to adjust for the potential endogeneity and heteroskedasticity problems in the estimation.

Columns 2 and 4 of the table show results of model 2, and columns 3 and 5 present results of model 3. Adjusted R^2s report the goodness of fit and *F*-statistics show the overall significance of the models. In addition, the table also shows J-statistics of Sargan's (1958) test checking the validity of the set of instrumental variables used in those models.

In general, the absolute values of t-statistics tend to be lower than those in the OLS regressions. However, conclusions on the significant level of individual explanatory variables are not substantially affected. After controlling for endogeneity and heteroskedasticity, family dummy variable mostly remains negatively insignificant, except for model 3 on value-weighted portfolio returns. This suggests that although on average, stocks of family firms tend to have slightly lower returns than those of non-family firms, firm ownership seems to significantly influence the firm's stock prices through its effects on other factors. Also, the large values of J-statistics validate the choice of instruments used in the 2SLS-IV tests. In short, the consistency in results after controlling for endogeneity and heteroskedasticity implies that there is no simultaneity between stock returns and firm ownership status.

The next sections will present additional robustness checks to rule out the possibility that the results are purely driven by statistical non-spherical disturbances in the data. More specifically, they further control for both heteroskedasticity and serial correlation

in error terms which could lead to incorrect interpretation of the significance of estimated coefficients.

3.5.3.B. Serial correlation in residuals and Heteroskedasticity

Although like the previous problems, serial correlation does not bias the partial regression coefficients, its presence might render the estimation inefficient. In this section, panel regressions on both value-weighted and equal-weighted excess returns will allow for the presence of serial correlation and heteroskedasticity (clustered covariance) to be adjusted using Panel Corrected Standard Error (PCSE) methodology. As a result, even though the estimated coefficient values are unaffected, the *t*-statistics have changed after adjusting for serial correlation and heteroskedasticity. If there is a serial correlation between successive values of the residuals, the *t*-statistics generated by OLS method tend to be inflated. This may lead to a Type I error which is incorrectly rejecting a true null hypothesis about parameters.

Table 3.6 shows the results of another robust check which controls for not only heteroskedasticity but also possible serial correlation in residuals. In the table, next to the explanatory variable list, columns 2 and 4 represent the four-factor model, and columns 3 and 5 control for four more variables, trading liquidity, dividend yield, firm age and stock prices. From the table, accounting for serial correlation and heteroskedasticity yields statistically similar results to those found in the OLS before adjusting and those in the 2SLS-IV regressions. Comparing to the t-statistics reported in table 3.4, most of the values are lower but still high enough to keep the key findings unaffected.

As can be seen from table 3.6, for value-weighted return regressions, the excess market return and HML keep showing their strong explanatory power in capturing the movement of stock returns cross-sectionally. When adding more variables, liquidity effects become statistically significant while momentum appears to lose its weakly significant role. Moreover, effects of the family dummies on the sensitivity of HML continue to contribute to the overall significance of the models. They are about 1.7 to 2.4 above zero (*t*-statistics of 1.95 and 3.10 respectively).

In equally weighted return estimations, model 2 continues to see the dominant roles of the market beta and momentum effects while in the expanded model (model 3), turnover, firm age and stock prices substantially add their parts in the overall explanatory ability of the whole model. Interestingly, TURN variable becomes statistically significant and changes sign. The change, however, does not offer a clear explanation in this case. In

contrast, it is not surprising that the exposure to book-to-market value effects, the variable that was significant at only 10% level before controlling for the non-spherical disturbances, cannot keep up its role in the four-factor model. Apart from these, majority of other variables remain their roles as before the adjustment was made.

To sum up, the panel analysis results reported for the OLS regressions are relatively robust after controlling for serial correlation and heteroskedasticity in error terms. Although *t*-statistics have a decreasing tendency, the ability to reject the null hypothesis of zero coefficients remains strong. A few exceptions appear in weakly significant cases but the changes do not seem to significantly affect the findings.

3.5.4. Conclusion

Empirical results suggest that in Turkey, investing in stocks of firms mostly owned by families does not provide abnormal returns compared to those of non-family firms. In fact, that strategy may even lead to a slightly lower return on average. Both time-series and panel analyses agree on the important roles of family firm status on their stock market performance. In that sense, the results are consistent to those in developed as well as in other emerging economies. However, this chapter does not confirm the abnormal returns should investors put a long position on family firm stocks and a short position on stocks of non-family firms. The underlying reason behind this anomaly is that unlike in other markets, Turkish family firms are strongly concerned about consolidation issues, such as hostile takeovers. They therefore tend to retain a high percentage of shareholdings and also hold the firm management positions. In addition, their dividend policies are not much different from those in non-family firms. These are perhaps the main reasons for the indifference of outside investors to whether or not a firm is a family firm. The family ownership effects are, however, incorporated in factors relating to stock prices, such as past returns and current stock prices. This is also in line with the market efficiency theory, which implies that all relevant and available information should be incorporated in the prices.

Further analysing the data, we finds that whether a firm is a family firm or not does not directly explain the return differentials between stocks of family and non-family firms but their effects on the sensitivity of other variables do. Among low growth prospects firms and/or small firms, family firms outperform non-family firms and as firms grow in size and market value to book-value, non-family firms appear to perform better. In addition, other factors that show significant explanatory power in capturing the return

differentials are the market beta, exposure to B/M, size, past returns, liquidity ratio, firm age and immediate stock prices. Among large firms, older firms and those with higher recent stock prices are more likely to have higher stock returns. The results hold after controlling for possible impacts of the 2001 economic reform, possible endogeneity, heteroskedasticity and serial correlation biases in the analysis.

3.6. Conclusions and Further research

Among countries that are characterised by family businesses, Turkey with its own interesting characteristics has shown how the family shareholders attitude can influence the stock market and lead to different stock behaviour than in other countries. Because of their highly concentrated ownership in the form of a pyramid or a complex structure, family firms could raise serious concern over minority shareholder protection issues. However, in Turkey, excess cash flow rights, an effective tool for expropriating minority shareholder, are documented not to be popular. In addition, the attitudes of Turkish owner families on mergers and acquisitions are rather negative. Thus, examining the way outside investors view Turkish family firms in relation to non-family firms promises different findings to previous studies, and the results in this chapter indeed confirm that.

While the literature on corporate ownership structure mainly addresses large shareholding, family ownership has recently seen interesting characteristics brought by the owner families. Since they normally hold some management positions and wish to pass a successful business to the next generations, they tend to preserve loyalty and bring special skills. The managerial agency problems in family firms are also eliminated. However, some concerns over the operation inefficiency, tunneling and excess cash flow rights arise largely among family firms.

By contrast, recent research provides a great deal of support for a better performance of family firms over non-family firms. This is attributed to their lower agency conflicts, longer investment horizon and more efficient investment policies. However, a majority of those studies seem to pay attention on the largest firms leaving the results unrepresentative.

This chapter covers not only the largest firms but also small and medium size businesses. It also traces ultimate control of both direct and indirect ownership. This is particularly vital in examining family corporations whose complicated ownership structures show little sign of ultimate owners at first glance. By doing that, the chapter aims to provide a more comprehensive analysis on the relation between family ownership and stock market performance.

Generally, the results show that family firms' stocks do not perform as well as their non-family stock counterparts. The finding is consistent with the view that while family ownership brings many benefits to the firms, the typical attitude of Turkish owner

families toward avoiding takeovers or losing their ultimate control may reduce outside investors' interests. However, that relation between family ownership and stock market returns is still strong enough to explain the cross-section differential in stock returns between family and non-family firm groups. Although family ownership does not appear to directly capture the return differentials, its effects on the sensitivity of other factors do largely explain the difference. One possible reason for this result is that since Turkish firms seek to maintain a balance between cash flow rights and voting rights, the benefits of large family shareholders are broadly in line with those of the firms. Hence, the market values stocks of family firms are based on their expected risk loadings rather than on the fear of extra agency costs likely caused by the owner families. Another underlying reason for the insignificant difference in stock returns between the two groups is that investors appear to efficiently price stocks of family firms and many other firm characteristics.

The variables that have a strong ability to explain most of the cross-section pattern in the return differentials between stocks of family and those of non-family firms are, in fact, well-known factors, such as the CAPM's market beta, the Fama and French's (1993) three factors, the Jegadeesh and Titman's (1993) past returns, liquidity ratio, firm age and immediate stock prices. Among large firms, firm age and recent stock prices can largely contribute their explanatory abilities in capturing the cross-section returns.

More interestingly, within firms with low growth prospects and/or small firms, family firms outperform non-family firms and as firms grow in size and market value to book-value, non-family firms appear to perform better. The results are robust to a number of possible data biases as well as to the Turkish economic restructuring in 2001.

One question that would be of interest for further research is why, as family firms grow bigger and stock returns get lower, owner families in Turkey do not leave the firms. It is possible that at the firm level, with comprehensive inside information and a long history of presence, family shareholders do not leave the firms even if they experience a long period of low stock return because they have adequate information to fairly anticipate a better performance of the firms in the long run. However, firm level analysis is beyond the scope of this chapter and that perhaps leaves room for further research.

Another piece of information from the previous observations could potentially be an interesting topic for future research. As seen earlier in Figure 3.4, within family and

non-family firm groups, there are a large number of firms whose largest shareholders are not present in the management. They would have strong incentives to monitor the firm performance and act like independent protectors for the interests of other outside investors. Lins (2003) even refers to large non-management shareholders as effective external governance mechanisms which can increase firm value in low protection countries. Therefore, it may be interesting to look at whether the presence of large non-management shareholders in almost a half of the total firms in Turkey contributes to explaining the behaviour of family and non-family stocks.

Figure 3.1: Number of firms by sector (2012)

The figure presents number of family firms in total number of firms by sector as at December 2012. In the total of 325 listed firms, the figure graphs on the 286 firms which have sector classification provided in DataStream. *Utilities* consist of firms providing electricity, gas distribution and water. *Resources* companies operate in mining, oil and gas sector. *Non-cyclical services* are food, drug retailers and telecommunication service providers. *Cyclical services* provide industrial transportation and support services. *Non-cyclical consumer goods* are beverages, food producers and processors, health services, packing, personal care and household products, pharmaceuticals and tobacco. *Cyclical consumer goods* supply automobiles and parts, household goods and textiles. *Financial* firms include banks, life and non-life insurance firms, investment companies, real estate and other financial service firms. *General industrials* includes firms in aerospace and defence, diversified industrials, electric and electrical equipment, and engineering and machinery sub-sectors. *Basic industries* consist of firms producing chemicals, construction and building materials, forestry and paper, steel and other metal products.

A family firm is a firm in which an individual or multiple members of the same family together own directly or indirectly at least 20 percent of the total shares outstanding. Firms which no individual or families hold more than 20 percent and those do not have information on ownership which are rare in the testing sample are classified as non-family firms.

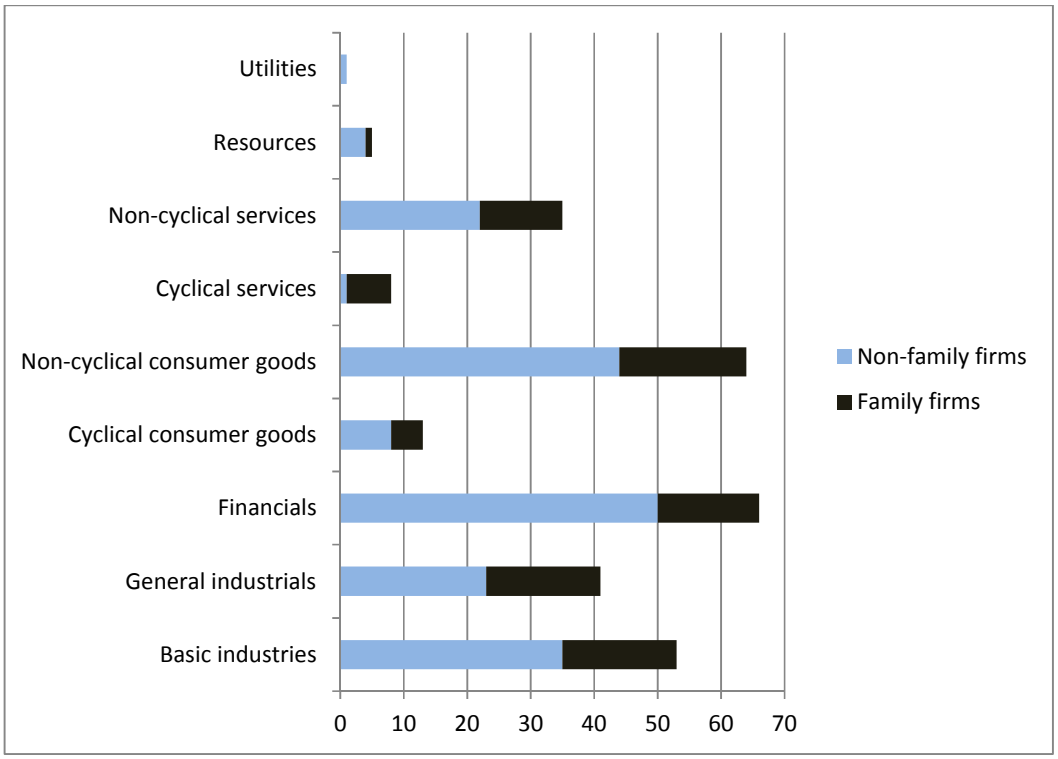


Figure 3.2: Market value of firms by sector (2012)

The figure presents market value of family firms in total market value of firms by sector as at December 2012. In the total of 325 listed firms, the figure graphs on the 286 firms which have sector classification provided in DataStream. *Utilities* consist of firms providing electricity, gas distribution and water. *Resources* companies operate in mining, oil and gas sector. *Non-cyclical services* are food, drug retailers and telecommunication service providers. *Cyclical services* provide industrial transportation and support services. *Non-cyclical consumer goods* are beverages, food producers and processors, health services, packing, personal care and household products, pharmaceuticals and tobacco. *Cyclical consumer goods* supply automobiles and parts, household goods and textiles. *Financial* firms include banks, life and non-life insurance firms, investment companies, real estate and other financial service firms. *General industrials* includes firms in aerospace and defence, diversified industrials, electric and electrical equipment, and engineering and machinery sub-sectors. *Basic industries* consist of firms producing chemicals, construction and building materials, forestry and paper, steel and other metal products.

A family firm is a firm in which an individual or multiple members of the same family together own directly or indirectly at least 20 percent of the total shares outstanding. Firms which no individual or families hold more than 20 percent and those do not have information on ownership which are rare in the testing sample are classified as non-family firms.

in Millions TRY.

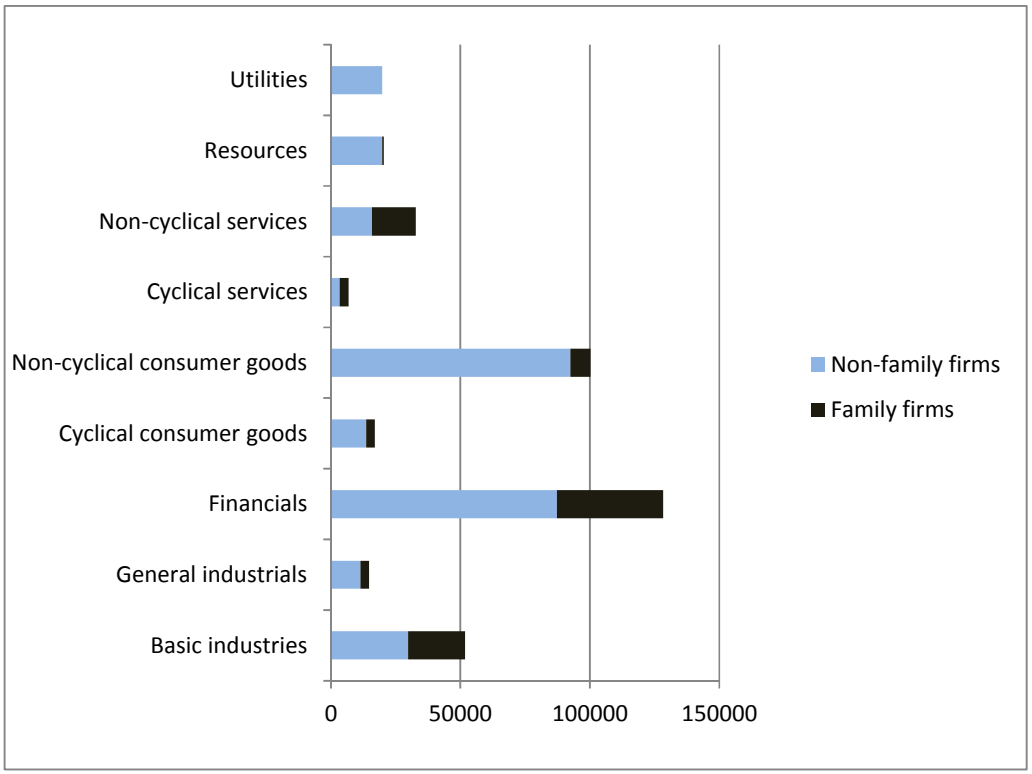
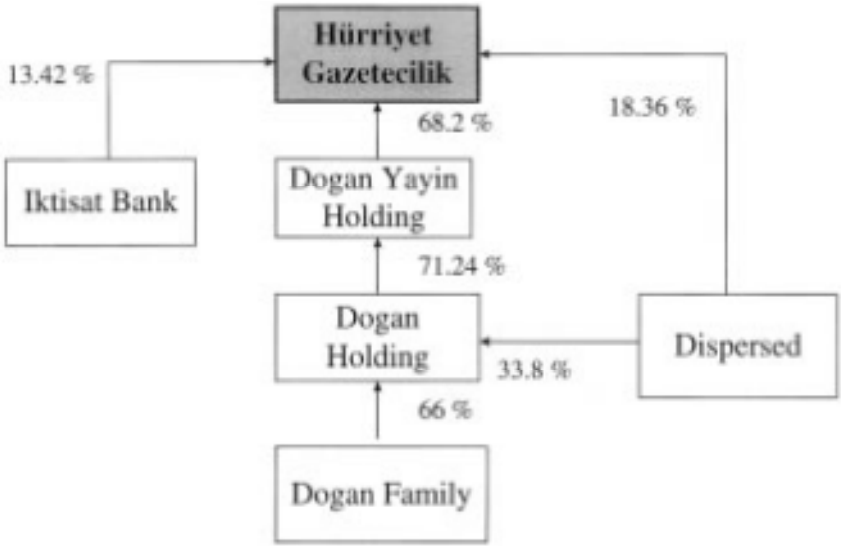


Figure 3.3: Examples of pyramid and complex web of ownership

The diagrams are Figures 1 and 2 from Yurtoglu's (2000 p.203-204) study illustrating a pyramid structure (the first diagram) and a complex web of ownership (the second diagram) in Turkey.

A business group organised in a pyramid structure



A business group organised in a complex ownership structure

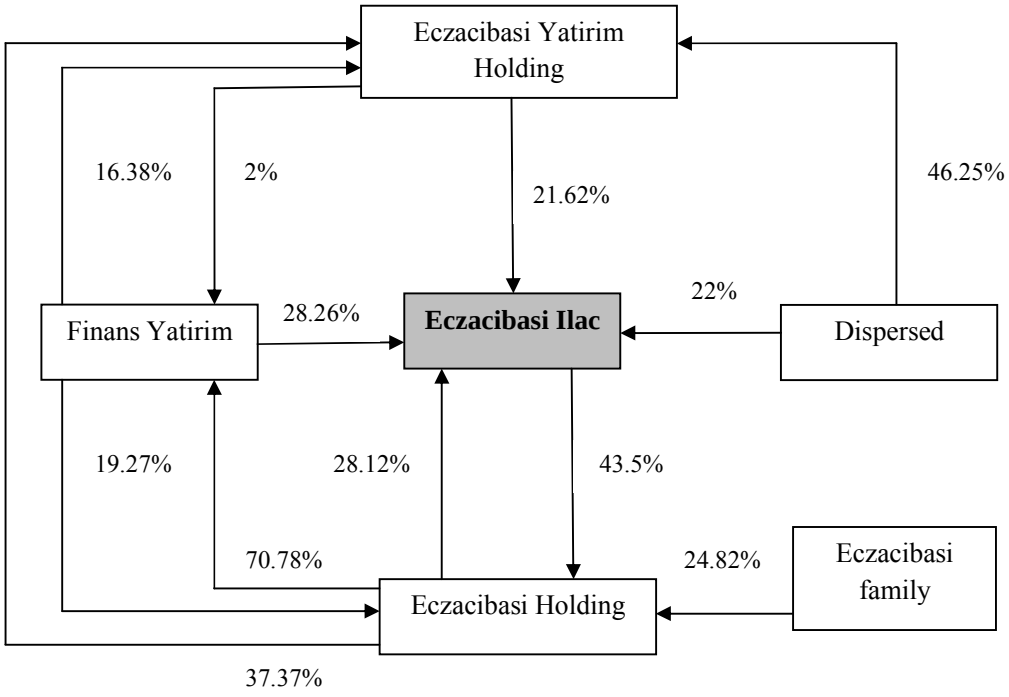


Figure 3.4: Management versus Ownership

The figure compares the number of firms which have the top management also owning a large amount of shares and presenting in the board of directors in family firms with those in non-family firms.

A family firm is a firm in which an individual or multiple members of the same family together own directly or indirectly at least 20 percent of the total shares outstanding. Firms which no individual or families hold more than 20 percent and those do not have information on ownership which are rare in the testing sample are classified as non-family firms.

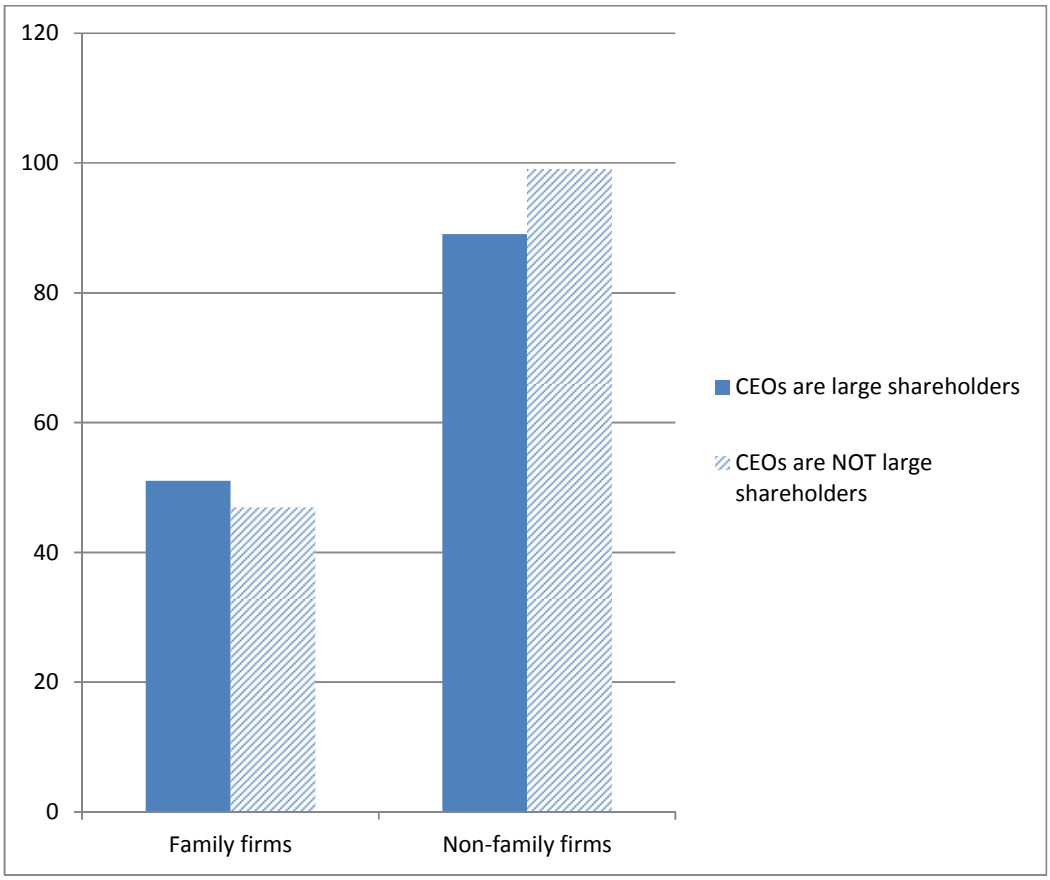


Table 3.1: Descriptive Statistics for Family and Non-family firms

The table describes summary statistics for the sample. The data covers from July 1993 to December 2010 for ISE-National All share firms. A family firm is a firm in which an individual or multiple members of the same family together own directly or indirectly at least 20 percent of the total shares outstanding. Firms which no individual or families hold more than 20 percent and those do not have information on ownership which are rare in the testing sample are classified as non-family firms. Firm age is the number of years since the firm setting up and Price is the closing share price. The excess market returns, R_m-R_f, is the return differential between market portfolio and 1-month LIBOR which stands for the risk-free asset. The High-minus-Low, HML, and Small-minus-Big, SMB, portfolios meant to mimic the risk factor in returns associated with B/M and with size, respectively, with 1-month lag. Turnover, TURN, proxy for liquidity factor, is a mimicking portfolio that long in low turnover stocks and short in high turnover ratio stocks. Turnover ratio is defined as trading volume divided by number of shares outstanding. The momentum factor is Winner-minus-Loser, WML, based on the Jegadeesh and Titman (1993) momentum strategy of buying high 11-month past returns and selling low 11-month past returns, lagged 1 month. DIV is the one-year aggregate dividend yield. Ln (Age) is the natural logarithm of the time passing since firms were first listed in the ISE (in months). Ln (1/P) is the natural logarithm of the reciprocal of the share price at month *t-2*.

Panel B reports results of the difference of means tests between family firms and non-family firms. The asterisks indicate significance at the ten percent level and *t*-statistics are two-sample *t*-tests on the null hypothesis that the two groups have the same mean value. Panel C provides the correlation matrix for all explanatory variables used in the analysis of this chapter.

Panel A: Summary statistics

	Mean	Median	Standard Deviation	Max.	Min.
Market capitalization (millions TRY)	1,464.2	184.8	4,122.4	30,996.0	2.0
Firm age (years)	14.2	14.7	6.9	23.3	1.5
Price (TRY)	11.0	2.5	30.1	300	0.2
P/E	28.4	11.1	59.3	594.9	1.5
Annual Returns (%)	18.4	10.6	42.2	302.6	-72.8
12-month Revenue (millions TRY)	1,843.7	253.7	6,088.6	73,584.8	0.2

Panel B: Difference of means tests

	Family firms	Non-family firms	*t*-statistics
Number of firms	57	164	
Market capitalisation (millions TRY)	923	1,738	-1.53
Ln(Age)	5.09	5.24	-1.51
Price (TRY)	22.45	25.02	-0.28
P/E	7.50	13.47	-1.90*
Monthly average returns % (Equally-weighted)	4.45	4.86	-0.27
Monthly average returns % (Value-weighted)	4.16	4.61	-0.28
12-month Revenue (millions TRY)	1,7829	1.518	0.29

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Panel C: Correlation matrix

	Family firms	$R_m - R_f$	HML	SMB	WML	TURN	DIV	Ln (Age)	Ln (1/P)
Family firms	1.0000								
$R_m - R_f$	-0.1383	1.0000							
HML	0.0133	0.2679	1.0000						
SMB	-0.0443	-0.0827	0.1846	1.0000					
WML	0.0576	-0.1297	-0.4396	-0.1348	1.0000				
TURN	0.0052	-0.2806	0.0318	-0.0808	-0.2228	1.0000			
DIV	-0.4727	0.1183	-0.0932	-0.0423	0.0405	-0.0287	1.0000		
Ln (Age)	-0.6180	0.1805	0.0394	-0.0445	-0.0604	0.0006	0.7570	1.0000	
Ln (1/P)	0.9058	-0.1576	-0.0289	0.0214	0.0625	-0.0166	-0.4820	-0.7706	1.0000

Table 3.2: Regressions on Excess Returns of Family and Non-Family firm Portfolios

The table shows time-series results of excess returns on Family (Panel A) and Non-family portfolios (Panel B) formed in both equal-weight and value-weight methods. Model including the Fama and French three factors, i.e. the market, size and B/M, is numbered as model [1]. Beside these three, model [2] also controls for momentum variable. Regressors are listed in the first column, subsequent columns report estimation results for Fama and French (1993) three factor (model 1) and also with momentum factor by Jegadeesh and Titman (1993) (model 2). Estimated coefficients, *t*-statistics (in parentheses) are presented. R^2 (in percentage) and standard errors (s.e.) are adjusted for degrees of freedom. Adjusted R^2s are reported in percentage form. F-statistics and their p-value test the joint significance of the corresponding factor loadings. See notes to Table 3.1 for explanations of variables.

Panel A: Family firm portfolio

	Value-weighted		Equal-weighted	
	[1]	[2]	[1]	[2]
Intercept	-0.0004	-0.0005	0.0001	0.0001
	(-0.07)	(-0.08)	(0.03)	(0.02)
R_m-R_f	1.0526***	1.0523***	1.0238***	1.0282***
	(25.9)	(25.9)	(35.1)	(35.0)
HML	-0.1360***	-0.1539***	-0.0857**	-0.0959**
	(-2.6)	(-2.66)	(-2.29)	(-2.30)
SMB	0.1131**	0.1118**	0.2775***	0.2768***
	(2.01)	(1.98)	(6.8)	(6.8)
Momentum		-0.0379		-0.0218
		(-0.70)		(-0.56)
Adj R^2	76.72	76.66	86.04	85.99
s.e.	0.0825	0.0826	0.0595	0.0596
F-stat	230	172	430	322
p-value	0.00	0.00	0.00	0.00

Panel B: Non-Family firm portfolio

	Value-weighted		Equal-weighted	
	[1]	[2]	[1]	[2]
Intercept	0.0031	0.0031	0.0027	0.0026
	(1.13)	(1.13)	(1.01)	(0.98)
R_m-R_f	1.0112***	1.0112***	0.9740***	0.9735***
	(55.0)	(54.9)	(54.2)	(55.0)
HML	0.0215	0.0222	0.1029***	0.0738***
	(0.92)	(0.85)	(4.5)	(2.9)
SMB	0.0018	0.0019	0.1948***	0.1926***
	(0.07)	(0.07)	(7.8)	(7.9)
Momentum		0.0016		-0.0616***
		(0.07)		(-2.6)
Adj R^2	94.07	94.04	94.10	94.26
s.e.	0.0373	0.0374	0.0365	0.0359
F-stat	1106	826	1111	859
p-value	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 3.3: Stock performance before and after the 2001 economic reform

The table shows time-series results of excess returns on Family (Panel A) and Non-Family portfolios (Panel B) before and after the 2001 economic reform. The analysis uses the Fama and French three-factor model including the market, size and B/M. Regressors are listed in the first column; subsequent columns report estimation results for Fama and French (1993) three factor. Estimated coefficients, *t*-statistics (in parentheses) are presented. R^2 (in percentage) and standard errors (s.e.) are adjusted for degrees of freedom. Adjusted R^2s are reported in percentage form. F-statistics and their p-value test the joint significance of the corresponding factor loadings. See notes to Table 3.1 for explanations of variables.

Panel A: Family firm portfolio

	Value-weighted		Equal-weighted	
	Jul 1993-Jun 2001	Jul 2001-Dec 2010	Jul 1993-Jun 2001	Jul 2001-Dec 2010
Intercept	0.0024	-0.0064	-0.0029	-0.0022
	(0.19)	(-1.63)	(-0.33)	(-0.84)
R_m-R_f	1.0420***	1.0593***	1.0456***	0.9984***
	(15.8)	(28.1)	(22.3)	(38.8)
HML	-0.768**	0.2359***	-0.1177**	0.1326***
	(-2.3)	(3.2)	(-2.2)	(2.6)
SMB	0.1350	-0.1265	0.2430***	0.5628***
	(1.64)	(-1.55)	(4.2)	(10.1)
Adj R^2	72.45	88.89	84.34	93.73
s.e.	0.1125	0.0389	0.0805	0.0779
F-stat	84	302	172	534
p-value	0.00	0.00	0.00	0.00

Panel B: Non-Family firm portfolio

	Value-weighted		Equal-weighted	
	Jul 1993-Jun 2001	Jul 2001-Dec 2010	Jul 1993-Jun 2001	Jul 2001-Dec 2010
Intercept	0.0058	0.0031	0.0022	0.0004
	(1.24)	(1.13)	(0.43)	(0.22)
R_m-R_f	1.0101***	1.0112***	0.9720***	0.9907***
	(41.1)	(54.9)	(35.5)	(49.9)
HML	0.0014	0.0222	0.0915***	0.1771***
	(0.05)	(0.85)	(2.9)	(4.5)
SMB	0.0077	0.0019	0.1637***	0.4451***
	(0.25)	(0.07)	(4.8)	(10.4)
Adj R^2	95.10	94.04	93.76	96.12
s.e.	0.0422	0.0374	0.0470	0.0205
F-stat	616	826	477	933
p-value	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 3.4: Panel regressions

The table presents panel regression estimation on individual stock return with the same weight (Equally-weighted) or according to the market value one month prior to the formation date (Value-weighted). Model including a family dummy, D_{Family}, and the four factors, i.e. the market, size, B/M and momentum effects, is numbered as model [2]. Model [3] includes four extra control variables, which are trading liquidity, dividend yield, firm age and price. Estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom. F-statistics and their p-value test the joint significance of the corresponding factor loadings. Adjusted R^2s are reported in percentage form. See notes to Table 3.1 for explanations of variables.

	Value-weighted		Equally-weighted	
	[2]	[3]	[2]	[3]
Intercept	0.0209	-0.1984**	-0.0010	-0.0572
	(1.41)	(-2.2)	(-0.09)	(-0.82)
D_{Family}	-0.1139	-0.5932***	0.0043	-0.1924
	(-1.49)	(-3.0)	(0.07)	(-1.27)
R_m-R_f	1.0279***	0.9936***	1.0010***	0.9810***
	(42.1)	(38.9)	(53.2)	(49.2)
HML	-0.4202***	-0.3218**	-0.1841*	-0.0306
	(-3.2)	(-2.4)	(-1.77)	(-1.13)
SMB	0.0460	0.0240	-0.1087	-0.0658
	(1.36)	(0.73)	(-0.82)	(-0.49)
WML	-0.0473	-0.0661*	-0.0558**	-0.0494*
	(-1.39)	(-1.98)	(-2.1)	(-1.92)
TURN		-0.1153***		0.1107
		(-3.2)		(1.09)
DIV		0.1012		-0.0793
		(0.35)		(-0.35)
Ln (Age)		0.0955***		0.0494*
		(2.6)		(1.73)
Ln (1/P)		0.0162*		0.0156**
		(1.70)		(2.1)
D_{Family} x HML	2.4089***	1.7243**	1.1774*	
	(2.9)	(2.0)	(1.73)	
D_{Family} x SMB			2.2004***	1.9107**
			(2.6)	(2.2)
Adj R^2	84.47	85.07	89.78	89.96
s.e.	0.0639	0.0626	0.0494	0.0490
F-statistics	381	240	527	342
p-value	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 3.5: Two-stage least-squared Instrumental Variable regressions

The table presents estimations on Value-weighted and Equally-weighted stock return using two-stage least-squared Instrumental variable regressions that control for endogeneity and possible cross-section heteroskedasticity. See notes to Table 3.1 for explanations of variables. Instruments include all explanatory variables in apart from the dummies in model [2], with an addition of lags in model [3]. Accordingly, estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom, J-statistics are Sargan test of the over-identifying restrictions and F-tests report the joint significance.

	Value-weighted		Equally-weighted	
	[2]	[3]	[2]	[3]
Intercept	0.0304	-0.2331	0.0205	-0.0252
	(1.35)	(-0.97)	(0.77)	(-0.28)
D_{Family}	-0.2012	-0.6923	-0.1388	-0.2595
	(-1.63)	(-0.86)	(-0.89)	(-1.57)
R_m-R_f	1.0295***	0.9921***	0.9934***	0.9787***
	(34.6)	(33.4)	(36.3)	(47.8)
HML	-1.6673***	-0.3312**	-0.7698*	-0.0206
	(-3.2)	(-2.2)	(-1.81)	(-0.78)
SMB	0.0129	0.0222	-1.4655	-0.1414
	(0.30)	(0.63)	(-0.93)	(-1.1)
WML	-0.1576***	-0.0658*	-0.0986*	-0.0546**
	(-2.7)	(-1.96)	(-1.94)	(-2.13)
TURN		-0.1146***		-0.0627**
		(-3.2)		(-2.3)
DIV		0.0965		-0.1188
		(0.32)		(-0.51)
Ln (Age)		0.1123		0.0620**
		(0.80)		(2.2)
Ln (1/P)		0.0191		0.0187*
		(0.62)		(1.9)
D_{Family} x HML	1.8808***	0.7912*	1.1662*	
	(3.1)	(1.85)	(1.79)	
D_{Family} x SMB			1.8956*	1.3785***
			(1.76)	(2.8)
Adj R^2	80.12	85.06	84.67	85.88
s.e.	0.0723	0.0627	0.0605	0.0491
J-statistics	27	30	29	31
F-statistics	389	233	521	372
p-value	0.00	0.00	0.00	0.00

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 3.6: Panel regressions controlling for heteroskedasticity and serial correlation

The table presents estimations on individual stock return with the same weight (Equally-weighted) or according to the market value one month prior to the formation date (Value-weighted), using panel data regressions that control cross-section heteroskedasticity and serial correlation in residuals. Model including a family dummy, D_{Family}, and the four factors, i.e. the market, size, B/M and momentum effects, is numbered as model [2]. Model [3] includes four extra control variables, which are trading liquidity, dividend yield, firm age and price. Estimated coefficients, t-statistics (in parentheses), R^2 and standard errors (s.e.) are adjusted for degrees of freedom. F-statistics and their p-value test the joint significance of the corresponding factor loadings. Adjusted R^2s are reported in percentage form. See notes to Table 3.1 for explanations of variables.

	Value-weighted		Equally-weighted	
	[2]	[3]	[2]	[3]
Intercept	0.0209	-0.1984*	-0.0010	-0.0476
	(1.28)	(-1.81)	(-0.08)	(-0.68)
D_{Family}	-0.1139	-0.5931***	0.0043	-0.1814
	(-1.49)	(-2.6)	(0.07)	(-1.06)
R_m-R_f	1.0279***	0.9936***	1.0010***	0.9799***
	(38.2)	(31.5)	(43.7)	(40.1)
HML	-0.4202***	-0.3218**	-0.1841	-0.0209
	(-3.0)	(-2.1)	(-1.55)	(-0.48)
SMB	0.0460*	0.0240	-0.1087	-0.1401
	(1.39)	(0.80)	(-0.72)	(-0.96)
WML	-0.0473	-0.0661	-0.0558*	-0.0554**
	(-0.98)	(-1.38)	(-1.89)	(-2.0)
TURN		-0.1153**		-0.0627**
		(-2.2)		(-2.2)
DIV		0.1012		-0.1135
		(0.35)		(-0.53)
Ln (Age)		0.0955**		0.0485*
		(2.4)		(1.58)
Ln (1/P)		0.0162		0.0163*
		(1.45)		(1.7)
D_{Family} x HML	2.4089***	1.7243*	1.1774*	
	(3.1)	(1.95)	(1.77)	
D_{Family} x SMB			2.2004***	2.3790***
			(2.8)	(3.1)

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

CHAPTER 4: PRIVATISATION AND FAMILY INVOLVEMENT: A CASE STUDY OF TUPRAS COMPANY

4.1. Introduction

After a long period of being viewed favourably, nationalisation programmes and state ownership which were usually connected with socialism started to be re-examined from both a political and an economic standpoint[27]. For many years, in spite of scepticism from many economists, state ownership dominated not only socialist economies but also market economies, such as Japan, Germany and the U.S. It was particularly popular in key industries, such as land, mining, banking, and iron and steel. The question of the extent to which government should involve in regulating and controlling the national economy is still an open issue.

Among several ways to understand the concept of privatisation, this chapter uses the definition suggested by Megginson and Netter (2001) in their comprehensive survey, that privatisation is a method of transferring ownership, in which government sells state-owned enterprises or their assets to private entities.

There was a significant privatisation wave in industrial countries during the 1980s, during which the most prominent and historically important programme was launched by Margaret Thatcher after the conservative government came to power in Great Britain in 1979. Although it was not the first, the programme set an example for other governments to follow. The 1990s continued to see another trend of privatisation around the world, especially in developing and transition countries where the programme considerably changed the face of their economies. Although Turkey was among the first country to adopt the programme since 1985, its privatisation progress was rather slow (Ercan and Onis 2001). Under huge pressure to implement economic reforms in order to overcome the country crisis in 2001 and repay a large international debt owned of the International Monetary Fund (IMF), the Turkish government finally decided to sell all their stakes in a large number of state-owned enterprises to balance their deficit: many of them were among the largest companies in Europe.

[27] See Lewis (1949), Meade (1948) and Allais (1947) for arguments supporting nationalisation and Jewkes (1948) and Samuelson (1948) and Friedman (1962) for the opposite view.

During more recent times, privatisation saw almost every sector of the economy involved and the growing number of new privatisation proposals provides a rich source of information for modern research. It is however worth noticing that privatisation deals in recent times tend to be on large firms and/or in key sectors which are very much handled on a case-by-case basis. The case-by-case performance of privatised firms is also unpredictable enough to deserve particular attention.

The chapter will study one of such privatisation cases in Turkey for the following reasons. First of all, since the privatisation wave in this country is only significant in the more recent period, studies on Turkish privatisation are unsurprisingly limited and outdated. Secondly, it is worth mentioning that among the scarce sources of case studies on privatisation, few were done in industries other than railway and airline services. Perhaps the convenience of assessing service fares and the fact that almost all firms operating in these sectors have been privatised had facilitated the comparison between pre- versus post-privatisation performance. At the same time, this limits our understanding of privatisation transactions to a few sectors. Thirdly, privatisation deals in Turkey tend to take much longer than in any other countries and involved unusual mixtures of different methods of privatisation as well as ownership structures. Thus, this offers an ideal case study to compare and contrast the impact of different privatisation methods on the same object. One type of ownership that attracts our interest is the involvement of family firms and this chapter aims to examine the potential impacts of such ownership on a privatised firm.

Having that in mind, we select Tupras to test our hypotheses. Tupras or Turkey Petroleum Refineries Joint-stock Company (i.e. Turkiye Petrol Rafinerileri Anonim Sirketi in Turkish) is a Turkish-based company operating mainly in refining and distributing petroleum products. From being a state-owned monopoly firm, Tupras went through several phases during its 15 year privatisation via block sale and share issues, and was fully privatised in 2006 with more than 50% of its shares owned by a family business, Koc Holding.

The questions this chapter aims to address are how privatisation affects the Tupras operating performance and its stock performance in both the short run and long run. More importantly, which privatisation methods seem to be more beneficial to the firm and whether Tupras's existing shareholders should be concerned about the involvement of the Koc family.

The results in this chapter show that both share issue and block sale privatisation methods had positive impacts on boosting the firm revenue and productivity. Using the direct sales method appears to be a more suitable option for oil and gas firms. In terms of stock performance, the immediate reaction of the market to the privatisation was not positive due to a long experience of privatisation failure in Turkey. However, in the long run, the firm stock prices experienced a long period of high profit even after adjusting for the market and industry index movement. More interestingly, after the ownership transfer, new investment plans and dividend policies launched by Koc Holding seem to favour those shareholders whose investment horizon is in line with that of the family, but not those shareholders with a shorter investment plan.

The chapter is organised as follows. Section 4.2 outlines the privatisation programme in Turkey and describes the special case of Tupras. Data and methodology are presented in section 4.3. Sections 4.4 and 4.5 examine the impacts of each method of privatisation that Tupras has experienced. Section 4.6 particularly analyses the role of the Koc family, the new ruling owner, in Tupras's new dividend policy and investment styles. Finally, section 4.7 summarises and discusses the main findings.

4.2. Tupras privatisation

This section briefly outlines the history of Turkish privatisation programme and provides some background information about Tupras, Turkey's largest petrochemical enterprise, and its long and drawn out privatisation process. As mentioned earlier, although the 2001 economic reform had seen an extensive wave of privatisation in Turkey across a wide range of industries, key sectors such as energy and electricity were retained in the Government's hands for economic control purposes. Subsequently, the majority shares owned by the state in some companies, including Tupras, were eventually opened to public bidders, both domestic and foreign. The firm privatisation however experienced a longer and more problematic process than any others.

4.2.1. Privatisation in Turkey

Historically an economy heavily depending on state-owned enterprises, Turkey first adopted the privatisation programme when the new Prime Minister, Turgut Ozal, of the Motherland Party came to power in 1985 (Okten and Arin 2006). Although the Turkish privatisation was designed to follow the example of the British privatisation programme with strong support from the new government, it was not until the 2000s that privatisation became a key government strategy. After launching a big privatisation plan in 2000 which raised nearly 3 million dollars revenue, the Turkish government slowed down the process as a result of the 2001 crisis and only picked up speed again in 2004. As can be seen from Figure 4.1, during the year 2005 alone Turkey raised more than 8.2 million dollars from selling state-owned companies, twice as much as revenue of the whole 1985-1997 period. The following three years from 2006 to 2008 continued to see a huge contribution of privatisation to the Turkish government budget: the revenue from the scheme was 8.2, 4.3 and 6.3 million dollars, respectively. Up to 2010, the process seemed to be rather slow but still contributed more than 2.5 million dollars to the government budget every year.

It is worth mentioning that a driving force for a faster and larger privatisation process in Turkey was the pressure from IMF for major economic reforms. This enabled the economy to repay its large international debt of 16.7 billion dollars with the IMF (out of a 63.5 billion dollar foreign loan and 139.3 billion dollar domestic debt as at the end of 2003, according to *FTSE Global Markets*[28]). For the energy sector in particular, another

[28] http://www.ftseglobalmarkets.com, issue 2 July/August 2004.

important reason for resorting to privatisation was the insufficiency of public funds for the investment required to respond to the increasing demand of energy in Turkey (Eyyubglu 2006).

There are at least three methods of privatisation which have been adopted in Turkey: direct sales in auctions, share issue privatisations (SIPs), and private negotiations. The first method appears to have been the preferred ones. As can be seen from Figure 4.2, about 53% of the sales were made via block sales and another 26% via asset sales. Accounting for about 18% of the privatisation revenue, the SIPs method only became more profitable in the recent years when the stock market became better regulated with more trading instruments available. The first privatisation in Turkey was the sale of a successful telecommunications firm, Teletas, in 1988 via fixed-price SIPs method. Subsequently, the 1990s witnessed a small number of privatisations across various industries from cement, steel to banking and electricity industries. This was followed by a quiet period until 2005 when there was a boost from large flows of foreign direct investment into the country. Regarding government priority in privatisation, Okten and Arin (2006) notice that in Turkey the government chose to privatise more profitable cement plants first due to the heavy pressure of budget deficits and loan repayments.

Possibly, due to such pressure of quick privatisation, the programme in Turkey was launched without much regulatory and public preparation. That in fact had led to a slow privatisation process with many embarrassing experiences. More specifically, according to Okten and Arin (2006), the privatisation programme faced many legal and political constraints as well as huge opposition from labour unions. As pointed out in Palmer's (2010) study, for many years the Turkish government used the Laws of Motivate Savings and Accelerate Government Investments as a legal framework for privatisation. This did not clearly state the government roles as well as issues related to layoffs, compensation and competition in the privatisation process. Although most firms privatised in the early stage of the programme were profitable firms, only a small number were privatised without a long delay or serious legal opposition. For example, the sales in the late 1980s of Citosan and Petkim were brought to court by the labour union for violating their employee rights. The lack of a sufficient and consistent legal

framework and of stronger action by politicians has considerably slowed the sales process down. Some of them took up to ten years to complete[29].

Although it was one of the first groups being targeted for privatisation, it took until the 2000s for key sectors such as oil and gas to start being privatised. Oil and gas were among the main energy sources in Turkey. Although compared with other resources, such as coal, lignite and geothermal, Turkey's oil and gas reserves are much lower, about 66% of total energy consumption of the Turkish economy was from oil and gas sources (Demirbas 2002). Hence, the sale of these industries was carefully planned and was mostly carried out in block sales transactions.

This chapter studies the privatisation of Tupras for a number of reasons. Firstly, there have not been many efforts looking at privatisation in key sectors like energy. As discussed earlier in the chapter, governments tend to keep control over strategic sectors and thus many of them were privatised only recently. In addition, among the limited number of studies on the energy sector, surprisingly none has looked at oil and gas industry. Secondly, studies on privatisation mainly paid attention to how firm performance is affected by the identity of the new owners, e.g. whether they are domestic or foreign investors and whether they are insiders or outsiders to the firm. Some compared and contrasted different methods of transferring state ownership. However, few have been concerned with their post-privatisation ownership structure, especially if the new owner is also a family firm owner. As family ownership is well documented to have significant impact on corporate governance, dividend policy and the long-term strategy of firms, it is natural to ask if the family characteristics would affect firm post-privatisation performance. Thirdly, Tupras offers a unique opportunity to compare and contrast the effectiveness of different privatisation methods in one case study. Previous studies on this matter are generally carried out on different firms where institutional factors could affect the findings. Finally, before the full privatisation in 2005, a number of Tupras shares had been sold to the public in 1991. It is therefore interesting to study how such the substantial change in ownership in 2005 affected the benefits of both new and existing shareholders and whether the controlling family expropriates the existing minority shareholders at Tupras.

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[29] For instance, Eyyubglu (2006) provides an example of a privatisation of power and coal plants in the Cayirhan district, which has been an on-going process since 1995, to illustrate the extreme slow pace of the Turkish privatisation programme.

4.2.2. Tupras prior to full privatisation

Tupras is a Turkish-based company, founded in 1983 under Law no. 2929, aimed at reorganising state-owned enterprises to increase their productivity and efficiency. Accordingly, the government brought all four state-owned refineries, including Izmit refinery of Istanbul Petrol Rafinerisi A.S. corporation and three refineries of Turkiye Petrolleri A.O. (Izmir, Kirikkale and Batman), under the single roof of Tupras[30]. Owning four out of the total of five refineries in Turkey, Tupras is holding a nearly monopoly power in the refinery industry, especially in supplying energy for consumption. The other plant is ATAS, a private plant just recently established in 2004.

The firm is operating mainly in refining and distributing petroleum products including No. 2 fuel oil (heating oil), diesel fuel and asphalt. It is the largest industrial company in Turkey and also among the top 10 largest refining companies in Europe according to Reuters News (on 20th August 2010). It also has the advantage of being located near consumption cities and of being the only refining company operating in four big oil areas in Turkey.

With four large oil refineries scattered over Turkey, Tupras has a processing capacity of about 28.1 million tons crude oil per year. As can be seen from table 4.1, which reports Tupras capacity and production as at the end of 2010, the four refineries can process about 560 million barrels per day, of which Izmit and Izmir refineries are the two main contributors with 220 million barrels per day each.

In terms of production output, Tupras produces more than 547 million barrels per day, of which nearly a half is distillate products, such as fuel oil and jet fuel. For these products, Tupras consistently owns about 90% share of the domestic market, and the firm is a monopoly in supplying asphalt for Turkish market. Other important products produced by Tupras are diesel and gasoline, which provide 56% and 83% of the market share in Turkey, respectively.

Regarding profitability, Tupras was not a profitable firm although a minor restructuring had been done prior to the privatisation. The firm even experienced a great loss during 1994-1997 period, with the net income being between -TRY 386 million and -TRY 188 million. Additionally, before the privatisation decision was announced in 1991, Tupras net sales were about TRY 10.2 million, operating profits of TRY 240 thousand and

[30] Source: Tupras 2002 annual report, at http://www.tupras.com.tr/uploads/Annual_Report_2002.pdf.

earnings before interest and taxes (EBIT) more than TRY 320 thousand. These figures alone could show the large expenses and investment a refinery firm needs to put in processing crude oil to gain one unit of revenues (98% in the case of Tupras). This is not surprising since refinery firms usually require larger investment than in other sectors. For example, British Petroleum also spent about 93% of its revenues to cover costs at the time. However, Tupras profits seemed to be rather low compared to the other oil and gas producers in the country (EBIT of TRY 320 thousand compared to TRY 405 thousand of OMV Petrol, for example).

As at the end of 2010, Tupras revenue stood at about TRY 26.2 billion, much higher than it was in 1991. Section 4.4 later will analyse this improvement in the firm performance over time and discuss the driving causes. As can be seen from table 4.1, besides the main income from refinery activities, the firm also had additional revenue of more than TRY 4.2 billion from providing petroleum transportation. This is mainly contributed by DITAS, a subsidiary of Tupras joining the firm in late 2002. Ownership of DITAS is important not only to expand the firm investment but also to benefit from DITAS services in transporting their petroleum products.

First listed in the ISE in 1991, with a total market capitalisation of nearly five million TRY in the domestic market, Tupras is now trading in Borsa Istanbul (a combination of the former ISE and the Istanbul Gold Exchange) under the ticker TUPRS and in the London Stock Exchange under the symbol TPRD with the size of TRY 12,897 million (about EUR 5,030 million) and EUR 3,561 million, respectively (data as at the end of 2012). The stock performance of the firm over several privatisation stages will be further discussed in the empirical sections.

4.2.3. The struggling privatisation process

The history of Tupras privatisation was a gradual but smooth process in the beginning, however it became mired into a series of legal battles and opposition during the later stages. The firm was transferred to Privatisation Administration Council for privatisation on 10th July 1990 and in 1991, about 2.5% of its shares started to be sold to the public under "class A" shares. The Council however still kept a majority of Tupras shares as class C shares or golden shares. The privatisation process was relatively slow. As at the end of 1999, only about 3.58% shares of Tupras were trading in the domestic stock market. The second public offering was launched in April 2000, offering 31.66% of Tupras total capitalisation (or class A shares) to the ISE and the London Stock Exchange. The third public offering was delayed due to a poor condition of the whole

market after the 2001 crisis but when it took place, the last sale faced strong opposition and a series of legal troubles.

4.2.3.A. The first challenge

According to Oker (2014), with more than 31.66% shares traded in the stock markets, the initial purpose of selling 65.76% of total shares was to reduce the percentage of stated-owned shares in Tupras to less than 50%. On 7th June 2003, the Turkish government announced the decision to privatise the remaining part. Unlike the previous two public offerings, this was done via a block sale method in auctions. Using the direct sale method, the Privatisation Administration Council perhaps wanted to quickly sell the largest part of Tupras at an optimal price. The final negotiations of the sealed-bid auction were held in January, 2004.

Nevertheless, this first attempt to sell the remaining of Tupras owned by the state was not very successful. It started with little opposition but the legal setbacks became more serious at later stages. A leading labour union in Turkey, Union of Petroleum Chemical and Rubber Workers of Turkey (Petrol-IS), claimed that the process had violated competition rules. After a long delay, the auction was still carried on and completed in January 2004. On 9th February, 2004, the Turkish Finance Minister, Kernal Unakitan approved the privatisation, in which the government would sell the remaining 65.76% state-owned shares to a German-based corporate named Efremov-Kautschuk GMBH group, a joint-venture between a Russian energy company, Tatneft, and a German holding firm. The result was a joint bid between Efremov-Kautschuk and a local company, Zorlu Holding. The sales price was more than 1.3 billion dollars, which was believed to be too low. Following a tender cancellation of Tekel privatisation, a large monopoly tobacco company, by the government in November 2003, critics seemed to very much doubt the outcome of Tupras privatisation. One of their concerns was that the reason given by the government for cancelling Tekel sale results was also that the winning bid was too low.

Later, the sale was in fact cancelled because the tender had violated the privatisation law and public interest. Like many other privatisations, the sale of Tupras faced strong opposition from the labour union, represented by Petrol-IS, which raised much concern about a mass lay-off during and after the full privatisation. Together with Privatisation Board, the Union brought the case to Regional Administrative Court of the 10th district. There were also several other legal issues the court pointed out, such as the lack of

compliance in information filing, practicing and low competitive auction (Law No. 2004/8257, Decision No. 2004/7618).

During the course of the trials, Petrol-IS, representing for Tupras's workers, had filed about 125 lawsuits including 8 cancellation claims against the firm privatisation (Yeldan 2005). The Union claimed that beside low wages (about half the salary their European counterparts received based on the 2000 data), the number of employees in Tupras kept falling during the privatisation process despite a significant increase in labour productivity and jobs needed in the company. After the claims were submitted to the Supreme Court, the transaction was blocked for months and the Court eventually cancelled the deal. Additionally, the firm share prices dropped immediately following the news about the court's decision. Although the Privatisation Administration Board, who supervised the transaction, had appealed the cancellation in the Council of State, the court's decision was not reversed.

4.2.3.B. The second attempt

The next effort to sell the remaining 65.76% of Tupras was done with caution after the failures to sell the block in June 2003 and in May 2004. This time, the shares were split into two parts. On 4th March 2005, a smaller part of 14.76% total shares was offered to foreign investors using the SIPs method. This action can be considered as a "tester" to assess investors' reaction before privatising the remaining 51% of Tupras stake. In April 2005, the third public offering was launched with another cautious step was taken by the Privatisation Administration. They tried to sell 17% shares using SIPs. However, the offer was not accepted as it was claimed to be a non-legal deal (Oker 2014).

After that unsuccessful attempt aiming to give the private Tupras greater managerial freedom, the Privatisation Administration Board decided to sell the block of 51% Tupras shares in a new auction open to both domestic and foreign investors. On 29th April 2005, the Administration announced an invitation to tender for privatising the remaining stated-owned shares at Tupras. However, the struggling privatisation so far had somewhat damaged its reputation. Some bidders from the previous auction such as the Russian oil company Tatneft decided to drop the plan of acquiring Tupras due to "high risks" in the transaction (according to Shafagat Takhautdinov, CEO of Tatneft, answering an interview with ICIS News[31] on 27th May 2005). However, the auction

[31] Independent Chemical Information Services (ICIS) is an independent organisation providing data, reports and analyses on petrochemical industries worldwide. http://www.icis.com.

seemed to be carried out with a greater care and transparency. The managers even had many official negotiations with the labour union before the auction.

On 12th September 2005, among 13 qualified bidders[32], a consortium of Koc Holding Joint Stock Company, thereafter Koc Holding, one of the largest Turkish holding firms, and Shell, a Dutch energy firm, won the auction at a price of 4.14 billion dollars. The winning bidder was a new joint venture firm named Enerji Yatirimlari A.S. formed between Koc Holding, Aygaz A.S. Opet Petrolculuk A.S. and Shell Overseas Investment B.V. It is however worth mentioning that in the joint win, Koc Holding held 75% while Shell owned only 2% of the total shares they won in Tupras[33]. As a result, Koc Holding was the largest block shareholder of Tupras and the actual transfer took place in January 2006. As can be seen from Figures 4.1 and 4.2, which show the organisation structure of Tupras and Koc Holing respectively, at least four members of the Koc family and the CEO of Koc Holding are holding key positions in Tupras's Board of Directors and its implementation committee.

However, in February 2006, the Council of State once again suspended the privatisation transaction due to another call for cancellation from Petrol-IS labour union. Among many lawsuits, the Petrol-IS claimed that Tupras stopped recruiting new employees since 1996, when the first privatisation announcement was made, and had fired more than 16% of its total employees after transferring its largest part of ownership to Koc Holding. In addition, they believed that some contract terms between Koc Holding and Shell in oil price agreements would go against Tupras's benefits and its employee rights (*ICIS News*, 3rd February 2006). According to that arrangement, Tupras would import 40% of the oil they needed from Shell with a higher price than Tupras currently paid. Fortunately, two months later, the Council announced a rejection of the claims since they were not made from a legal aspect, and Koc Holding finally became the largest shareholder of Tupras.

Overall, the process of privatising more than 96% of Tupras took nearly seven years from 2000 up to 2006. It faced strong legal opposition, reputation damage and was challenged to be cancelled at least three times, of which one succeeded. The case has

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[32] Although there were 13 qualified bidders, they mostly bid as a consortium. Foreign investors were Indian Oil Corporation, Austria's OMV, Royal Dutch Shell, Spain's Repsol, Italy's Eni, Hungarian group MOL and Poland's PKN Orlen. Domestic bidders were Petrol Ofisi, Zorlu Group, Oil Office, OYAK, Opet, and Koc Holding.

[33] Source: Tupras main website, at http://www.tupras.com.tr/file.debug.php?lFileID=2023

also raised the crucial lesson for policy makers that building a transparent and well-regulated legal framework as well as ensuring proper implementation and sufficient employee benefits is essential in order to achieve a successful privatisation programme.

4.2.4. Koc Holding – the winning bidder

Founded in 1963 by Vehbi Koc, Koc Holding is the only Turkish firm named in the Fortune Global 500, the list of the world 500 largest corporations by revenues. Its owner, the Koc family is one of the wealthiest Turkish families, also named in the Forbes 2005, the list of the world richest people, and the third generation is now controlling the business group. With at least four family members in the Board of Directors (as at the end of 2012), the family directly owns more than 24% shares of Koc Holding. The firm is a good example of a family business group organised in a complex ownership structure which results in a much higher indirect control over its subsidiaries.

For example, in Tupras, Koc Holding directly owns approximately 38% (75% times 51%) of the total shares, in which the Koc family owns about 10% (38% times 24%). Thus, in theory, the Koc family does not own a significant amount of Tupras total shares outstanding and Tupras is still classified as a non-family firm. However, as mentioned earlier, there are at least four members of the Koc family holding key positions at Tupras's Board of Directors, including the Chairman and the Vice-chairman while the Board consists of only eight members. Moreover, they are also in most of the other company committees, such as the implementation committee and the corporate governance and risk management committees, according to the firm 2010 corporate governance compliance report. As a result, the Koc family would have a considerable influence on Tupras corporate governance and operating performance. Figure 4.3 shows the organisation chart of Koc Holding which has only one family member in the Board while the structure of Tupras displaying in Figure 4.4 clearly shows more involvement of the Koc family in Tupras.

In terms of business areas, the Koc conglomerate group invests in almost every sector worldwide from energy and automotive to education and financial services. Along with Tupras, Koc Holding also holds a number of other energy related firms, such as a fuel distributor (Opet), natural gas providers (Aygaz, Aygaz Dogal Gaz and Aes Entek) and shipping (Ditas Denizcilik). It is expected that the cooperation between subsidiaries will bring significant cost reduction advantages to the group as well as to each member.

Koc Holding is trading in the ISE under the symbol KCHOL with the total market value of TRY 23,482 at the end of 2012.

4.2.5. Conclusion

The privatisation programme in Turkey has a history of nearly 30 years, but it only recently became prominent both in terms of numbers of firms involved and revenues raised. Under pressure to repay a huge international loan and overcome the economic crisis in 2001, Turkish privatisation targeted many key sectors, such as telecommunication, cement, electricity and energy. In their privatisation schedule, the Turkish government also tended to sell more profitable companies first and most transactions were carried out in auctions with the aim of quickly increasing government income.

Because of a nearly monopoly position in the oil and gas industry in Turkey, Tupras was regarded as a suitable target for privatisation. The firm was operating quite efficiently in comparison to its European counterparts but was not a very profitable producer compared to other Turkish oil and gas firms. This may have been the reason why the Turkish government decided to privatise Tupras in several stages. Starting with a small offer of 2.5% shares in 1991, Tupras privatisation was a long and troubled process until its eventual completion in 2006. It also used various privatisation methods, involved a large number of investors, including the most influential family owned group in Turkey, Koc Holding. This experience, therefore, provides an interesting case study for examining the performance of different privatisation methods and to assess, for the first time, the impact of family involvement in a privatised firm.

4.3. Data and Methodology

4.3.1. Data

Firm stock prices and market value were obtained from DataStream database. Most other firm specific data, such as financial statements, segment production and dividend payment methods were provided by Bloomberg Professional data services. Details on organisational structure, investment and new projects were obtained from the firm annual reports. Additionally, information on the firm announcements, news and public reports was collected from a range of mainstream media sources and will be specified where appropriate.

The sample spans from 31st June, 1991 to 31st December, 2010 (234 months) to ensure the whole privatisation process is covered. The coverage period starts in 1991 when the first part of Tupras was initially offered to the public, covering subsequent partial sales, and up to five years after its full privatisation in 2006. For the first part, tests of the

impacts of share public offerings will cover the period from July 1991 to February 2005 and the second period up to the end of 2010 will be employed for direct sale analysis.

4.3.2. Methodology and Hypotheses

4.3.2.A. Existing methodological issues

Due to the nature of privatisation transactions, there are a number of methodological obstacles concerning the privatisation literature. The first issue is the lack of data or poor data availability. For example, Temple (1999) and Tybout (2000) observe higher data availability in developed countries than in less developed economies and notice that there are more data for better performing enterprises compared to less profitable firms in one country. Thus, they argue that such under-represented data could yield biases. The criticism is not implausible when one links it with a dominant finding in the literature that firms perform better after privatisation. This could be simply due to the fact that their data happen to mostly consist of well performing firms. In addition, Megginson and Netter (2001) indicate that when firm managers manipulate accounting figures around privatisation deals, analysis based on such "bad" data is unreliable.

The second problem is pointed out in the Megginson and Netter (2001) survey and concerns the possibility of omitting variables and endogeneity in estimation. Although there have been some efforts in seeking relevant explanatory variables in the function explaining firm post-privatisation performance, the list has never satisfied researchers. For examples, Aghion and Blanchard (1996) suggest firm's incentives to restructure before privatisation, and Che (2009) adds buyers' financial constraints and level of the legal protection over private property rights. In addition, Vickers and Yarrow (1988) emphasise the role of competition level and Norback and Persson (2012) include government incentives to invest in to-be-privatised firms in their model, while Bennedsen (2000) adds the possibility of international pressure on governments and political intervention, which Perotti and Oijen (2001, p.43) call the "political risk" in the regressions. However, besides the fact that most of those factors are proposed from theoretical standpoints and are hard to measure or proxy, there can be other variables, for instance technology changes which can distort the results (Norback and Persson 2012)[34].

[34] See Ramamurti (2000) for a more comprehensive range of variables at firm-level, industry-level and country-level that may affect firm performance in privatisation.

Regarding the endogeneity problem, the question of whether either privatisation improves performance or better performing firms tend to be privatised was left untouched for many years. Although a similar branch of research has looked at potential endogeneity between firm performance and ownership in general and private versus state ownership in particular (see the large body of studies which carefully discussed this issue in chapter 3), it was not until the 2000s that this issue in privatisation programme literature started to be explored. This is also largely supported by newly developed statistical techniques. Some of the most commonly used techniques in this respect are two-step instrumental variables approach, 2SLS-IV [35], two-stage conditional maximum likelihood (Arin and Ulugasoglu 2009), and adjusting for endogenous variation of related variables (Bennett et al. 2007).

The third issue is that the selection of an appropriate set of measurements of privatisation outcome and firm performance is crucial but difficult. Firm performance can be viewed from both business and stock market standpoints. Though measurements of firm stock performance are relatively straightforward, operating performance appears to be difficult to compare across different sample periods and markets (Megginson and Netter 2001). Over the last three decades, there have been many efforts to measure the operating performance of privatised firms. Among the proposed indicators are net incomes, profitability, sales, assets, employees (Megginson, Nash and Randenborgh 1994, La Porta and Lopez-de-Silanes 1999 among others), productivity growth (Ehrlich, Gallais-Hamonno, Liu and Lutter 1994), corporate value (Tian 2000), labour productivity, wages (Estrin, Hanousek, Kocenda and Svejnar 2009), material costs over revenue (Frydman, Gray, Hessel and Rapaczynski 1999), capital spending, and leverage (D'Souza and Megginson 1999). However, a comprehensive set of variables is not yet finalised.

Fourthly, almost all cross-section privatisation research is subject to selection bias. As discussed earlier, a large amount of studies indicates that there are not only economic motivations but also political reasons behind the choice of firms as candidates for privatisation. Many have noted that the sequencing of reform is such that governments tend to select good firms to privatise first. This is meant to create a good impression of

[35] See examples of 2SLS-IV in the works of Boubakri and Hamza (2007), one of the early tests of privatisation impacts on firm stock performance adjusting for endogeneity, Chong, Guillen and Lopez-de-Silanes (2011) for these impacts on labour policies, and Che (2009) for the causation tests on legal protection power and buyers' financial constraints.

privatisation programme or to offer an opportunity for the public to familiar themselves with the programme. As a result, not all state-owned firms are treated in the same way in a privatisation programme. Even when there is no sequencing in privation, not every firm with similar characteristics is involved in the privatisation programme (Sprenger 2011). This practice, thus, would lead to an initial selection bias when forming samples.

Additionally, in the last two decades, privatisations tended to scatter over a wide period with huge differences in macroeconomic conditions, regulation and market conditions (Megginson and Netter 2001). Multinational analysis even faces another problem due to country-specific conditions. As also pointed out by Megginson and Netter (2001), the impacts of privatisation are strongly correlated with the level of market competition and the strength of existing private sector. In incomplete markets like in developing economies, Baland and Francois (2005) argue further that although helping to achieve higher efficiency, privatisation can still damage individuals' benefits. Political and legal systems also have significant impacts on a privatisation plan and its implementation. Failure to take into account these differences may lead to a biased conclusion.

Last but not least, since privatisation tends to be accompanied with a large legal and economic reform, it is hard to imagine one could isolate the impact of privatisation programme from other factors on firm performance. Also, since privatisation is a programme launched by governments, it is possible that some policies aim at a particular firm or industry to ensure the success of their privatisation (Bennedsen 2000). Thus, it is difficult to compare the performance of these firms or industries before and after being privatised and to those still in government hands.

Most recent studies have taken selection bias into consideration. It is, however, well acknowledged that government intervention such as restructuring firms before privatisation or sequencing in choosing to-be-privatised firms could not be eliminated.

In practice, there are at least two approaches which have been adopted by past studies to look at the potential impact of privatisation on firm performance: a large scale or a case-by-case approach. However, the methodological issues discussed above appear to be more problematic in the former than the in the latter approach. The reason is that privatisation is complex in nature. Some firms are selected to be privatised, some are not. Also, depending on their situation, privatisation method and timing would vary case by case. In addition, differences in economic conditions, legal system and government objectives make it difficult to form a set of comparable firms (Meggison and Netter 2001). Fortunately, some studies, such as Vickers and Yarrow (1991) show that

although a comparable set of firms is scarce in large scale samples, it is possible to find a like-with-like firm in case-by-case analysis.

Other problems such as selection bias might also affect the ability to draw broad conclusions from case-by-case privatisation analysis; however the bias, if any, is less likely to be serious. Moreover, examination at an individual level has a distinctive advantage of providing an in-depth analysis and insight that could be useful for more general cases while limiting the serious methodological problems that have been discussed so far. Furthermore, privatisation at present is no longer carried out under a mass programme but rather as a single deal treated on an individual basis. Therefore, it seems to be more meaningful to analyse it at the firm level. These considerations have partly guided the choice in this chapter to test its hypotheses with a case study approach.

4.3.2.B. Methodology

This chapter employs both case studies techniques and comparative analysis methods to assess the performance of the privatised firm in terms of operating and stock return indicators.

Firstly, the firm operating performance is evaluated by a wide range of accounting measurements, including revenue, operating margin, net income, return on assets, export sales, labour productivity and enterprise value. The Tupras performance will also be put in comparison to other oil and gas firms in Turkey to adjust for possible industry effects. For the purpose of creating a comparable set of measurements across firms and periods, the chapter uses the annual growth rate rather than raw figures.

In terms of stock performance, the subsequent sections analyse both the share issuing and direct sale privatisation methods in Tupras privatisation. The SIP offers an opportunity to study both short-term and long-term reactions of the market to the transaction. Regarding the short-term effects, case studies techniques will be applied to measure the potential impact of privatisation around the announcement dates. The long-term analysis looks at 5-year stock performance of Tupras shares after each transaction. In order to eliminate the possible changes in business setting over a long sample period, the results will also be adjusted for the market and industry index movements.

4.3.2.C. Hypotheses

Proposition 1: Privatisation has positive impacts on firm operating performance.

There has been a large debate on the impact of privatisation on a firm. The chapter will first revisit the question of whether privatisation helps boost the firm productivity and

profitability. Since there have not been many efforts to study the energy sector, with few of them looking at oil and gas industries, the chapter hopes to fill this gap in the literature.

Additionally, recent studies have found a strong link between identity of the new owners and post-privatisation performance of a firm but family involvement has not been considered. For instance, Omran (2009) indicates that post-privatisation performance of Egyptian firms was strongly associated with ownership structure and ownership identity. He finds that if ownership was concentrated in the hands of foreign investors, privatised firms experienced a significant positive improvement, however the opposite was true when major shares were held by domestic insiders. Nevertheless, one of the reasons why family ownership has not earned enough attention is that family firm involvement in privatisation deals only become popular recently. This chapter will aim to capture their impact, if any, on the privatised firm.

Proposition 2: Privatisation has positive impacts on firm stock performance.

This study is perhaps the first one to examine stock performance in the privatisation literature. This is because it is not very common that firms have already traded in stock markets before their full privatisation and that the active trading period is long enough for the stock performance testing. The case of Tupras privatisation offers just that. The process was carried out in several stages, scattered over a period of almost 15 years. This setup allows our analysis to explore how the stocks of a firm react to the news on its own privatisation. The empirical analysis will address the market reaction under both short-term and long-term horizons.

Proposition 3: Privatisation by direct sale is more profitable than by share issue.

Given an objective of maximising the sales price under a tight deadline, it was an optimal choice for the Turkish government to sell Tupras in auctions. However, both direct sales and SIP methods were chosen on their own merits. This chapter aims to test which method better served the Turkish government in the case of Tupras. The application of these findings is perhaps not limited to one firm. Lessons learnt from Tupras could at least benefit investors and policy makers in privatising firms in the oil and gas sector. Also, in most cases, since governments tend to share the same objective of maximising privatisation revenue, choosing the right method is crucial to reach the largest potential group of investors.

More importantly, it is worth mentioning that there have not been any efforts to test comparative performance across privatisation methods. This is possibly due to the fact

that, generally, each firm uses solely one privatisation method and the benefits of each method heavily depend on economic aggregate and individual firm conditions. Since it offers the advantage of experiencing two of the most commonly used privatisation methods in the recent time, Tupras offers a unique case study to contrast and compare them.

Proposition 4: Family owners pursue a dividend policy which is biased in favour of their own interests after privatisation.

Among new market participants, family firms are increasingly important in many countries and are starting to show more interest in taking over state-owned enterprises. Interestingly, family-owned firms seem to have the corporate governance style and investment behaviour of both institutional and individual buyers. While having a common objective of profit maximisation, family firms also have a longer term investment horizon and a stronger incentive to retain control over the firms. However, in order to retain control, one of the most commonly used methods in Turkish family firms to reduce the risk of hostile takeovers is to create a less attractive dividend payment policy. A question raised is whether their involvement in privatised firms could create an opportunity for exploitation as seen in many family firms.

There have been numerous studies raising the problem of poor and unfair dividend payout for the minority shareholders in family owned firms. For example, studying the Times Mirror Company, DeAngelo and DeAngelo (2000) show that minority shareholders suffered a significant reduction in dividend payment while the dividend for the owner family was kept unchanged. Thus, it is interesting to explore the dividend payout policy after privatisation that brought Tupras under the control of the Koc family, and investigate whether the changes are a result of privatisation, of family ownership effects or of the weak minority investor protection system.

4.4. Share issue privatisation analysis

4.4.1. Privatisation and Tupras operating performance

Table 4.2 looks at Tupras performance over the three main phases of the firm privatisation using the SIP method. With an unusual privatisation time frame, Tupras provides an exclusive case study for analysing privatisation impact on a firm in both short term and long term. This section analyses the firm operating performance over time (time-series analysis) as well as in comparison to its rivals, which have different levels of family interference (cross-sectional analysis). The section also selects a firm that has a similar proportion of shares owned by the owner family but has never

experienced privatisation for the purpose of assessing the impact of privatisation, if any, on the overall performance of the firm.

4.4.1.A. Time-series analysis

As mentioned in section 4.2.3, Tupras was privatised in at least three stages over the course of 15 years. After it started trading with only 3.4% of total shares in the stock market since 1991, Tupras's first significant share, 31.66% shares of the firm, were offered to public in April 2000. The next sale of 14.76% followed after 5 years, in March 2005, and the last phase with the sale of the remaining 51% of the total shares took place in 2006.

This section will, therefore, split the sample into three main periods, from 1991- 2000, 2001-2005 and 2006-2010 in order to compare and contrast the firm performance over the three privatisation phases. Table 4.2 shows the average changes in each measurement per year over the three sub-periods. In the table, panel A compares the firm overall performance with the last column showing the average change over the entire sample from 1991 to 2010. Panel B focuses on Tupras's main accounting figures as at the end of 2010 in comparison with those of its competitors in the Turkish oil and gas industry. Taking a closer look at potential privatisation effects on the firm, the last panel analyses yearly performance of the firm comparing to Dogan Holding, a firm with a similar level of family ownership but which did not experience privatisation. Panel B and C of the Table will be discussed in the next section on the firm performance cross-sectionally.

From Panel A of table 4.2, we can see that the SIPs in 2000 and 2005 did improve the firm revenue growth rate and productivity, but not profit, and the direct sale privatisation in 2006 was better at boosting the firm overall performance. This raises the question of whether the better performance in the last phase of privatisation was a result of privatisation or of family involvement.

On average, Tupras revenue growth rate was 8.55% per year before 2000. The growth rate was slightly lower at 3.13% during the 2001-2005 period as a result of Turkish economic crisis, but quickly increased at 12% per year after the full privatisation. Thus, over the whole period, Tupras revenue grew about 8.01% annually, much higher than most of other oil and gas firms in the region. In terms of operating margin, measured by operating profit divided by net sales, Tupras witnessed a downward trend throughout the three sub-periods. After suffering a long period of profit shrinking up to 2000 with decreasing net income and operating margin, Tupras gradually increased its profitability

with an increase in net income of 0.12 per year during 2001-2005. Over the last period 2006-2010, the firm operating margin grew slightly at 0.04 per year because net income increased at a higher pace than net sales. Looking at another measurement of profitability, return on assets ratio seemed to show a similar trend.

In terms of productivity, Tupras saw an increase in sales per employee, implying a better product and sales management as the firm's number of employees was relatively stable over time. On average, the labour productivity rate (measured by actual sales per employee) increased by about 1.32% in the first 10 years but rapidly increased at a rate of more than 6% and then 9% in the following five-year periods. Overall, the firm gained an increase of 5.63% in labour productivity per annum.

Although Tupras does export refinery products, mostly to the U.S., the growth rate of export sales is not significant because Tupras mainly supplies its products to the domestic market. According to the Tupras 2004 report, the firm owned more than 71% market shares in Turkish oil and gas sector by 2003. On average, from 1991 to 2010, the firm increased its export sales around 10% - 20% per year. The only exception was during 2001 and 2005, when domestic demand was too low due to the negative impact of the economic crisis in Turkey and the firm decided to increase its exports by about 45% each year.

Another indicator of firm performance is enterprise value, which includes not only the part owned by shareholders, i.e. the firm market value, but also the part owned by creditors. As can be seen from panel A, the firm value increased at a higher pace in ten years following the IPO and on average, it gained a 23% increase in the enterprise value over the whole period. The increase was not only a result of more shares traded in the stock markets but also of higher debt used by the new owners.

In addition, over the whole period, Tupras experienced a steady increase in sales revenue. A similar trend was seen in export sales and firm value. The profitability growth rate, however, decreased and only started to increase in the recent years from 2006 up to 2010.

There are three possible explanations for the firm lower profitability rate during the first two SIPs and the higher rate following the direct sale. The first is the negative impact of the Turkish economic crisis in 2001, which became less significant in the period from 2006 to 2010. The success of the Turkish 2005 economic reform could also have been a boost for the economy. Secondly, perhaps the lower profitability rate was caused by the huge investment by the firm in a number of long-term projects after privatisation. This

is because investment in infrastructure in the refinery industry is generally large and has slow turnover. Therefore, the investment plans only started to yield profits in the recent years from 2006 up to 2010. Lastly, the better performance in the later phase could be a result of the family intervention in the firm management. Section 4.6 will describe in detail Tupras's management restructuring process in early 2006 after the Koc family took over the firm.

If the first explanation was true and indeed Tupras profitability shrank mainly because of the 2001 economic crisis, the rise in net income and enterprise value (average of 12% and 11%, respectively) did not seem to confirm that line of argument. Moreover, if the crisis was the main critical factor, what would be the reason for the decreasing profit the firm experienced many years prior to the crisis?

The second possibility did not seem to hold either. From table 4.6 which will be discussed later in section 4.6, one can easily identify that the period with the highest investment expense was after the direct sale in 2006. Hence, investing greatly in restructuring after privatisation would not be the main reason for the firm low profit before 2006.

This leads to the final explanation that, perhaps, the involvement of the Koc family in Tupras had a positive impact on the firm overall performance. In fact, after taking over Tupras, Koc Holding launched a major restructuring programme, including replacing the Board of Directors, raising a large amount of new capital, and retaining most of the firm earnings to re-invest in a wide range of new projects. Additionally, Tupras would benefit from internal services from other firms operating under the umbrella of Koc Holding. For example, DITAS provided transportation services for petroleum products. Also, direct sales in auctions offered the advantage of maximising sale prices which did contribute large revenue to help the government repay their large international loan. In summary, there is evidence that the success of privatisation in enhancing Tupras performance is a result of family involvement and the proper choice of privatisation method. An in-depth analysis of the Koc family intervention will be discussed further in section 4.6.

4.4.1.B. Cross-firm analysis

This section will place Tupras in relation to its competitors in order to control for the possible market and industry effects. Besides Tupras, Turkey has three other firms producing petroleum products, OMV Petrol- AS (also known as POAS), Dogan Holding and Turcas Petrol. Among them, only POAS had gone through a privatisation process which was completed in 2000. About 6% of the firm total shares are directly owned by a family, Dogan family. The other firms, Dogan Holding and Turcas, were set up as private firms and have a level of family involvement of about 11% (owned by the Dogan family) and more than 40% (by the Aksoy family), respectively.

Panel B of Table 4.2 summarises the main characteristics of Tupras and its competitors. It can be seen from the panel that Tupras was significantly larger in size compared to the rest of the group. With total assets of nearly TRY 14 billion, Tupras was about twice the size of Dogan Holding, the second largest firm in the industry. In terms of market value, Tupras was about three times as large as POAS. The two firms, however, had a similar enterprise value (TRY 6.7 billion), signalling a high debt ratio in Tupras. Indeed, as at the end of 2010, out of Tupras's TRY 14 billion assets, Tupras had more than TRY 10 billion funded by borrowing.

It is also worth noticing that volatility rates, measured by 12-month stock price changes, were rather low and stable among oil and gas sector. Ranking from the least to the most volatile stocks (from 1 to 20 according to DataStream database), the rankings of Turkish oil and gas firms ranged from 5 to 7, in which investing in Tupras and POAS appeared to be slightly safer than in Turcas and Dogan Holding.

Within the oil and gas industry, panel C aims to assess the impact, if any, of privatisation aside from the effects of family intervention on Tupras by comparing it to Dogan Holding. The firm is the second largest energy firm by total assets and has a similar level of family involvement but did not go through a privatisation process. The analysis starts from 2001, right after the first significant share sales of Tupras and spans the period until 2010.

Overall, Tupras performed better than Dogan Holding under all measurements over the ten year period. The overall performance was, however, largely contributed by a huge success of Tupras after its last phase of privatisation in 2006. As can be seen from panel C of table 4.2, over the first two SIPs in April 2000 and March 2005, the two firms did not seem to behave much differently in terms of growth rates of revenue and operating margin. The only difference worth noticing was that Dogan Holding operating income

to revenue ratio increased more speedily than Tupras in 2002 and 2003. In contrast, Tupras gained a consistent and rapid increase in both labour productivity and return on assets in comparison to Dogan Holding. Upon the completion of the direct sale privatisation in early 2006, Tupras grew quickly and at a higher pace than Dogan Holding under all measurements.

In short, it can be said that overall privatisation had a positive impact on Tupras operating performance, but direct sales method appears to outperform SIPs. This is, perhaps, due to the key benefit of the former method in maximising privatisation sale prices which is especially important for oil and gas firms.

4.4.2. Share Issuing and Tupras stock performance

This section aims to examine the impact of SIPs on Tupras stock returns both in the short run and long run. This is achieved by looking at the market reaction to firm privatisation announcements and to firm performance after part-privatisation.

4.4.2.A. Short-term effects on stock returns

In order to analyse the short-term effects of a privatisation, the chapter tests the impact of a SIP announcement on the firm stock prices by utilising event studies techniques. It is worth noticing that in the ISE, privatised firms' shares are suspended from trading a couple of days before and after the sales date. This is to allow investors time to review and assess the news. Thus, the event window will be a 2-day window over the business day prior to and after the day of announcement. The announcements considered for each event include the sales announcement and trading resumed announcement.

For details, table 4.3 shows the market reaction to two announcements on the sales of 31.66% of Tupras in 5^{th} -7^{th} April, 2000 (Panel A) and of 14.76% shares in 4^{th} March, 2005 (Panel B). The announcement dates were 30/3/2000 and 2/3/2005 and the resumed trading dates were 13/4/2000 and 7/3/2005, respectively. During the trading halts, Tupras's stock prices were kept unchanged and the rate of return therefore is marked as not applicable (n.a). The two-day rates of return are not adjusted for the overall market effects and industry price movements. However, as DeAngelo and DeAngelo (2000) among others point out, price changes due to the market and industry factors over two-day windows are generally close to zero. Moreover, those effects could be considered by using the following two measurements. Besides Tupras two-day rate of return around the announcement date, the table also reports cumulative rates of return of the whole market (R1) and of a portfolio consisting of all Tupras's competitors in Turkish oil and gas industry (R2) over the same period. All returns are value-weighted based on the

market value one-month prior to the portfolio formation dates. These could provide a picture of their movements around the announcement dates.

From panel A of table 4.3, it seems that the first major public offering did not receive a positive response from the market. Both before and after the sale, the two-day rates of return were negative. The rate was much lower after the trading resumed at -12.67% comparing to -2.74% after the sale announcement. The rates were also lower than those of the market and industry index over the same period. This implies that investors did not seem to be very optimistic about the firm future after privatisation. Indeed, since the first IPO in 1991 when only 2.5% shares were sold, there had been a long period of privatisation failures in Turkey that made a sale unattractive to investors. Moreover, the legal system for protecting minority shareholders was weak and only developed as the number of privatisations started to grow. The market, therefore, did not seem to consider the sale as a positive turn for the firm performance. In addition, Tupras stocks kept performing badly after trading resumed because of the overall industry performance. As can be seen from panel A, the cumulative rate of return on the market index was much higher than on the industry index, 12.47% and 4.98%, respectively.

In contrast, the second phase offering 14.76% of Tupras total shares on 4th March, 2005 appeared to receive a more positive reaction from the market. In Panel B, not only that the two-day rates of return on Tupras stocks over the sales were positive, but they were also higher than both the market and industry indices. After the sales announcement, Tupras stocks gained 2.98%, higher than other oil and gas firms (1.16%) and the overall market (2.60%). The abnormal return was much higher after the sales results were released (6.36% compared to 2.13% and 5.00% respectively). In other words, Tupras stocks generated high returns during these periods due to the positive impact of privatisation in addition to the overall better performance of the oil and gas industry. It is interesting to note that 14.76% shares were sold to an international fund. This might somewhat contributed to the positive reaction of the market to the sale compared to the previous sales since Turkish investors tend to follow foreign investors' choices.

4.4.2.B. Long-term stock returns

This section looks at Tupras stock returns during a 5-year horizon from 2000 to 2005 as well as those of the other three oil and gas firms in Turkey. Table 4.4 reports simple cumulative rates of return, compounded rates of return, cumulative abnormal returns and 5-year buy-and-hold compounded rates of return on a monthly basis. It also tests the difference in means between Tupras cumulative returns with those of the competitors.

The cumulative rate of return refers to a simple average of monthly stock returns over the 5 year period while the compounded rate of return is calculated under the assumption that dividends are re-invested annually. Cumulative abnormal return, CAR1, is computed as the cumulative returns on the firm in question minus the cumulative return on the Market portfolio and CAR2 is equal to this minus the cumulative return of the equal-weighted portfolio consisting of the other three comparison firms. The last measurement is the 5-year rate of return calculated from a strategy in which one buys and holds the equity for the whole period without rebalancing. Accordingly, the only two prices that matter are those in the buying and the selling dates.

As can be seen from Table 4.4, Tupras performed better than both the market and its rivals in terms of compounded rates of return and 5-year buy-and-hold returns. Dogan Holding, however, generated a higher income if no dividends were re-invested. Both firms appeared to outperform the market portfolio and the portfolios consisting of only their competitors.

In comparison to the average rates of return of the other three competitors, Tupras was the only firm that had higher returns than the average according to all measurements. For the purpose of extracting privatisation effects, the last two rows of the table exclusively compare Tupras stock returns to the average value over a 5-year period prior to the Tupras first SIP in 2000. From these, it can be said that Tupras stocks outperformed both the market and its competitors only after privatisation.

However, one might argue that it is difficult to conclude that the better performance is driven by privatisation. For example, although OMV also completed its privatisation in 2000, the firm showed no sign of a better performance in the long run. Nonetheless, it is worth mentioning that in most cases, a privatisation procedure critically depends on firm conditions, and on buyers and sales targets set by its government. The impacts, therefore, are expected to vary from case to case.

In the Tupras case, as discussed in section 4.4.1, it appears that privatisation did play a significant role in boosting the firm operating performance which in turn enhanced the firm position in the stock market. Moreover, the discussion so far has shown the outperformance of Tupras stocks over both the market and its peers after being privatised but not before. Hence, the evidence suggests that privatisation has contributed to enhance the firm stock performance in the long run.

4.5. Direct sales analysis

4.5.1. The legal lessons

Firstly, Turkish privatisation would have been successful in the presence of a well-developed legal framework. As mentioned in section 4.2, under the pressure for a quick economic reform required to access a 16.7 billion dollar loan from the IMF, Turkey was in need of speedy and high-revenue privatisations. Since Tupras was the biggest oil and gas firm in Turkey, the government hoped to sell the firm quickly while still maximising the sales price. At that point, block sale via auctions seemed to be an optimal option that satisfied both the timing and pricing requirements. However, a sale of 65.76% shares the government held at Tupras in 2003 was not successful due to lack of sufficient legal framework in implementing and monitoring the block sale privatisation.

The second lesson is compliance and monitoring. A critical role is played by a legal institution that can interfere in any privatisation process in Turkey, the Council of state. The Council is the only institution that can revoke the deal and is thus considered to have veto power against privatisations in Turkey. Of course, not every privatisation faces a veto: only if there is a case opened at the Council of state, will it be considered. Oker (2014) observes that in Turkey privatisations in high revenue sectors such as oil and gas tend to be challenged more often and Tupras in fact became a target.

As mentioned earlier, the process of privatising the last part of Tupras faced strenuous opposition from Petrol-IS, the labour union of Petroleum Chemical and Rubber Workers of Turkey. The Petro-IS trade Union had used the right to challenge the transaction results by opening a case at the Council of state. In the first attempt to sale 51% shares of Tupras for a joint venture between a Russian company Tatneft and a local firm Zorlu Holding, Petrol-IS won the trial. As a result, a sale worth more than 1.3 billion dollars was cancelled.

According to a statement made by the Ankara 10th Administrative Court on 24th May 2004 (Law No. 2004/8257, Decision No. 2004/7618), the main reasons for the Court decision were that the auction process was not transparent, the deal did not serve the public interest and violated competition rules. First of all, the contract was supposed to conclude all information of the bidders in a 3-month period prior to entering the deal. However, the Russian partner, Tatneft, did not disclose information relating to its subsidiary, and Efremov Kautschuk did not report its capacity, production, capital and financial structure. Moreover, the tender proposal from Efremov included some

conditions while making conditions in tender letters is not allowed by Turkish privatisation law. Secondly, the Privatisation Administration chose a closed envelopes bid but there was no open bidding. The lack of transparency had gone against the competition rules. Thirdly, the method of payment was not clear in the tender letter. Finally, the auction did not seem to provide a necessary competitive environment when there were few bidders. In addition, Zorlu Holding, a joint winner, was believed to have entered the bid after the closing date. A lesson to be learnt from this unsuccessful attempt is the need for a more transparent and a stronger monitoring system over privatisation processes.

The second attempt was more successful thanks to the past experience. Besides following all necessary procedures, the Privatisation Administration did put an effort to create a more transparent auction.

An open auction was broadcasted on television on the 14th September 2005 and the announcement was made by the Turkey privatisation agency OIB one week before the event. The nine bidders shortlisted were Indian Oil /Calik Enerji (multinational), Koc Holding /Shell /Aygaz /Opet Petrolculuk consortium (multinational), OMV (Australia), PKN Orlen (Poland), Eni (Italy), MOL group (Hungary), Oyak (Turkey), Anadolu Tasima Joint Initiative group (Turkey) and Tupras Acquisition /Petrol Ofisi (Turkey). This time, the number and variety of participants clearly offered a more competitive environment. The broadcasted opening bidding also served to ensure the transparency and compliance of the transaction.

Although the Petro-IS trade union opposed the sales again, claiming that an arrangement on oil importing price between Shell and Koc Holding could damage the country interest and its employee rights, the Court decided that the claim was not based on legal grounds and that the privatisation result was still valid.

Last but not least, a final lesson from the analysis so far concerns the appropriate choice of privatisation methods. Once there is a sufficient legal framework supporting the privatisation process, direct sale privatisation did not only maximise the sales price but also boosted the firm performance. Compared to other privatisation methods, the direct sale method outperformed the SIPs method in terms of the timing and pricing objectives set by the government.

4.5.2. Long-term effects on stock performance

Generally, a full privatisation is expected to bring major changes to a firm in the long run, especially in terms of firm structure and management. Hence, this section will pay

more attention to the long-term stock performance of Tupras after the sales which transferred the firm completely from state-owned to private hands in 2006. This section uses a similar method to the previous tests on short-term effects and the results are summarised in table 4.5.

Table 4.5 reports Tupras average stock returns in relation to those of the market and oil and gas industry index 5 years after being fully privatised. According to the table, with the exception of Dogan Holding, other oil and gas firms seemed to perform relatively well, generating more than 2% returns on average, and a slightly lower compounded return rate at about 1.1% per month. Among them, Tupras was ranked at the second position after Turcas. It is, however, worth mentioning that Turcas was the smallest firm among the four, being less than one-tenth the size of Tupras in terms of market value. Also, while Tupras shares were traded at the significant higher price of TRY 38.6 per share, the share price of Turcas was only TRY 3.86 per share, Dogan Holding was traded at TRY 1.12 and OMV at about TRY 6.6 per share as at the end of 2010. Thus, the actual returns received by investing in Tupras will be much higher than the rest.

In addition, comparing to the previous 5 years, Tupras also offered a higher return. The compounded rates of return over both one-month and 5-year buy-and-hold periods were at the rate of about 1.4%, whilst they were 1.1% and 1.3% previously. The abnormal returns over the market and the industry index during 2006-2010 were also higher at 0.75% and 0.22%, respectively, compared to 0.40% and 0.57% over the previous period from 2000-2005. The better performance of Tupras after adjusting for the market and industry movement might signal a better firm management and a positive reaction of the market to its privatisation.

4.6. The roles of family ownership

After taking over more than 50% shares of Tupras, Koc Holding has systematically changed the firm management and investment styles. This section discusses these changes in detail and their possible impacts from the firm's shareholders prospective.

In terms of management, all members of the Board of Directors including chairman and general manager were replaced with more members of the Koc family in the Board. Accordingly, Mr Omer M. Koc was appointed as the new Chairman and Mr Yavuz Erkuet as the General Manager. As can be seen from Figure 4.4 that details Tupras organisation chart, there are at least four members of the Koc family holding key

positions in the Board of Directors while most of other members were transferred from the Koc Holding Board of Directors, such as Semahat Arsel, O. Turgay Durak and Temel K. Atay. Also, most committee members used to be key personnel at Koc Holding. Kutsan Celebican, for example, was the President of the Finance Group at Koc group before becoming an independent member at Tupras.

Because of the significant amount of shares it holds in Tupras, the Koc family has incentives and power to introduce a new dividend policy and direct the firm toward longer-term projects that are apparently more beneficial to long-term investors. On one hand, after full privatisation in 2006, a new policy to better protect shareholders was launched. The duration that a Board member can stay in office was shortened to one year instead of two years. Also, Tupras has the policy of equal voting rights on shares, no veto or golden shares, and equal treatments policy for minority shareholders. On the other hand, the firm has "reference" shareholders who have the majority of the voting rights. In terms of dividends, Table 4.6 shows that dividends tend to be made in cash rather than bonuses or rights issues which were commonly used before privatisation.
Regarding investment styles, Koc Holding doubled the amount of capital put in Tupras during the previous period (277.8 million dollars between 2006 and 2010 in comparison to 144.6 million dollars during the 2001-2005 period). Nonetheless, the corporation seems to aim at very long-term investors, including the owner family themselves, when it comes to choosing investment projects. Although the oil and gas sector may require huge capital and long-term investment, many projects at Tupras could take more than 10 years before starting to yield any income for the firm.

Moreover, as can be seen from table 4.6, Tupras tends to retain increasingly high earnings to fund new projects, especially under the Koc Holding management. While the retained earnings over a 10 year period up to 2000 were about TRY 753 million, these increased to TRY 2,093 million in the following 5 years and TRY 3,492 million in the last 5 years of the sample. Since more shares are trading in the stock market, it is expected that dividend payment would increase over time. However, in relation to the firm net income, the dividend payout ratio was particularly low under the Koc Holding management. While the firm paid about TRY 2.26 million in dividend during 2006-2010, increased by 79% from TRY 1.26 million in 2001-2005, the dividend payout was down to 0.66 from the previous value of 0.75.

Furthermore, besides increasing investment expenses which squeezed the firm profits, Tupras also increased borrowing by more than four times from TRY 477 million to TRY 1,659 million under the new management. These do not seem to give a positive signal to the market and therefore, investors may not expect a high return from trading Tupras shares.

Overall, unless shareholders have a very long investment horizon, the new investment style clearly does not serve the benefits of medium-term investors both in terms of dividend earnings and stock returns.

4.7. Conclusions and Implications

Although the history of privatisation can be traced back to the 1960s, more recent announcements of privatisation continue to create a great deal of debate, opposition and lessons to be learnt. Perhaps, this is due to the nature of privatisation deals as they are different case by case. Additionally, recent privatisations appear to offer a more interesting insight with the involvement of new sectors and new economic elites, such as family firms and cross-border consortiums. Thus, this chapter aims to study this programme by applying a case study approach to one of those interesting deals.

From 1991 to 2006, the Tupras privatisation went through several stages, using direct sale and share issuing methods. It was finally taken over by Koc Holding, one of the biggest business groups in Turkey run by the Koc family. As the privatisation process spanned over a period of nearly 15 years, it has an advantage of providing sufficient testing intervals between each privatisation phase. The involvement of a family firm in Tupras also raises much concern about the interests of the firm and of its existing shareholders.

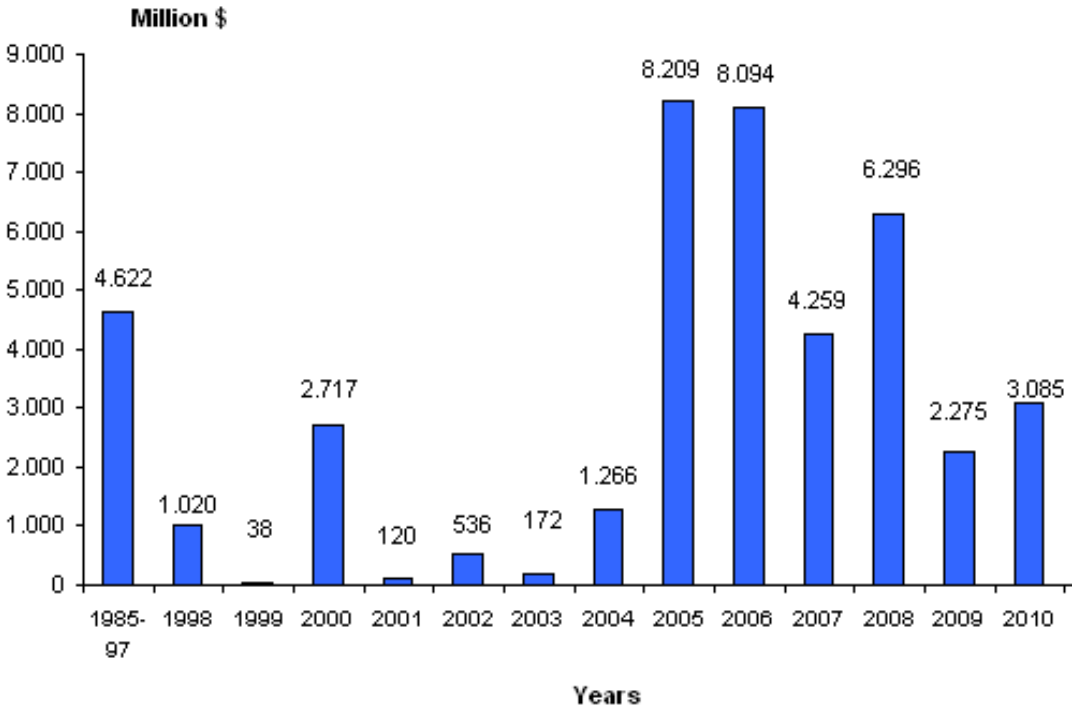
Overall, the empirical results show that privatisation had a positive impact in boosting the firm revenue and productivity. The direct sale method appeared to be the most effective method to privatise an oil and gas firm. In terms of stock performance, it is not surprising that the immediate reaction of the market to the privatisation was not positive due to a long experience of privatisation failure in Turkey. Over a 2-day window, Tupras stocks underperformed both the market and the industry index. However, in the long run, investors benefited from a long period of high profit even after the stock returns are adjusted for the market and industry index movement.

More importantly, the privatisation case of Tupras, which faced much opposition and difficulties before its privatisation completion in 2006, could provide a number of lessons for a successful privatisation. These pertain to the need for a sufficient legal framework, for a transparent process and for a suitable privatisation method that well serves the government's pre-set objectives.

Finally, the findings of this chapter suggest that the involvement of a family firm in privatisation may also affect the stock performance of the firm and the benefits to the other shareholders. After the ownership transfer, Tupras saw a significant change enacted by the new owner family in terms of both its organisational structure and its

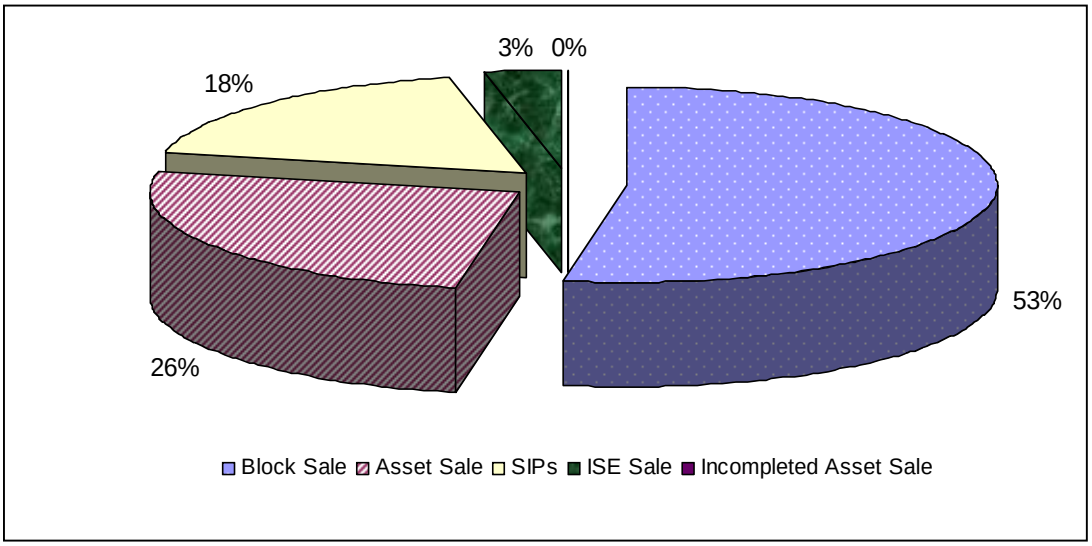
operations strategy. As the Koc family became involved, all Board members were replaced with Koc family members in the leading roles. However, there are reasons for concern about the interests of existing shareholders, especially those with a shorter investment horizon. On one hand, their long-term investment style of the Koc family and its dividend policy present the typical characteristics of a family business. On the other hand, according to the Tupras new operations strategy, unless the shareholders' investment horizon is in line with that of the owner family and unless they intend to keep its shares for at least ten years, they would not benefit from the firm long-term investment projects and may even suffer from a much lower dividend payout. From a legal point of view, the Koc family did not violate the law or damage the firm; however from the shareholders standpoint, when there is a family involvement, it is important that their investment horizon is matched with that of the owner family.

Figure 4.1: Privatisation revenues by years



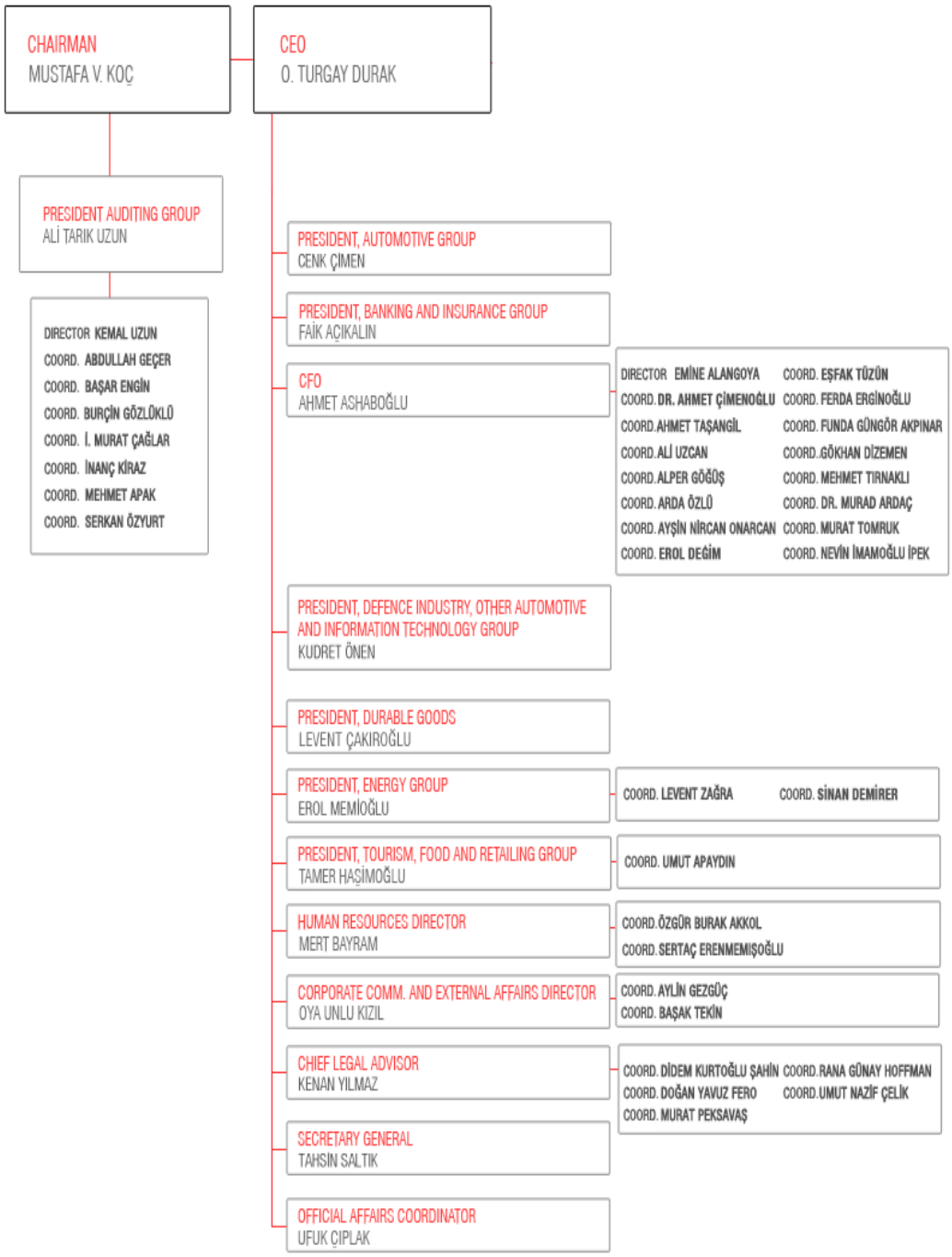
Source: Privatisation Administration, Republic of Turkey Prime Ministry.

Figure 4.2: Privatisation gross revenues by methods



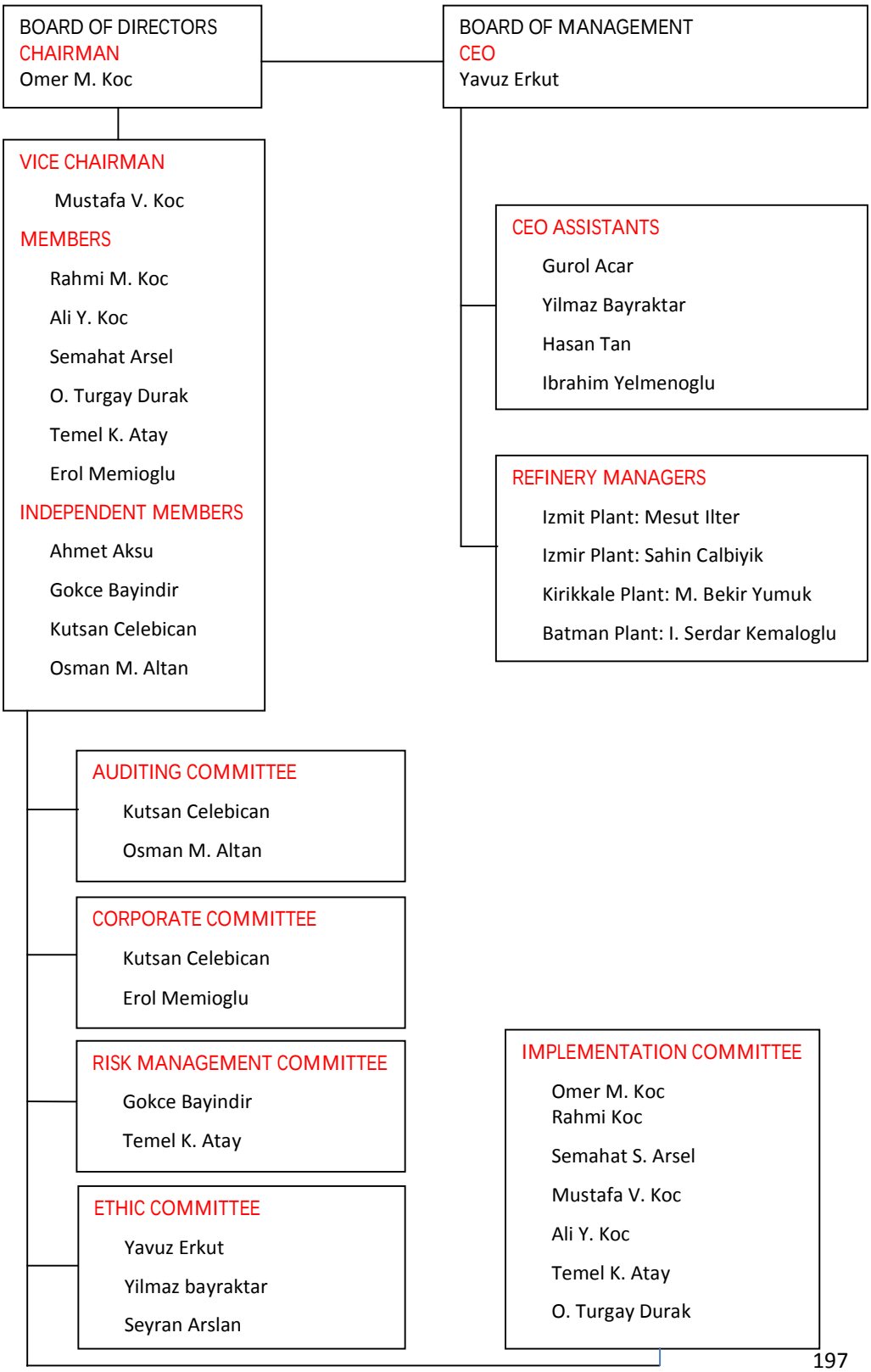
Data: Privatisation Administration, Republic of Turkey Prime Ministry.

Figure 4.3: Koc Holding Organisation chart



Source: Company annual report 2012.

Figure 4.4: Tupras Organisation chart



Source: Company annual report 2012.

Table 4.1: Tupras production

The table briefly reports the capacity, product segmentation and market share owned by Tupras at the end of 2010. Refining capacity is the total capacity in barrels per day (mbpd) of all four refineries owned by Tupras.

	Segment	Total
Refining capacity (mbpd)		560
- Izmit refinery	220	
- Kirikkale refinery	100	
- Izmir refinery	220	
- Batman refinery	20	
Output (mbpd)		547.38
- Distillates	209.59	
- Diesel	98.07	
- Gasoline	107.16	
- Other	132.56	
Revenue (millions TRY)		26,218.72
- Refineries	22,679.53	
- Transportation	4,227.14	
- Adjustments	-687.95	
Domestic market share		
- Gasoline	83%	
- Jet fuel	89%	
- Fuel oil (except bunker oil)	96%	
- Asphalt	99%	
- Low sulphur diesel	56%	

Table 4.2: Tupras performance

Table 4.2 summaries the operating performance of Tupras over three periods of its privatisation process and in comparison to its rivals.

Panel A shows the geometric average rate of change in Tupras's revenue growth rate and cumulative average of change in other accounting performance, such as operating margin and return on assets over three stages of the firm's privatisation. Operating margin is measured by operating profit divided by net sales. Labour productivity is defined as actual sales per employee. Enterprise value refers to the total market value of the firm, including all liabilities and equities minus cash and cash equivalents. The far right column shows the average rate of change over the full sample period from July 1991 to December 2010.

Panel B compares the four oil and gas firms in Turkey in terms of corporate structure and value as at the end of fiscal year 2010. Although to date, all four firms are private firms, two of them are the results of privatisation. Market capitalization is the share price multiplied by the number of shares outstanding. Volatility rating measures the degree of share price changes over the previous 12 month, and scored from 1 to 20 with 1 is the least risky stocks in DataStream.

Panel C reports the operating performance of Tupras in comparison to a similar firm in the industry, partly controlled by a family, but does not involve privatisation, Dogan Holding. The far right column of the panel gives the geometric growth rate of annual sales revenue, the average mean of operating margin, labour productivity and return on assets ratios over 2001 to 2010.

Entries marked 'n.d' indicates the data were not disclosed for the corresponding year.

Panel A: Tupras operating performance before and after privatisation

	1991-2000	2001-2005	2006-2010	1991-2010 change
Revenue growth rate (%)	8.55	3.13	12.00	8.01
Operating margin	-0.63	-0.01	0.04	-0.32
Labour productivity (%)	1.32	6.17	9.41	5.63
Return on Assets	-0.50	-0.02	0.05	-0.25
Export sales	0.09	0.45	0.19	0.21
Net income	-0.70	0.12	0.19	-0.27
Enterprise value	0.39	0.11	0.09	0.23

Panel B: Tupras and three comparison oil and gas firms

	Year of fully privatisation	Family involvement/ Percentage of family ownership	Total Assets	Total Liabilities	Market capitalisation	Enterprise value	Volatility	Number of employees
			Millions TRY	Millions TRY	Millions TRY	Millions TRY	Score 1 to 20	Persons
Tupras	2005	Koc family/ 10%	13,918	10,017	9,666	6,662	5	5,480
OMV Petrol-AS (POAS)	2000	Dogan family/ 6%	6,597	4,405	3,812	6,655	5	954
Dogan Holding	N/A	Dogan family/ 11%	7,936	3,315	2,744	1,972	7	n.d
Turcas Petrol	N/A	Aksoy family/ >40%	561	14	869	735	6	34

Panel C: Tupras and Dogan Holding

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	**2001-2010**
A. Revenue growth rate											
Dogan Holding	0.38	-0.03	-0.03	0.09	0.27	0.23	-0.14	0.21	-0.17	-0.72	**-0.06**
Tupras	-0.15	-0.07	0.47	0.09	0.29	0.35	0.12	0.35	-0.33	0.29	**0.11**
B. Operating Margin (%)											
Dogan Holding	2.21	6.05	8.11	5.61	2.90	2.07	1.97	2.44	0.59	-2.84	**2.91**
Tupras	3.73	3.78	3.99	6.51	5.30	4.16	5.64	4.05	4.68	4.40	**4.62**
C. Change in Labour productivity											
Dogan Holding	1.24	-0.16	-0.06	-0.15	0.60	0.25	-0.41	n.d	n.d	n.d	**n.d**
Tupras	-0.33	0.09	0.04	0.13	0.37	0.04	0.13	0.36	-0.31	0.24	**0.08**
D. Change in Return on Assets											
Dogan Holding	-3.97	1.30	4.20	2.16	6.45	11.21	4.66	0.72	-1.13	7.47	**3.31**
Tupras	7.20	5.93	10.58	12.74	11.88	12.92	16.15	4.88	8.60	6.11	**9.70**

Table 4.3: Short-term effects of Share Issue Privatisations on stock performance

The table summarises the stock market reaction to Tupras's two main Share Issue Privatisations (SIPs) in 7th April 2000 and 4th March 2005, which transferred a total of 49% of shares to the public. The two-day return is the raw rate of return over the business day prior to and the day in question. Cumulative rate of return, R1 (and R2), refers to the cumulative return on the value-weighted return of the ISE-All share index (of the comparison firms) from the business day prior to the trading halt to the day in question. Entries marked n.a are not applicable.

Panel A: 7th April 2000 SIP

Sales date	Two-day return	Cumulative rate of return		Description
		R1	R2	
31/3/2000	-2.74%	1.53%	1.58%	Last date of trading before trading halt for the sales of 31.66% of Tupras shares.
5/4/2000	n.a	0.93%	0.19%	The Administration started received applications
7/4/2000	n.a	7.62%	7.41%	Completion of the sale for nearly 1,105 million USD.
13/4/2000	-12.67%	12.47%	4.08%	Tupras stocks resumed trading.

Panel B: 4th March 2005 SIP

Sales date	Two-day return	Cumulative rate of return		Description
		R1	R2	
3/3/2005	2.98%	1.16%	2.60%	Last date of trading before trading halt for the sales of 14.76% of Tupras shares.
4/3/2005	n.a	1.60%	3.71%	Completion of the sale to foreign investors for 454 million USD.
7/3/2005	6.36%	2.13%	5.00%	Tupras stocks resumed trading.

Table 4.4: Long-term stock performance and three comparison firms

The table reports the average stock return of Tupras over a 5-year period from April 2000 to March 2005 inclusive (except the last 2 rows are from February 1995 to March 2000), and this of three comparison oil and gas firms during the same period. CAR1 equals to cumulative returns on the firm in question minus cumulative return on the Market portfolio. CAR2 is the cumulative abnormal return of the firm in question over the cumulative return of equal-weighted portfolio consisting of the other three comparison firms. The Difference in mean is t-test on the difference in means between the average cumulative rate of return on Tupras stock and this of each firm. The Average shows the simple average of return rate of three comparison firms and the subsequent row compares Tupras's stock return to the Average. The last two rows exclusively report the return differential between Tupras over the Average of its three rivals for the 5-year period prior to March 2000. All rates of return are on a monthly basis.

Firms	Cumulative rate of return	Compounded rate of return	Cumulative Abnormal Return		5-year buy-and-hold rate of return	Difference in mean	*t*-statistics
			CAR1	CAR2			
Tupras	2.16%	1.14%	0.40%	0.57%	1.30%	-	-
OMV Petrol-AS (POAS)	1.04%	-0.55%	-0.72%	-0.93%	-0.27%	1.12%	0.585
Dogan Holding	2.43%	-0.47%	0.66%	0.92%	-0.18%	-0.26%	-0.107
Turcas Petrol	1.32%	-0.58%	-0.44%	-0.56%	-0.53%	0.84%	0.454
Average	1.60%	-0.53%	-0.17%	-0.19%	-0.33%		
Relative to the Average	above	above	Above	above	above		
1995-2000	-0.38%	-0.10%	-1.62%	-0.19%	-0.11%		
Tupras relative to the Ave.	below	below	Below	below	below		

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 4.5: Long-term effects of Direct Sales Privatisations on Tupras stock performance and three comparison firms

The table reports the average stock return of Tupras over a 5-year period from January 2006 to December 2010 inclusive, and this of three comparison oil and gas firms during the same period. CAR1 equals to cumulative returns on the firm in question minus cumulative return on the Market portfolio. CAR2 is the cumulative abnormal return of the firm in question over the cumulative return of equal-weighted portfolio consisting of the other three comparison firms. The Difference in mean is t-test on the difference in means between the average cumulative rate of return on Tupras stock and this of each firm. The Average shows the simple average of return rate of three comparison firms and the last row compares Tupras's stock return to the Average. All rates of return are on a monthly basis.

Firms	Cumulative rate of return	Compounded rate of return	Cumulative Abnormal Return		5-year buy-and-hold rate of return	Difference in mean	*t*-statistics
			CAR1	CAR2			
Tupras	2.06%	1.42%	0.75%	0.22%	1.41%	-	-
OMV Petrol-AS (POAS)	2.15%	1.16%	0.84%	0.34%	1.15%	-0.09%	-0.050
Dogan Holding	0.41%	-0.37%	-0.91%	-1.99%	-0.36%	1.65%	1.042
Turcas Petrol	2.97%	1.76%	1.65%	1.43%	1.75%	-0.91%	-0.485
Average	1.84%	0.85%	0.52%	-0.07%	0.84%		
Relative to the Average	above	above	above	above	above		

: significant at 10% level* *: significant at 5% level* ****: significant at 1% level*

Table 4.6: Dividend policy

The table presents the average amount of retained earnings, dividend payout, debt and new investment per year, and the change in dividend payout ratio over three main stages of Tupras's privatisation. The last column reports the average figures over the entirely period from 1991 to 2010. Earnings, debt and dividend payout are in millions TRY, investment expenses are shown in million US dollars.

	1991-2000	2001-2005	2006-2010	**1991-2010 (Ave.)**
Retained earnings	753.19	2,093.44	3,491.54	**1,772.84**
Dividend payout ratio	0.70	0.75	0.66	**0.70**
Dividend payout:	**0.97**	**1.26**	**2.26**	
- Regular cash	0.01	0.79	2.26	
- Bonus	0.53	0.47		
- Rights issue	0.43			
Total debt	659.58	476.96	1,658.57	**863.67**
Investment (millions USD)	101.0	144.6	277.8	**155.6**

Appendix 1: Data definitions

Data type	Abs	DataStream definitions	DataStream Mnemonic
Ticker symbol		Ticker symbol represents a symbol used to identify the company on the stock exchanges where it is listed. Local Ticker symbols are used for non-US corporations.	ISIN
Base or start date		The base date is the date from which DataStream holds information about the stock issuing. Stocks are rebased in accordance to events of mergers, acquisitions and splitting off. It is used to calculate firms' age.	BDATE
Sector		Datastream classifies each company by industry (that is, its primary activity only). Equities with the same industrial classification are grouped into sectors. Datastream industrial classifications exist at six levels and this chapter classifies firms up to level 3 which consists of the following sectors 1. Resources 2. Basic industries 3. Cyclical consumer goods 4. Non-cyclical consumer goods 5. Cyclical services 6. Non-cyclical services 7. Utilities 8. Information technology 9. Financials	ICBSN
Return Index		A return index shows a theoretical growth in value of a share held over a specified period, assuming that dividends are re-invested to purchase additional units of the equity at the closing price applicable on the ex-dividend	RI

		date.	
Price Index	P	Price market index differs from Return index in the way that it does not assume dividends are re-invested	PI
Market capitalization/ Market value	MV	The share price multiplied by the total number of shares outstanding	WC08001
Book-to-Market equity	B/M	The balance sheet value divided by the market value of the ordinary (common) equity	WC03501#
Earnings per Price	E/P	The earnings rate per share divided by the price of the ordinary (common) equity	PE#
Dividend yield	DY	A ratio in percentage of the total amount of dividends weighted by the total market value	WC05101
1 month London Interbank Offered Rate	1month LIBOR (R_f)	The average interbank rate at which a selection of banks on the London money market charge one another for loans with 1 month maturity, and is used in this thesis as a proxy for the Risk-free asset.	BOELI1M
Total Asset		Represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.	WC02999
Employees		Represent the number of both full and part time employees of the company. It excludes: Seasonal employees Emergency employees	WC07011
Sales		Represent gross sales and other operating revenue less discounts, returns and allowances.	DWSL
Total Cash flow		Consist of: **Net Cash flow Financing:** represents the net cash receipts and disbursements resulting from reduction and/or increase in long or short term debt, proceeds from sale	WC04890

		of stock, stock repurchased/redeemed/retired, dividends paid and other financing activities. **Net Cash flow Investing:** represents the net cash receipts and disbursements resulting from capital expenditures, decrease/increase from investments, disposal of fixed assets, increase in other assets and other investing activities. **Net Cash flow Operating Activities**: represent the net cash receipts and disbursements resulting from the operations of the company. It is the sum of Funds from Operations, Funds From/Used for Other Operating Activities and Extraordinary Items. It includes but is not restricted to: Funds from operations Funds from/for working capital Extraordinary items Data for this field is generally not available prior to 1989.	WC04870 WC04860
Working capital		Represents the difference between current assets and current liabilities. It is a measure of liquidity and solvency.	WC03151
Data type		**Bloomberg database**	
% Shares owned directly by Insiders		The percentage of shares owned by the individuals who are in the firm management. Example: To get the percentage of shares directly held by insiders of , for example, Anel Telekomunik company (Ticker ANELT), the following formula in Excel with a Bloomberg Add-in =BDP("ANELT TI Equity","PCT_INSIDER_SHARES_OUT")	
List of companies by sectors		Using Bloomberg's private company screening tool, run {PSRC <GO>} and then filter by sector/industry by selecting oil and gas industry.	
Company data		To obtain Tupras's (code TUPRS in Bloomberg) financial statements and other company information, in Bloomberg station, start from TUPRS TI Equity FA IS <GO>.	

		For Tupras historical dividends from 01/01/1991 to 31/12/2010, use the following formula in Excel: =BDS("TUPRS TI Equity","DVD_HIST_ALL", "DVD_END_DT=20101231", "DVD_START_DT=19910101")

#: DataStream Mnemonic provides the reciprocals

Appendix 2: Variable definitions

Variables	Abs	Variable construction
High-minus-Low	HML	The mimic the risk factor in returns associated with B/M. At the end of July of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their B/M in June. The 1 month allows the factor to capture underlying risks but still can differentiate from Value and Growth portfolios which are built with a 6 month lag. The monthly portfolio returns are value weighted by market value at the end of June, year *t.* The return differential between the top 30% B/M stocks and the bottom 30% (i.e. HML) means to capture the B/M effect.
Small-minus-Big	SMB	The mimic the risk factor in returns associated with size (i.e. market capitalization). At the end of July of year *t*, stocks are split into 2 groups by the median. The 1 month allows the factor to capture underlying risks and also avoid possible biases caused by asymmetric way of treating HML and SMB factors. The monthly portfolio returns are value weighted by the market value at the end of June, year *t.* The return differential between the small-cap stocks and the large-cap (i.e. SMB) means to capture the size effect.
Dividend yield	DIV	The monthly value-weighted Dividend return, which is the aggregate dividend divided by current stock price.
Short – term Treasury bill yield	STBill	The weighted average auction rate on 3-month Turkish Treasury bills. The monthly rate is calculated using compounding interest rate formula from 3-month Treasury bill rate provided by DataStream (Mnemonic code: TKOIR077R)
Term spread	TERM	The variable means to capture the risk factor in returns associated with changes in interest rates. It is the difference between the yields of a long-term and a short-term Government bond. Turkish Government Bonds are sold in auctions and long-term bonds are bonds with maturity from 12-61 months and short –term ones are 3-month bonds. The choice of bond maturity in each period aims to maximise data availability while ensure representative purposes.

		Auction reports are obtained from the Central Bank of the Republic of Turkey http://www.tcmb.gov.tr/yeni/evds/piyasaing.html
Default spread	DEF	The mimic the default risk factor in returns. At the end of July of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their probability of bankruptcy, measured by O-scores at the end of December year *t-1*. The 6 month lag allows delayed release of financial reports which is common. The return differential between the highest 30% O-score stocks and the lowest 30% O-score stocks means to capture the default spread. The monthly portfolio returns are value weighted by the market value at the end of June, year *t*.
Changes in Term spread	ΔTERM	$\Delta TERM_t = TERM_t - TERM_{t-1}$
Changes in Default spread	Δ DEF	$\Delta DEF_t = -(DEF_t - DEF_{t-1})$
Turnover	TURN	The mimic the liquidity risk factor in returns. At the end of July of year *t*, stocks are divided into 3 groups using the breakpoints: 30%, 40% and 30% based on their turnover ratio at the end of June, measured by trading volume divided by the number of shares outstanding. The return differential between the lowest 30% turnover stocks and the highest 30% turnover stocks means to capture the liquidity risk. The monthly portfolio returns are value weighted by the market value at the end of June, year *t*.
Winner-minus-Loser	WML	The mimic the momentum factor of Jegadeesh and Titman (1993) in returns. 11-month past returns are used to classify the winners from the losers. The return differential between the top 30% stocks and the bottom 30% stocks means to capture the momentum effects. The monthly portfolio returns are calculated at July, year *t* with 1-month lag and value weighted by the market value at the end of June, year *t*.
Firm age	Ln(Age)	Firm age is the natural logarithm of number of months firms have been listed in the ISE according to DataStream

		records.
Stock price	Ln (1/P)	Ln (1/P) is the natural logarithm of the reciprocal of the share price at month *t-2*.
Family firm dummy	D_{Family}	The binary variable takes value of 1 when the firm is a family firm and value of zero otherwise.

Appendix 3: RATS codes modified from Lee and Strazicich (2003) Unit root test with breaks

Five National indices including the ISE National 100 (denoted *ise*), the FTSE 100 (*ftse*), the Nikkei 225 (*nikkei*), the DAX 30 (*dax*) and the S&P 500 (*sp*) are examined with maximum lags of 8. Monthly data are obtained from DataStream Thomson Reuters, covering the period from January 1988 to December 2010. The Lee and Strazicich's codes have been modified for testing monthly return data as followed.

```
calendar 1988 1 12
allocate 2010:12
open data unitroot.xls
data(FORMAT=XLS,ORG=COLUMNS) /ise ftse nikkei dax sp

source(noecho) LS_UROOT.src

@LS_UROOT(model=1,break=1,lags=8,method=gtos,print=0) ise;
@LS_UROOT(model=1,break=1,lags=8,method=gtos,print=1) ise;

@LS_UROOT(model=2,break=0,lags=0,method=gtos,print=1) ise;

@LS_UROOT(model=1,break=1,lags=8,method=gtos,print=1) ise;
@LS_UROOT(model=1,break=2,lags=8,method=gtos,print=1) ise;

@LS_UROOT(model=2,break=1,lags=8,method=gtos,print=1) ise;
@LS_UROOT(model=2,break=2,lags=8,method=gtos,print=1) ise;

dec series timetot timeavg; set timetot 1 276 = 0.; set timeavg 1 276 = 0.;
 do country = 1, 5
 set x = [series]country

 do month = 1, 276
 com timetot(month)= timetot(month)+x(month)
 end do month
 end do country
 do month = 1, 276
 com timeavg(month) = timetot(month)/5
 end do month
do dgp = 1, 2
 do country = 1, 5
 set y = [series]country
com l$ = %l(country)
 dis; dis l$
 dofor j = 1 to 3
 dofor i = 1 to 2
 set dly = y - timeavg
 if dgp == 1 {; @LS_UROOT(model=i,break=j-1,lags=8,method=gtos,print=0) y; }
 if dgp == 2 {; @LS_UROOT(model=i,break=j-1,lags=8,method=gtos,print=0) dly;}
      end dofor i
      dis; dis "----------"
      end dofor j
 dis; dis "********************************************************************* "
 end do country

end do dgp
```

Appendix 4: Excel VBA codes to calculate firms' O-score from annual accounting data

1- Calculate O-score for individual firms

```
Sub Oscore() ' Calculate O-Score
   Dim i, j, d, g As Integer 'd,g are dummies take 1 or 0
   For i = 1 To Range("os").Rows.Count 'i la moi firm
      For j = 1 To Range("os").Columns.Count 'j= years, Starting from 1989
       If IsNumeric(Range("TotalAssets").Cells(i, j).Value) = True And _
          IsNumeric(Range("TotalLia").Cells(i, j).Value) = True And _
          IsNumeric(Range("CurrentAss").Cells(i, j).Value) = True And _
          IsNumeric(Range("CurrentLia").Cells(i, j).Value) = True And _
          IsNumeric(Range("FundOper").Cells(i, j).Value) = True And _
          IsNumeric(Range("GNP").Cells(j).Value) = True And _
          IsNumeric(Range("NetIncome2").Cells(i, j).Value) = True And _
          IsNumeric(Range("NetIncome2").Cells(i, j + 1).Value) = True And _
          IsNumeric(Range("NetIncome2").Cells(i, j + 2).Value) = True And _
          IsNumeric(Range("WorkingCap").Cells(i, j).Value) = True And _
          IsEmpty(Range("TotalAssets").Cells(i, j).Value) = False And _
          IsEmpty(Range("TotalLia").Cells(i, j).Value) = False And _
          IsEmpty(Range("CurrentAss").Cells(i, j).Value) = False And _
          IsEmpty(Range("CurrentLia").Cells(i, j).Value) = False And _
          IsEmpty(Range("FundOper").Cells(i, j).Value) = False And _
          IsEmpty(Range("GNP").Cells(j).Value) = False And _
          IsEmpty(Range("NetIncome2").Cells(i, j + 2).Value) = False And _
          IsEmpty(Range("NetIncome2").Cells(i, j + 1).Value) = False And _
          IsEmpty(Range("NetIncome2").Cells(i, j).Value) = False And _
          IsEmpty(Range("WorkingCap").Cells(i, j).Value) = False Then

          If Range("TotalLia").Cells(i, j).Value > Range("TotalAssets").Cells(i, j).Value Then
          d = 1
          Else: d = 0
```

```
        End If


        If Range("NetIncome2").Cells(i, j).Value < 0 And Range("NetIncome2").Cells(i, j + 1).Value < 0 Then
           g = 1
        Else: g = 0
        End If


        Range("os").Cells(i, j).Value = -1.32 - 0.407 * Log((Range("TotalAssets").Cells(i, j).Value /
Range("GNP").Cells(j).Value)) / Log(10) _
                                + 6.03 * (Range("TotalLia").Cells(i, j).Value / Range("TotalAssets").Cells(i, j).Value) _
                                - 1.43 * (Range("WorkingCap").Cells(i, j).Value / Range("TotalAssets").Cells(i, j).Value)
_
                                + 0.076 * (Range("CurrentLia").Cells(i, j).Value / Range("CurrentAss").Cells(i, j).Value) _
                                - 1.72 * (d) _
                                - 2.37 * (Range("NetIncome2").Cells(i, j + 2).Value / Range("TotalAssets").Cells(i,
j).Value) _
                                - 1.83 * (Range("FundOper").Cells(i, j).Value / Range("TotalLia").Cells(i, j).Value) _
                                + 0.285 * (g) _
                                - 0.521 * (Range("NetIncome2").Cells(i, j + 2).Value - Range("NetIncome2").Cells(i, j +
1).Value) / _
                (Abs((Range("NetIncome2").Cells(i, j + 2).Value)) + Abs((Range("NetIncome2").Cells(i, j + 1).Value)))
      Else: Range("os").Cells(i, j).Value = "x"
      End If


      Next j
   Next i


End Sub
```

2- Pick and match firms' O-scores for each year

```
Function CountFirms1sheet()
    Dim m, i As Integer
    m = 0
    i = 1
    Do While IsEmpty(Cells(i, 1)) = False
        m = m + 1
        i = i + 1
    Loop
    CountFirms1sheet = m - 1
End Function


Sub PickOscoreAllSHEETsaccordingtoCode()
    Dim n, i, j, k, f, e, b, a, z As Integer
    Dim h, c, t As String
    Dim g As Date
    Dim d As Integer
    Dim ws As Worksheet
    Dim s As Boolean

    Workbooks("O score.final").Activate
    Sheets("O Score").Select
    a = Range("NamdCode").Rows.Count - 1
    b = Range("OscoreValues").Columns.Count

    Workbooks("O-score.Each year").Activate
    For Each ws In Worksheets
        Workbooks("O-score.Each year").Activate
        ws.Select
        f = 0
        n = CountFirms1sheet
```

```
For i = 1 To n
    Workbooks("O-score.Each year").Activate
    ws.Select
    h = Cells(i + 1, 3).Text

    'If IsEmpty(h) = False Then

      "Workbooks("O score.final").Activate
      "Sheets("O Score").Select
      "a = Range("NamdCode").Rows.Count - 1
      For j = 1 To a 'or Range("NamdCode").Columns.Count

      Workbooks("O score.final").Activate
      Sheets("O Score").Select
      c = Cells(j + 4, 3).Text

      If h = c Then
        "Workbooks("O score.final").Activate
        "Sheets("O Score").Select
        "b = Range("OscoreValues").Columns.Count

          Workbooks("O-score.Each year").Activate
          ws.Select
          g = Cells(1, 5).Value

        For e = 1 To b
          Workbooks("O score.final").Activate
          Sheets("O Score").Select
          'Range("OscoreValues").Select
          d = Range("OscoreValues").Cells(1, e).Value 'K    'd = CDate(t)

          If d = Year(g) - 1 Then
```

```
                k = e


                Workbooks("O score.final").Activate
                Sheets("O Score").Select
                'Range("OscoreValues").Select
                f = Range("OscoreValues").Cells(j + 1, e).Value
                'If IsEmpty(f) = False Then

                  Workbooks("O-score.Each year").Activate
                  ws.Select
                  Cells(i + 1, 4).Value = f
                  Exit For
                'Else: Exit For
              End If
              Next e
            Exit For
            End If
          Next j
        'End If
      Next i

  Next ws

End Sub
```

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