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THE ROLE OF EARNINGS AND BOOK VALUES IN PRICING STOCKS: EVIDENCE FROM TURKEY

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THE ROLE OF EARNINGS AND BOOK VALUES IN PRICING STOCKS: EVIDENCE FROM TURKEY

Abstract

In this study, we examine factors associated with equity valuation in a newly emerging market, Turkey. In the United States and other developed countries, research indicates that both earnings and book value are important predictors of equity valuation. In Turkey, earnings appears to have information content but earnings, by itself, appears to be declining in importance over time. Book value adjusted for inflation has a stronger association with equity values. In the inflationary and risky environment of Turkey, where future value of earnings is quite uncertain, investors may be paying less attention to earnings and more attention to book values. With respect to the role of book value there are competing explanations. While some researchers conclude that it is only important because it is a control for scale differences, (Barth and Kallapur 1996) others conclude that it is relevant as a proxy for normal earnings (Ohlson 1995). Still others conclude that it is only relevant in the valuation of loss making and generally unsuccessful firms (Berger, Ofek and Swary 1997; Burgstahler and Dichev 1997). The additional contribution of this study is to show that book value is also important as a value proxy for firms operating in environments where there is rampant inflation. Our study also indicates that, overall, earnings and inflation-adjusted book values combined virtually explain almost 75 percent of the variation in equity prices in Turkey.

Keywords: *Earnings, book values, equity values, Turkish firms, Istanbul Stock Exchange*

THE ROLE OF EARNINGS AND BOOK VALUES IN PRICING STOCKS: EVIDENCE FROM TURKEY

1. INTRODUCTION

In the developed world, empirical research finds that earnings and book value can be used to predict firm value. In particular, researchers have examined the association between earnings, book value, and a combination of both with stock prices and have found it to be significant (Ball and Brown 1968; Ball 1972; Kaplan and Roll 1972; Collins and Kothari 1989; Burgstahler and Dichev 1997). In a landmark paper, Ohlson (1995) modeled this association and provided a widely used framework for empirical exploration. Burgstahler and Dichev (1997) [henceforth, BD (1997)], an important study in this area, suggested that equity value is an option style combination of *recursion value* (capitalized expected earnings when the firm recursively applies its current business technology to its resources) and *adaptation value* (the value of the firm's resources adapted to alternative use). They used current earnings as a proxy for recursion value and book value of equity as a proxy for adaptation value. While earnings provide a measure of how the firm's resources are currently used, book value provides a measure of the value of the firm's resources independent of how the resources are currently used. In particular, they note that when the ratio of earnings/book value is high, earnings is the more important determinant of equity value. This is because under such a scenario the firm is likely to continue in its current approach to using resources. When earnings/book value is low, book value becomes the more important determinant of equity value. Under this alternative scenario the firm is more likely to exercise the option to adapt its resources to a superior alternative use.

In this study, we examine the association between earnings and book value with equity prices in the Turkish stock market. Analysis of the Turkish market presents the potential for obtaining insights into stock valuation in a developing (emerging) market. While an argument could be made that certain factors, such as inflation and political and economic consequences of joining the European Union (EU), make the

Turkish market unique we note that the Turkish market is still very reflective of developing markets in general. Beim and Calomiris (2001) classify Turkey as an emerging market because of its low per capita income, chronic inflation, thin and immature capital markets, and concentrated financial and industrial sectors; criteria that they use to characterize emerging markets in general.

Although the Istanbul Stock Exchange (ISE), established in 1986, is considered as one of the fastest growing emerging markets, it is still small relative to the stock markets in developed countries. As Zychowicz et al. (1995) note, potential volatility and inefficiency also characterize the Turkish market in that the buying and selling activity of a few large investors can significantly influence stock prices. Turkey is now in a state of transformation and is on the path to becoming a fully fledged member of the EU. Hence, it is interesting to examine if the relationships between earnings, book value and equity values that exist in the larger and presumably more efficient markets will hold in a developing stock market that aspires to join its more developed counterparts. The objective of this study is to examine the association of recursion value (earnings) and adaptation value (book value of equity) with share prices in an emerging stock market. Our results show that when the sample is partitioned based on "success" earnings is significantly associated with equity value for successful and middle-of-the-road firms; inflation adjusted book value is significantly associated with equity value for unsuccessful firms. This may indicate that the "adaptation value" component of a firm's equity value is relatively more important than the "recursion value" component for unsuccessful firms whereas the opposite is true for successful firms. Moreover, we find that in a risky business environment the recursion value generally outweighs the adaptation value in determining the market capitalization of a firm.

This study will try to underline the potential factors causing the variation of stock prices in different settings. It is, therefore, imperative to understand the institutional and economic factors behind such differences. Accordingly, our paper is structured as follows. In Section 2 a detailed analysis of the unique institutional and economic characteristics of Turkey is provided and our results are discussed against this

backdrop. Section 2 and the Appendix also provide a brief history of the evolution of the Turkish stock market commencing in the period after the First World War. Section 3 discusses fundamental characteristics of the accounting treatments in Turkey. This discussion is important because any differences in results could be attributed to differences in accounting treatments. Thus, a critical examination of the key differences and similarities is essential. Section 4 discusses prior studies and methodology. We present our empirical results in Section 5 and offer concluding comments in Section 6.

2. INSTITUTIONAL AND ECONOMIC CHARACTERISTICS OF TURKEY

In this section, we summarize the history of the Turkish stock market (refer to the Appendix for a more detailed discussion of events). In the period after World War One Turkish government policy was characterized by an orchestrated economic development strategy popularly referred to as Etatism. This strategy followed a similar pattern adopted in a number of developing countries (Okyar 1965). This "planned development" period was primarily characterized by the introduction of incentive schemes to foster private enterprise. The private sector flourished with the aid of extensive government protection (e.g., entry barriers and high tariffs for foreign products) and incentive schemes (e.g., subsidized lending and tax exemptions among others). Barth and Hemphill (2000) note that due to such incentive schemes the private sector contributed a little more than half of the value added in manufacturing. Within this closed economic and financial environment, a number of giant industrial holdings emerged. These holdings tended to be predominantly family-owned and had close political and financial ties. Due to entry barriers, scarce internal capital, lack of developed capital markets and open collusion these groups have continued to dominate in their respective sectors.[1]

In January 1980, the Turkish government initiated an economic stability program called "***National New Economic Policy***" with the principal goal of integration into the world economy through the establishment of a free market. Under this policy unified accounting principles and a standard reporting system were adopted and firms began to be audited by independent external auditors in accordance with

internationally accepted principles of accounting. Isik and Hassan (2002) note that Turkey's determination to be a permanent member of the EU motivated its authorities to ensure that their regulations were in harmony with those of the Union. As a reflection of financial market development policies, the Istanbul Stock Exchange (ISE) was re-established in 1986 to provide liquidity in the financial system.[2, 3] The ISE has grown substantially since its inception both in terms of the number of companies listed and total market valuation (please refer Table 1 for details). The number of companies listed in the exchange increased from 350 in 1986 to 1,284 in 1993, but later declined to 262 in 2002. Total market capitalization increased significantly from $938 million in 1986 to approximately $34 billion in 2002. Both the price-earning multiple and dividend yield indicate a decreasing trend for the ISE firms over time, with considerable variation between periods.

[Insert Table 1 here]

Money and capital markets in Turkey remain relatively thin and underdeveloped compared to those in Western Europe and North America (Zychowicz et al. 1995; Kiymaz 2000; Isik and Hassan 2002). Evidence of this is shown in Table 2. As an illustration, the market value of Turkey in 2002 was $6.1 billion compared to $1,288 billion for the United States.

[Insert Table 2 here]

The underdevelopment of capital markets in Turkey can be attributed to a variety of factors:

a. the government provides protection from foreign competition;

b. firms are mostly family owned and relatively small and family controlled firms have no incentives to issue equity to raise capital especially if they own a bank;

c. bank loans are relatively cheap given the high rate of inflation in the country.

The shares of relatively few firms are traded on the stock exchange and the ownership of stock investment is not as widespread in Turkey as it is in more developed markets. The market is very susceptible to external and internal shocks as reflected by the fact that Turkish shares lost more than 50% of their value during the Russian crisis in 1998. Investor confidence is low due to lack of effective regulations and inefficiencies in their implementations (Zychowicz et al. 1995; Tracy and Schneider 2001). In essence, there are two reasons for the apparent low participation in equity investment in Turkey.

a. More secure alternative financial investments have performed better in Turkey's high inflation environment. Government debt instruments have been the most lucrative assets in Turkey in recent years.[4]

b. The financial and industrial sectors in Turkey are intertwined. Unlike the U.S. and Europe, most Turkish firms (regardless of size) are family owned. Large firms prefer traditional bank loans to equity issue as the source of funds because most of the private banks are in one way or another affiliated with these firms under the umbrella of a holding company structure (Isik and Hassan 2002).

Finally, the point has to be made that pricing of securities in Turkey may not be as efficient relative to more developed markets. Pi and Timme (1993) note that institutional investors (e.g., insurance companies, pension funds, mutual funds, investment companies) in the more developed countries, such as the U.S., contribute to more efficient pricing of securities due to their accumulated knowledge, experience and more sophisticated investment analyses. Turkish investors, on the other hand, are characterized by a general lack of strong information processing and decision making systems and techniques. In summary, due to the presence of a relatively greater fluctuating economic environment, high inflation and a less sophisticated and more complicated investor body the asset valuation process and factors used to appraise assets may be different in the Turkish market relative to a more advanced market. Furthermore, because the Turkish market is relatively thin compared to markets in the developed world, one could also expect that share prices in Turkey are more susceptible to external and internal events and thus riskier. These

differences in the economic environments could create variations across markets in stock valuation and the emphasis given to different components of valuation, such as earnings and book values.

3. ACCOUNTING TREATMENT IN TURKEY

There are three significant differences between Turkey and the United States. First, Turkish standards allow assets up to 150 million Turkish Lira (TL) to be directly written off as an expense. In the U.S., decisions to write off are governed by the *materiality* concept of Generally Accepted Accounting Principles (GAAP). Assets that are "material" must be capitalized and shown as an asset. Second, companies in Turkey can also determine the depreciation rate for fixed assets, excluding buildings, provided that such rates do not exceed 20 percent on a straight-line basis.[5] Third and most important, Turkish firms are allowed to *revalue* the cost of depreciable fixed assets and the related accumulated depreciation by *adjusting* (dividing) these values by the rate that is announced each year by the Ministry of Finance. [6] A *revaluation fund* is created for the purpose of ensuring a proper evaluation of fixed assets that have been adversely affected by inflation.[7] In the United States, such forms of revaluation for the purpose of valuation for financial reporting are not permissible (and likely not important with the relatively low inflation).

In summary, the main difference between accounting treatments in Turkey and the U.S relate to valuation. As a result of the revaluation process, the value of fixed assets and accumulated depreciation are increased commensurate with the rate of revaluation (Activefinans 2001). At the end of this process, the net revaluation increase of fixed assets is recorded under the shareholders' equity section of the balance sheet as the *revaluation fund*.[8]

4. LITERATURE REVIEW AND METHODOLOGY

In this section we initially discuss studies that examine the association of earnings and book values with equity values. We then focus on studies that have examined data from the Turkish stock market. As

evidenced in the latter stream of research, this study is the first to examine the relationship of earnings and book values and stock prices in the Turkish environment.

4.1 Studies examining the association of earnings and book values with equity values

In general, much of the research in the last thirty years focused on examining the association between certain variables and equity values. Ball and Brown (1968), in a seminal study, found a positive and statistically significant association between earnings and equity value. Beaver, Clark, and Wright (1979) found similar results and corroborated the initial findings of Ball and Brown (1968). Subsequent studies (Barth et al. 1992; Collins and Kothari 1989) again found similar results. Lipe (1990) found that the relationship between earnings and equity value varies with the persistence of earnings. Other studies refined the earlier studies by decomposing earnings into components and then empirically testing the association between these components and equity values (Lipe 1986; Wilson 1986).

A number of studies focus on the balance sheet measures of assets and liabilities. These studies find a statistically significant association between book values and equity value of the firm (Penman 1992; Barth and Kallapur 1996; Ohlson 1995; Berger, Ofek and Swary 1996; Burgstahler and Dichev 1997). These studies use the book values of the firm's assets and liabilities impounding the assumption that measures of assets and liabilities reflect the expected results of future activities. However, the studies arrive at different conclusions regarding the importance of book value. Barth and Kallapur (1996) state that book value is important only because it acts as a control for scale differences. Penman (1992) and Ohlson (1995) conclude that book value is important because it also acts as a proxy for earnings. Still, others offer a competing explanation. Berger et al (1996) and Burgstahler and Dichev (1997) conclude that book value has relatively more significant association with stock prices when a firm is unsuccessful and making losses. They argue that this is because book value acts as a proxy for the "abandonment option."

Some studies examine the relationship between a combination of earnings and book values and equity values. Bernard (1995) empirically tested several valuation models. He found that book value per share explained 55 percent of the cross sectional variability in price per share; that book value and the rank of return on equity explained 64 percent of the variation in equity price; and that estimated earnings and book values explained 68 percent of the variation in equity prices. Ohlson (1995) rather than focus on earnings alone, theoretically modeled the role of earnings, book value and dividends in the valuation of a firm's equity. He modeled the value of a firm as a linear additive function of both earnings and book value. He concluded that, while current dividends are more important than future earnings in predictive ability, current earnings might have a stronger association with equity values. Ohlson (1995) laid the theoretical framework for further empirical explorations.

BD (1997), in a further refinement of Ohlson (1995), showed that earnings and book values are positively and significantly associated with equity values. However, they found that the relation was non-linear (i.e., moderated by factors such as success of a firm) and not additive as suggested by Ohlson (1995). Specifically, they developed two propositions for the relationship of recursion (proxied by earnings) and adaptation value (proxied by book value of equity) components with market value:

(1) market value is an increasing, convex function of expected earnings, for a given adaptation value;

(2) market value is an increasing, convex function of adaptation value, for given expected earnings.

As mentioned above, BD (1997) found that the extent of association of equity values with earnings and book value was dependent on the level of success of the firm. When the firm is "successful" earnings is the more important determinant of equity value and when the firm is less successful book value is the more important determinant of equity value. This finding is further corroborated by Collins, Pincus and Xie (1999). Specifically, Collins et al. (1999) concluded that book value is an important determinant of

stock prices especially for firms making losses. For firms that have a high probability of liquidating due to their financial losses, book value acts as a proxy for what they referred to as the "abandonment option." Our study adds to the literature by concluding that book value is also important for firms operating in high inflation environments.

4.2 Studies examining Turkish stock market data

There are only a limited number of studies in accounting and finance journals using Turkish stock market data. One group of studies investigates the behavior of Turkish stock prices. Yuce (1994), for example, examined the main characteristics of Turkish stock prices in her dissertation and reported that, similar to their U.S. and European counterparts, returns of Turkish stocks were negatively skewed, highly leptokurtic and non-normal. Zychowicz, Binbasioglu and Kazancioglu (1995) explored the behavior of Turkish stock prices in the ISE covering the period 1988-1992. They examined whether stocks in the Turkish stock market conformed to the weak form of market efficiency, which maintains that all past information is reflected in the stock price and investors cannot earn excess returns based on historical information. Zychowicz et al. (1995) examined both daily and seasonal patterns in the ISE returns. They found that daily and weekly returns diverge from the random walk. The behavior of monthly returns was found to be inconsistent with the random walk hypothesis, which implies market inefficiency in pricing securities. These findings are consistent with the previous empirical studies on emerging stock markets. Kiymaz (2000) studied the initial and after-market returns for the Turkish IPOs to provide an emerging market case of international evidence. He found that newly issued shares are under-priced by about 14% overall and more specifically, 12% for industrials, 15% for financials and 19% for others; this is consistent with the findings of other international studies on IPOs.

In summary, there is a paucity of research in the international arena using Turkish data. The published research that is available has focused on the behavior of Turkish stocks. There is currently no research that examines the variables that drive equity values in the Turkish environment. Therefore, one of the

main goals of this paper is to investigate whether the underlying economic behavior of equity valuation pertains in this new environment. The results of this research contribute to the current literature as they can potentially present evidence of different or similar economic behavior in the environments of developed and developing markets. Overall, we *expect* to find a higher association between book values and equity values in Turkey relative to the level found in the U.S. due to significantly different levels of inflation and significantly different perceptions of risk in the two countries. In the relatively inflation free environment of the U.S., assets and liabilities are not required to be adjusted for inflation. In that environment, market values may diverge significantly from book values causing book values to be less meaningful. Turkey is characterized by high inflation rates. As already mentioned, reported asset values in Turkey have to be at *inflation adjusted values* rather than *historical* cost. Accordingly, all values are adjusted for inflation prior to incorporation in the Balance Sheet. In this environment, book values may not diverge significantly from market values. Thus, reported book values may have greater meaning to Turkish investors relative to American investors. Hence, it would be useful to examine how the roles of adaptive and recursive values in the Turkish market differ from their roles in the developed market.

4.3 Methodology

To investigate the value relevance of earnings and book value in Turkey, based on prior literature, we developed the following regression equations.

$$(1) \qquad P_{i,t}/B_{i,t-1} = \alpha_0 + \beta_1(E_{i,t}/B_{i,t-1}) + \varepsilon_1,$$

$$(2) \qquad P_{i,t}/B_{i,t-1} = \alpha_1 + \beta_2(B_{i,t}/B_{i,t-1}) + \varepsilon_2,$$

$$(3) \qquad P_{i,t}/B_{i,t-1} = \alpha_2 + \beta_3(E_{i,t}/B_{i,t-1}) + \beta_4(B_{i,t}/B_{i,t-1}) + \varepsilon_3,$$

$$(4) \qquad P_{i,t}/B_{i,t-1} = \alpha_3 + \beta_5 M + \beta_6 H + \beta_7(E_{i,t}/B_{i,t-1}) + \beta_8 M(E_{i,t}/B_{i,t-1}) + \beta_9 H(E_{i,t}/B_{i,t-1}) + \varepsilon_4,$$

$$(5) \qquad P_{i,t}/E_{i,t} = \alpha_4 + \beta_{10} M + \beta_{11} H + \beta_{12}(B_{i,t-1}/E_{i,t}) + \beta_{13} M(B_{i,t-1}/E_{i,t}) + \beta_{14} H(B_{i,t-1}/E_{i,t}) + \varepsilon_5$$

where

$\boldsymbol{P_{i,t}}$ is price per share (market value) of equity for firm ***i*** at the end of period ***t,***

$\boldsymbol{E_{i,t}}$ is the annual earnings per share for firm ***i*** in period ***t,***

$\boldsymbol{B_{i,t}}$ is book value per share for firm ***i*** at the end of period ***t,***

M is a dummy variable (1 for firms with **M**edium earnings to book value ratio in Equation 4 and scaled book value in Equation 5 firms; 0 otherwise),

H is a dummy variable (1 for firms with **H**igh earnings to book value ratio in Equation 4 and scaled book value in Equation 5; 0 otherwise),

$\boldsymbol{\varepsilon}$ is a normally distributed error term.

To be consistent with prior studies, we follow Bowen (1981), BD (1997) and Bao and Bao (1998) and normalize both the dependent and independent variables in Equations 1 through 3 by the beginning book value per share. Moreover, we prefer to use $B_{i,\ t-1}$ as the measure of book value of equity (adaptation value) for firm *i* at period *t*, since by definition $B_{i,t}$ contains $E_{i,,t}$ as a component. According to BD (1997), empirical tests using $B_{i,\ t-1}$ will more clearly separate the effects of earnings (*E*) and book value of equity (*B*).[9] The model in Equation 1 allows us to test whether price is positively associated with earnings. The model represented by Equation 2 allows us to test whether price is positively associated with book value. The model in Equation 3 uses an additive form of earnings and book value based on Ohlson (1995), who postulated that firm value is a linear function of both earnings and book value. This equation is also specified in Amir (1996). Equations 4 and 5 examine how the relationship of earnings and book value to price is moderated by the success level of firms. Dummy variables are included to represent successful (H), unsuccessful (L), and middle of the road firms (M). If the firm is "successful" and is likely to continue in operation then earnings information will be significantly associated with valuation. However, if a firm is "unsuccessful" then it will attempt to find alternative uses for its resources to survive.[10] For these firms, book value rather than earnings will be a significant variable influencing valuation of stocks (equity). Similarly, for "middle of the road" firms, equity value will be significantly associated with both

earnings and book values. The cutoff points are determined to ensure an equal number of observations in each group using the rankings according to E_{it}/B_{it-1} for Equation 4 (Table 7) and B_{it-1}/E_{it} for Equation 5 (Table 8). The last two columns in Tables 7 and 8 give the cutoff points for each period, which define the unsuccessful firms (earnings less than Cutoff1), middle of the road firms (earnings between Cutoff1 and Cutoff2) and successful firms (earnings greater than Cutoff2).

We obtained the data used in this study from the data bank of Istanbul Stock Exchange (ISE). Following Fama and French (1992), BD (1997) and Bao and Bao (1998), we excluded non-financial firms as well as firms with negative book value of stockholders' equity. In addition, some firms were deleted because of missing share performance information. The frequency of our data is semiannual and extends from the second half of 1992 to the second half of 2001.[11] The firms making up our sample are all traded in the National Market section of the ISE. Our panel data consists of a total of 3,671 observations of Turkish industrial firms for nineteen time periods. We estimate the regressions using least squares. As proposed by White (1980), we compute a consistent estimate of the covariance matrix allowing for heteroscedasticity. It should be noted that the coefficients themselves do not change, only their standard deviations. Further, in order to control for distorted results due to possible extreme observations, we omitted any observation for which the residual was larger than three standard deviations for each of the five models. This ensures that our results are not driven by outliers.

5. EMPIRICAL RESULTS

Table 3 provides descriptive statistics for our data. As can be observed, the number of firms generally increases over time from 98 in the first half of 1993 to 208 in the second half of 2001. The market to book value ratio exhibits wide fluctuations across firms and over time as evidenced by high standard deviation values and substantial changes in the mean values across periods. The average earnings as a percentage of book value also demonstrate large variations over the sample period. One interesting observation is that in

Turkey average earnings scaled by book value is substantially higher than in more advanced countries, such as the U.S. This wide difference in earnings may be a reflection of the degree of *business risk* associated with the two different environments.[12] Alternatively, this earnings difference may be a result of the degree of *competition* in the two markets. The environment in the U.S. is more competitive as firms have to compete not only with many domestic rivals but also with many foreign competitors, thus making it difficult for U.S. firms to earn high returns.[13] The business environment in Turkey, however, is closed and less competitive. Turkish firms are protected from internal and external competition with extensive regulation and entry barriers. Moreover, the industrial sectors in Turkey are highly concentrated and control is dominated by a few very large firms, the typical characteristics of an oligopolistic market that yield high profits.[14]

[Insert Table 3 here]

5.1 Regression Results

Table 4 contains coefficient estimates for the simple linear form relating $P_{i,t}/B_{i,t-1}$ to $E_{i,t}/B_{i,t-1}$ (Equation 1). Results are presented for regressions conducted for semi-annual periods from 1992 to 2001. As shown in Table 4, the coefficients on earnings are significant for all the years. This suggests that, in Turkey, earnings are important in terms of information content and significantly associated with equity prices. As can be observed in the Table 4, as we move to more recent periods the value of the coefficient declines. However, while noting that the estimates show a wide fluctuation about the trend, we attribute the decline to a general decrease in the importance of earnings over the years. (An alternate explanation is that the constraint imposed by the simple linear form may have become less appropriate over time.)

Turkey experienced an intense economic crisis in 1994 that caused the GNP to shrink by 6%, a record level of annual output loss to that date. The Turkish Lira lost more than 50% of its value against the U.S. dollar in the first quarter of 1994, which hurt the firms that carried a substantial amount of hard-currency

denominated borrowed funds from external and internal financial markets. This crisis was an important early warning signal and the precursor for the subsequent crises that occurred in 1997-1998, and more recently in November 2000 and February 2001. These later crises necessitated an international bailout of the Turkish economy. As Turkish firms began to operate in an increasingly risky environment, characterized by greater threats to survival, Turkish investors may have focused less on the "recursion value" component of a firm's value (the present value of the future earnings under the assumption that the firm continues to survive) and more to the "adaptation value" component (the liquidation value of the firm's resources when it is adapted to alternative uses). These developments in the Turkish environment during this period give credence to the results.

[Insert Table 4 here]

Table 5 contains estimates of the coefficients for the simple linear form relating $P_{i,t}$ /$B_{i,t-1}$ to $B_{i,t}$ /$B_{i,t-1}$ (Equation 2). The book values are inflation adjusted reported values (this holds for all equations). As shown in Table 5, the coefficient for book value is significant in all periods. This indicates that inflation adjusted book values is significantly associated with equity value for the time period under study. Interestingly, the estimates in Table 5 indicate that book value adjusted for inflation has a stronger association with equity value than earnings (based on higher adjusted R^2 for two-thirds of the period regressions). In the inflationary environment of Turkey, inflation adjusted book value seems to be more important to investors in assessing equity value. As BD (1997) note, within a volatile business environment the adaptation value (the current value of the firm's resources independent of its business technology) may become more important than the recursion value (how well firms currently apply their current business technology to its resources).[15] Since it is relatively more difficult to determine the market value of an asset by projecting future earnings in an unstable financial environment than in a stable one, it may be that Turkish investors are weighing the *inflation adjusted* value of the assets more than their *potential* value. In a turbulent environment, where firm failures are common, it appears that investors pay

less attention to future earnings that may not be realized. Also, to an extent, inflation accounting through revaluation funds reduces the differences between market value and book value. The average adjusted R^2 for the model in Table 5 (60%) is also greater than that of the model in Table 4 (approximately 40%), indicating a significantly stronger association between inflation adjusted book value and equity values than between earnings and equity values.[16]

[Insert Table 5 here]

Firm value can be considered a function of both earnings and book value. A firm has the option to either continue its present activities or adapt its resources to alternative uses. Table 6 contains estimates of the coefficients for the linear form relating $P_{i,t}/B_{i,t-1}$ to $E_{i,t}/B_{i,t-1}$ and $B_{i,t}/B_{i,t-1}$ (Equation 3). In Table 6, the coefficients on both earnings and book value are significant for most years. While both earnings and book values are individually associated with firm value, they are more powerful in explaining value when combined. The adjusted R^2 for all the periods except 1992:II is higher for the regressions that include both variables (Model 3) than for either variable alone (Model 1 and Model 2). The coefficient of partial determination measures the marginal contribution of one independent variable when all the other independent variables are already included in the regression model. The last two columns of Table 6 give the coefficients of partial determination for $E_{i,t}/B_{i,t-1}$ and $B_{i,t}/B_{i,t-1}$. For 13 out of the nineteen periods the marginal contribution of book value is greater than the marginal contribution of earnings. These estimates also support the argument that the importance of book value as an explanatory variable for equity value has been increasing in recent years.

[Insert Table 6 here]

Table 7 contains estimates of the coefficients for the piece-wise form relating $P_{i,t} / B_{i,t-1}$ to $E_{i,t} / B_{i,t-1}$ after controlling for firm "success" (Equation 4). Table 8 reports estimates of the coefficients for the piece-wise form relating $P_{i,,t}/E_{i,t}$ to $B_{i,t-1}/E_{i,t}$ after controlling for firm "success" (Equation 5).[17] As mentioned

earlier, we divided the domains of $E_{i,t}/B_{i,t-1}$ (Table 7) and $B_{i,t-1}/E_{i,t}$ (Table 8) into three groups with equal numbers of observations. For example in Table 7, the groups were identified in the 1992-II period as follows: those with $E_{i,t}/B_{i,t-1}$ less than 0.243 (Cutoff1) to the unsuccessful firms (L), which is excluded from the regressions as the base case, those with $E_{i,t}/B_{i,t-1}$ greater than 0.243 (Cutoff1) but less than 0.577 (Cutoff2) to the middle of the road firms (M) and those with $E_{i,t}/B_{i,t-1}$ greater than 0.577 (Cutoff2) to the successful firms (H). The same grouping procedure is implemented for $B_{i,t-1}/E_{i,t}$ in Table 8.

The intercept and slope coefficients for the middle of the road (β_5 and β_8) and successful firms (β_6 and β_9) were estimated *incremental* to the intercept and slope coefficients of the unsuccessful firms (α_3 and β_7).[18] In doing so, the objective is to test whether the incremental coefficients are equal to zero. Thus, the *t*-statistics given in the tables for the middle of the road (M) and successful firms (H) are for tests of incremental significance relative to the unsuccessful firms group (L). It should be noted, however, that the coefficients reported in the tables are the *total* intercept and slope coefficients for the group M ($\alpha_3 + \beta_5$ for the intercept and $\beta_7 + \beta_8$ for the slope) and the total coefficients for the group H ($\alpha_3 + \beta_6$ for the intercept and $\beta_7 + \beta_9$ for the slope). Therefore, t_8 shown in Table 7 is the relevant t-statistic for testing whether the difference between the slope coefficients of the middle of the road (M) and unsuccessful firms (L) is significant (i.e., whether β_8 is zero); t_9 is the relevant t-statistic for testing whether the difference between the slope coefficients of the successful (H) and unsuccessful firms (L) is significant (i.e., whether β_9 is zero). We also conducted different cut-offs using quartiles and the results were not significantly different. This indicates that the method of cut-offs for differentiating between successful and unsuccessful firms did not significantly drive the results.

As the results in Table 7 indicate, there is a significant positive relationship between scaled market value and scaled earnings (β_7 is significantly different from zero and positive). This finding supports the value

relevance of earnings. Consistent with the valuation model, the average intercepts of Equation 4 decrease as earnings scaled by book value increase across groups [($\alpha_3 + \beta_6$ = 0.516) < ($\alpha_3 + \beta_5$ = 0.745) < (α_3 = 1.156)]. In addition, the slope coefficients generally increase as we shift from the low earnings group to high earnings group as also predicted by the convexity theory [($\beta_7 + \beta_9$ = 19.930) > ($\beta_7 + \beta_8$ = 16.830) > (β_7 = 14.183)]. Also, the explanatory power of the Model 4 is greater than that of the Model 1, implying that the piece-wise form fits the data better than the simple linear form.

Table 8 presents the results for the piece-wise function of book value controlling for the level of earnings. As the results suggest, for unsuccessful firms, book value is more relevant for valuation of equity because the intercepts decline as the book value rises. The average intercepts of Equation 5 increase as book value scaled by earnings increase across groups [($\alpha_4 + \beta_{11}$ = -1.188) < ($\alpha_3 + \beta_{10}$ = 7.105) < (α_4 = 29.728)]. Furthermore, consistent with expectations, the slope coefficients uniformly increase across the groups: -1.295 for unsuccessful firms (low BV/E values); 0.629 for the middle of the road firms (medium BV/E vales); and 1.0136 for the successful firms (high BV/E values).

[Insert Table 7 and 8 here]

The estimated coefficients on earnings and book values are consistent with their theoretical values and the findings of BD (1997) for U.S. firms. However, while the results are surprisingly similar indicating similar relationships, a significant difference is that the models using Turkish data had much higher adjusted R^2 s than the models in the BD (1997) study. In the case of the first linear model incorporating earnings as the dependent variable, the BD (1997) study reported a mean adjusted R^2 of 0.11. In this study, using Turkish data, we found a mean adjusted R^2 of 0.405. The stronger results with Turkish data

indicate that, while in the U.S., a large number of variables may be influencing or driving equity values, in a developing market such as Turkey, equity values may be driven by very limited variables. In the relatively smaller and less complex capital market of Turkey, the limited disclosure of information to investors as well as small number of market participants may be among the plausible reasons underlying this observation.

5.2 Sensitivity tests

It could be argued that, in the presence of inflation and the revaluation of assets by inflation rates, the association of book value with equity values may be moderated by capital structure. For example, consider a situation where net fixed assets is $60 and liabilities are $1 at the start of the year. Assuming 100 common stocks outstanding, the total stockholder's equity is $59 and book value per share $0.59. If we assume that inflation adjustment (revaluation of fixed assets) is decided at 60%, then at the end of the year, ceteris paribus, the net fixed assets will be $100 resulting in stockholder's equity of $99 giving us a book value per share of $0.99, an increase of 68%. Taking the same situation as above, if everything else is held constant and liabilities are $59 at the start of the year, then book value per share at the start of the year is $0.01 and stockholder's equity assuming the same revaluation rate is $41 giving a book value per share of $0.41, an increase of 4000%. Similarly, a higher proportion of fixed assets relative to non-fixed (intangible) assets would also magnify the book value per share since only the fixed assets are revalued. The situation described above is unique to Turkey. In order to control for this, we add a capital structure variable (debt to equity ratio) in all of our regression estimates to examine whether the capital structured influenced our prior results. The reported results shown in Table 9 are quite similar to the reported results in Table 8. Also, we estimated our tables with time fixed affect controlling for year dummy variable for the sample years. Our conclusions do not change materially.

[Insert Table 9 about here]

6. CONCLUSIONS

Earnings have been identified as the predominant determinant of firm value in accounting research for the past three decades. Ohlson (1995) modeled firm value as a linear function of *both* earnings and book value. BD (1997) showed that firm value is a piece-wise function and not a linear additive function of both earnings and book value. All major studies focused on U.S firms. The United States is characterized by a strong well-established stock market with a multiplicity of investors, none of who can individually influence stock price. In this study, we examined whether earnings and book value have a similar relationship in the Turkish stock market that possesses significantly different characteristics. Turkey is currently an emerging market that has adopted liberal policies in the last two decades. The Turkish stock market has fewer firms relative to the United States. It is also relatively inefficient in that a few large investors can, by their buying or selling activity, significantly influence stock prices. Another significant difference between the two markets relate to accounting methods. This is an artifact of the high rates of inflation in Turkey. In particular assets in Turkey are valued at inflation adjusted book values. This is significantly different from the United States where assets are valued at historical cost.

The purpose of this research is to examine whether the association of book value and earnings with equity value holds in this very different environment. We found that the relationships do hold in Turkey but the *degree* of the relationships substantially differs. In Turkey, overall, earnings do have information content and are relevant in predicting equity values (after controlling for book values). However, the importance of earnings as a predictor of equity values appears to be declining. Book value adjusted for inflation has a stronger association with equity value. This may be explained by the fact that in the inflationary environment of Turkey it is more difficult to determine market value by projecting future earnings. In an inflationary environment in which book value of earnings is quite uncertain, investors may be paying less attention to earnings. Turkish investors may well be applying this criterion. Alternatively, the adjustment of firms' assets for inflation in Turkey may not have allowed book value of assets to deviate from market value of assets to a great extent. In countries that do not adopt this accounting treatment (U.S., for

example), book value information is based on primarily historical cost, which has little association with contemporaneous market prices (BD, 1997). Within this accounting environment, book value becomes largely independent of the success with which the firm currently employs its resources.

Some researchers have negated the importance of book value in equity valuation. For example Barth and Kallapur (1996) concluded that book value was only important because of its importance as a control for scale differences. Others have arrived at different conclusions regarding the role of book value. Ohlson (1995) and Penman (1992) concluded that book value was important because it was a useful proxy for expected future normal earnings. Still, others concluded that it was important but for a different reason. Berger et al (1996), Barth et al (1996) and BD (1997) concluded that book value was important as a value proxy for unsuccessful firms. The contribution of this study is to show that book value is a value proxy for firms operating in international environments where there is rampant inflation.

Specifically our results indicate that both earnings and inflation-adjusted book values have significant association with equity value. Combined, they have a very strong association with equity values. Finally, as in the U.S., when the sample is partitioned, we found that earnings are more relevant for valuation of equity of successful firms while book value is more relevant for valuation of equity of unsuccessful firms. This is consistent with the findings of BD (1997). In conclusion, the models using Turkish data have a higher adjusted R^2 than for studies conducted with U.S. firms. This may indicate that in this developing market, only a few variables are used to determine equity values.

Notes

[1] The two supposedly rival groups, Koc Holding and Sabanci Holding, are said to have an "understanding and respect" not to intervene in each other's markets for several decades, which, in reality, could be considered to be an open collusion.

[2] In addition to the ISE, the Interbank Money Market (IMM) for Turkish Lira was founded in March 1986. Subsequently, Open Market Operations were started in 1987 and Foreign Exchange and Foreign Banknote Markets were formed in 1989. The Gold Exchange opened its doors in Istanbul in 1995 taking the place of the Central Bank's Gold Market. In 1989 nonresidents were allowed to make purchases on the Istanbul Stock Exchange and Turkish residents were allowed to purchase foreign securities. Despite all these positive changes, financial markets are still incomplete and dominated by banks. Currently, traditional bank loans are still the prevailing source of funds for private firms to finance their short-term working capital needs and long-term projects (Isik and Hassan, forthcoming).

[3] The ISE is supervised by the Capital Market Board (the regulatory and supervisory authority for the Turkish capital markets), which ensures the proper operation of both the ISE and its members and protects the interests of both the public and the investing community.

[4] To illustrate, the average real interest rate in the 3-6 month, 6-9 month treasury bills and treasury bonds were 9% and 27% and 43% respectively in 1995 (Banks in Turkey, 1995, Banks Association of Turkey, Istanbul, Turkey).

[5] Fixed assets that are subject to depreciation at the rates other than this and the applicable rates are announced in the general communiqués issued by the Ministry of Finance.

[6] The Ministry of Finance determines the annual revaluation rate. The rate of revaluation for the year 2000 was 56 %.

[7] Inflation rate has been more than 50% on average for the past two decades although at times rose above three-digit during crises.

[8] All firms in our sample have a revaluation fund in their stockholder's equity section.

[9] Like BD (1997), we alternatively used $\mathbf{B_{i,t}}$ for robustness and sensitivity check. We found that the results are qualitatively similar.

[10] As mentioned, "success" or vice versa is defined in terms of an earnings to book value ratio in Equation 4 and scaled book value in Equation 5.

[11] We use semi-annual data because that enables us to observe firm or price behavior more frequently. This is critical in an environment that is vulnerable and susceptible to macro-economic fluctuations. However, most of the variables that are used in this study relate to market value and book value of stocks. In addition, the earnings variables are annualized, thus, our data are comparable to the annual figures used in earlier studies.

[12] Average earnings as a percentage of book value between 1992 and 1994 for Turkish firms was 69 percent, while the average earnings for U.S. firms was 4 percent. On average, the annual variation in earnings in the U.S. was 11 percent between 1976 and 1994 (BD, 1997), while it was approximately 131% in Turkey between 1992 and 1997.

[13] For example, the automotive manufacturing firms in the US face stiff competition from foreign firms in their home market. Evidently, the share of foreign automakers in the U.S. began to level with that of the US automakers in 2001.

[14] It can be argued that inflation could be driving the large values presented in Table 3 for E/B and B/B ratios because in each case the numerator is measured in current year TL and the denominator is measured in prior year TL. With high inflation, it is possible to get high values for these ratios, even if there is no change in inflation-adjusted book value and if the earning power of these assets is not great. In the BD (1997) analysis, it is likely that inflation did not play a significant role since their deflator was measured in essentially the same dollars as their numerators. The potential problem here is that with a discrepancy in the unit of measurement between numerator and denominator, it is uncertain whether the results are being driven by economic or econometric issues. In order to investigate this issue, we adjusted everything to a constant TL basis. The results remain the same, thus it is safe to state that underlying real

economic valuation differences in the Turkish market might be driving the differences observed vs. the BD (1997) results. We wish to thank Kari Lukka for providing this insight.

[15] In fact, BD (1997)'s observation related to volatile rather than inflationary environments. However, we find that their observation holds in an inflationary environment as well. As a matter of fact, inflation by itself is a source of a volatile economic environment.

[16] Traditional bank loans are the major source of funds for firms as mentioned before. Banks might focus more on firms' debt paying ability (solvency of the business, i.e., positive net-worth) than on profitability, enhancing the relevance of book values in driving equity values. We would like to thank Dr. D.H. Bao for this insight.

[17] Because it is hard to reach a conclusion based on casual observation, it is essential to conduct a formal test for the convexity of the relationship using the procedures outlined above for Equation 4 and 5. Nevertheless, we depicted the empirical relation between market value and earnings for the entire sample, both scaled by book value lagged by one period. We found that the plot is consistent with the view that market value and earnings are positively associated. It is available upon request from the authors.

[18] This procedure closely follows the treatment of BD (1997).

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APPENDIX

REVIEW OF DEVELOPMENTS IN THE TURKISH MARKET

Period after World War I to the 1930s

Event

First National Economic Congress held in Izmir in 1923. The purpose was to address a large number of economic issues that Turkey would have to overcome.

Result

Congress recommended the specialized banks should be formed to finance the main sectors of the economy. The state established six public banks in the 1930s including the Central bank (Denizer, 1997). This government orchestrated economic development policy (known as Etatism) followed a pattern similar to that adopted in other developing countries (Okyar, 1965).

Period 1930s to the late 1970s

Event

Continuation of the planned development phase (i.e., a protectionist and closed economic environment);strong incentive scheme to foster private enterprise (including directed credit programs, subsidized lending, tax exemptions, investment credits, entry barriers and high tariffs and customs for foreign firms and products).

Result

- Private sector flourished and contributed a little more that half of value added in manufacturing by the 1970s (Barth and Hemphill, 2000)
- Creation of a number of giant industrial holdings that have seized control in several sectors (Sabanci, Koc, Has Dogus, Cukurova, Yasar, Uzan, Toprak, Colakoglu, Cingilloglu). This is mainly attributed to entry barriers, scarce internal capital, lack of developed money and lack of adequate capital markets.

Event

Implementation of the Glass-Steagal Act.

This act prohibits any equity ownership by U.S banks.

Result

Lack of foreign penetration and control dominated by local firm management.

Late 1970s to the 1980s

Event

Economic stability program entitled “National New Economic Policy” implemented. Principal aim was integration with the world economy by establishing a free market economy.

Result

- New firm entries from inside and outside of the county now encouraged.
- Free trade zones established.
- Liberalization of commodity prices.
- Privatization of state economic enterprises

Event

As a reflection of liberal policies, unified accounting principles and a standard reporting system were adopted.

Result

Firms now audited by independent external auditors in accordance with internationally accepted principles of accounting.

Event

Steps taken to ensure that Turkish regulations are in harmony with those of the EU.

Result

- Formation of a single tariff system.
- Acceptance of EU practices in general (e.g., capital adequacy regulation for banks, among others)

Event

Establishment of the Istanbul Stock Exchange (1986).

Result

Greater liquidity in the Turkish financial system.

Event

Interbank Money Market (IMM) for Turkish Lira founded in 1986. Open market operations commenced in 1987.

Result

Non-residents are allowed to make purchases on the ISE and the Turkish residents are permitted to purchase foreign securities.

Table 1
The number of listed firms and market valuation in the Istanbul Stock Exchange (1986-2002)[1]

			MARKET VALUATION (in million US $)						
Year	No. of Firms		Total Market	National Market	Regional Market	New Market	Watch List M.	P/E Ratio ($)	Dividend Yield %
1986	350	31	938	938	---	---	---	---	9.15
1987	414	51	3125	3125	---	---	---	---	2.82
1988	556	66	1128	1128	---	---	---	---	10.48
1989	730	79	6756	6756	---	---	---	---	3.44
1990	916	88	18737	18737	---	---	---	---	2.62
1991	1092	95	15564	15564	---	---	---	---	3.95
1992	1238	107	9922	9922	---	---	---	---	6.43
1993	1284	124	37824	37824	---	---	---	14.86	1.65
1994	1204	116	21785	21785	---	---	---	10.97	2.78
1995	922	142	20782	20565	217	---	---	5.479	3.56
1996	788	165	30797	30329	377	61	30	7.71	2.87
1997	743	186	61879	61348	410	73	48	13.28	1.56
1998	686	340	33975	33473	470	9	24	6.36	
1999	319	273	114271	112276	1140	16	839	24.95	
2000	287	239	69507	68635	344		529	14.05	
2001	278	208	47689	47189	224		276	411.64	
2002	262	219	34402	33773	312		317	23.78	

1. There are four sub-markets in the Istanbul Stock Exchange (ISE). The "**National Market**" is the largest market, which includes all companies that fulfilled the listing requirements pre-determined by the ISE. The "**Regional Markets**" consist of companies de-listed temporarily or permanently from the ISE's National Market as well as companies that fail to fulfill the listing requirements and lack the necessary qualifications for trading on the ISE's National Market. The "**New Companies Market**" was formed in order to enable young companies with growth potential to offer their stocks to the public via the ISE, which enables trading of such stocks in an organized market. The "**Watch List Companies Market**" consists of the companies under special surveillance and investigation due to extraordinary situations with respect to stock transactions and/or companies traded on the ISE; disclosure of incomplete, inconsistent and/or untimely information to the public; failure to comply with the existing rules and regulations as well as other situations leading to de-listing of stocks and/or dismissal from the related market temporarily or permanently in order to protect investors' rights and public interest. **P/E ratio** stands for price-earning ratio denominated in US dollars. **Dividend yield** is simply average annual dividend payment divided by average closing price for the firms traded in the National Market segment of the ISE (Source: The Istanbul Stock Exchange (ISE), Istanbul, Turkey).

Table 2
Representative output statistics for individual stock exchanges 1997-2002

	Value of trading transactions US $ m	Market value US $ m	Number of companies listed
Australia	156271	295411	1219
Belgium	34055	138938	265
Brazil	191505	255478	537
Canada	356820	996944	3406
Denmark	46886	93766	249
Finland	36428	73322	126
France	415818	676311	924
Germany	1072935	825233	2696
Greece	21248	33784	210
Hong Kong	453900	413323	658
Hungary	7039	14700	49
Indonesia	41378	29050	281
Ireland	17470	49371	102
Japan	3122382	2160585	3140
Luxembourg	1052	33892	284
Malaysia	164482	93182	703
Netherlands	281248	468897	348
New Zealand	9720	29889	190
Norway	48176	66503	217
Philippine	19890	31212	221
Poland	7981	12135	143
Spain	139229	290383	388
Sweden	176356	264711	261
Taiwan	1254543	296808	404
Thailand	25259	22792	431
Turkey	59584	61095	259
United Kingdom	1925809	1996225	2513
USA	10600839	12884500	9091

Table 3
Summary Statistics of the Turkish firms' market value (P_t), earnings (E_t) and book value (B_t) scaled by book value (B_{t-1}) between 1992-II and 2001-II[1]

		Market Value ($P_{i,t}/B_{i,t-1}$)		Earnings ($E_{i,t}/B_{i,t-1}$)		Book Value ($B_{i,t}/B_{i,t-1}$)	
Period	# of firms	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
92-II	107	3.41	3.71	0.46	0.37	1.33	0.59
93-I	98	24.29	137.21	1.14	5.70	4.32	20.17
93-II	124	14.47	30.09	0.92	1.85	2.37	4.18
94-I	103	8.58	17.30	0.70	0.76	1.31	2.69
94-II	116	25.48	59.15	1.19	1.87	3.39	9.16
95-I	137	17.16	67.36	0.86	1.18	3.16	12.95
95-II	142	7.26	7.73	0.65	0.49	1.17	1.06
96-I	153	6.17	7.09	0.74	0.64	1.32	2.05
96-II	165	11.93	15.30	0.70	0.53	2.55	7.71
97-I	176	12.37	43.65	0.74	0.78	2.43	8.95
97-II	186	19.29	33.06	0.69	0.53	2.25	4.30
98-I	352	36.45	43.48	0.58	0.89	2.01	3.84
98-II	340	33.64	27.92	0.62	0.43	3.08	5.15
99-I	286	10.85	16.48	0.75	0.66	2.84	3.26
99-II	273	10.97	19.87	0.82	0.75	2.59	3.27
2000-I	250	8.42	15.98	0.79	0.80	2.93	3.02
2000-II	239	9.25	34.08	0.47	0.63	3.14	4.45
2001-I	216	12.86	17.16	0.66	0.87	2.73	6.19
2001-II	208	14.92	24.57	0.48	0.39	2.60	4.52
Mean	193	15.15	32.69	0.73	1.06	2.51	5.65

1. The definition of the variables used in the table are as follows: $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t.* Following Bowen (1981), Burgstahler and Dichev (1997) and Bao and Bao (1998), the variables are normalized by beginning book value per share.

Table 4
Market Value of Turkish firms as a function of earnings (1992-II/2001-II) [1]
Model 1: $P_{i,t}/B_{i,t-1} = \alpha_0 + \beta_1 E_{i,t}/B_{i,t-1} + \varepsilon_1$

Period	α_0	$t_{\alpha 0}$	β_1	t_1	*Adjusted* R^2
92-II	1.800	2.319***	10.156	10.932***	0.842
93-I	1.708	2.659***	13.537	10.460***	0.851
93-II	0.749	0.946	15.571	17.034***	0.847
94-I	1.832	1.468	14.887	3.415***	0.310
94-II	-0.894	-0.302	20.457	4.526***	0.415
95-I	-3.896	-1.206	35.957	3.227***	0.393
95-II	1.635	2.204**	7.544	5.363***	0.334
96-I	1.338	2.683***	10.661	6.926***	0.348
96-II	-1.023	-0.755	16.354	6.621***	0.467
97-I	-3.467	-2.705***	29.851	6.832***	0.603
97-II	1.209	1.971**	14.694	3.484***	0.326
98-I	0.734	0.938	17.247	4.031***	0.393
98-II	1.052	1.751*	14.656	5.252***	0.415
99-I	-0.183	-0.853	18.430	6.183***	0.426
99-II	1.204	2.736***	15.354	4.722***	0.440
2000-I	1.510	0.627	8.809	3.621***	0.391
2000-II	0.843	0.718	19.342	5.821***	0.432
2001-I	1.007	1.392	26.410	4.935***	0.491
2001-II	1.328	1.427	14.352	5.422***	0.426
Mean	0.4466	0.684	17.06	4.998***	0.405

1. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t.* Following Bowen (1981), Burgstahler and Dichev (1997) and Bao and Bao (1998), the variables are normalized by beginning book value per share. The above model (Equation 1) examines whether price is positively associated with earnings. Thus, Table 4 contains estimates of the coefficients for the simple linear form relating $P_{i,t} / B_{i,t-1}$ to $E_{i,t} / B_{i,t-1}$. Results are presented for regressions conducted semi-annually for the years 1992 to 2001.

Table 5.
Market value of Turkish firms as a function of book value (1992-II/-2001-II) [1]
Model 2: $P_{i,t}/B_{i,t-1} = \alpha_1 + \beta_2 B_{i,t}/B_{i,t-1} + \varepsilon_2$

Period	α_1	$t_{\alpha 1}$	β_2	t_2	*Adjusted* R^2
92-II	3.639	4.565***	2.265	10.375	0.824
93-I	2.053	2.981***	2.087	71.137***	0.903
93-II	-1.777	-1.682*	6.883	11.685***	0.841
94-I	0.288	0.550	5.167	27.459***	0.808
94-II	6.574	2.944***	4.848	3.501***	0.317
95-I	3.050	2.276**	3.991	3.064***	0.325
95-II	2.868	4.893***	3.079	6.868***	0.297
96-I	2.615	6.983***	2.147	8.205***	0.512
96-II	7.571	9.926***	1.122	4.557***	0.449
97-I	3.796	5.202***	2.460	17.117***	0.751
97-II	6.727	6.681***	3.637	12.602***	0.505
98-I	4.239	3.806***	2.826	15.851***	0.616
98-II	2.853	8.312***	1.923	10.362***	0.573
99-I	3.877	4.518***	2.556	18.915***	0.647
99-II	5.102	3.722***	3.821	12.400***	0.628
2000-I	6.736	5.024***	3.605	13.926***	0.537
2000-II	5.182	4.936***	2.981	16.818***	0.506
2001-I	6.084	5.183***	3.725	9.083***	0.618
2001-II	8.922	6.764***	3.102	12.705***	0.637
Mean	4.231	4.876***	3.275	13.38***	0.604

1. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t.* Following Bowen (1981), Burgstahler and Dichev (1997) and Bao and Bao (1998), the variables are normalized by beginning book value per share. The above model (Equation 2) examines whether price is positively associated with book value. Accordingly, Table 5 contains estimates of the coefficients for the simple linear form relating $P_{i,t} / B_{i,t-1}$ to $B_{i,t} / B_{i,t-1}$. The results are presented semi-annually for the 1992-2001 period. The book values are adjusted for inflation according to revaluation rates published by the Ministry of Finance of Turkey.

Table 6
Market value of Turkish firms as a function of earnings and book value (1992-II/2001-II)[1]
Model 3: $P_{it}/B_{it-1} = \alpha_2 + \beta_3 E_{it}/B_{it-1} + \beta_4 B_{it}/B_{it-1} + \varepsilon_3$

Period	α_2	$t_{\alpha 2}$	β_3	t_3	β_4	t_4	*Adjusted* R^2	*Coefficient of partial determination* E_{it}/B_{it-1}	B_{it}/B_{it-1}
92-II	1.380	2.218**	6.839	7.613***	-0.967	-1.843*	0.536	0.360	0.032
93-I	1.479	4.103***	16.117	4.378***	-0.217	-0.408	0.916	0.169	0.002
93-II	-1.244	-2.378**	12.700	6.289***	1.853	2.352**	0.884	0.248	0.044
94-I	-1.446	-1.176	6.442	1.469	5.085	17.888***	0.809	0.021	0.764
94-II	-0.944	-0.268	14.284	2.699***	2.039	1.315	0.538	0.061	0.015
95-I	-2.151	-1.854*	18.448	4.914***	2.990	2.760***	0.557	0.154	0.054
95-II	0.480	0.855	5.687	5.328***	2.015	4.834***	0.452	0.171	0.145
96-I	0.319	0.699	7.773	4.876***	1.967	9.054***	0.604	0.138	0.355
96-II	-1.345	-1.172	13.772	6.793***	1.042	12.901***	0.614	0.223	0.508
97-I	-2.653	-2.143**	19.404	4.696***	2.258	21.130***	0.816	0.114	0.722
97-II	-3.778	-1.599	18.964	3.828***	2.868	7.722***	0.585	0.075	0.247
98-I	-0.831	-1.423	14.910	4.082***	1.841	6.346***	0.717	0.046	0.104
98-II	-0.806	-0.897	12.726	4.206***	1.732	6.952***	0.668	0.050	0.126
99-I	0.162	1.153	13.550	3.829***	1.680	8.146***	0.704	0.049	0.190
99-II	0.093	1.940	14.081	3.621***	1.799	9.275***	0.637	0.046	0.242
2000-I	0.045	2.631***	15.224	3.456***	1.425	14.506***	0.608	0.046	0.461
2000-II	-0.021	-1.687*	16.183	3.584***	1.842	18.161***	0.636	0.052	0.584
2001-I	-0.045	-1.422	15.905	3.451***	2.545	14.824***	0.638	0.053	0.509
2001-II	0.324	1.252	16.737	3.737***	2.906	12.452***	0.701	0.064	0.432
Mean	-0.578	-0.079	13.66	3.493***	1.931	9.156***	0.628	0.113	0.291

1. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t*. Following Bowen (1981), Burgstahler and Dichev (1997) and Bao and Bao (1998), the variables are normalized by beginning book value per share. The above model (Equation 3) is labeled the additive form of earnings and book value based on Ohlson (1995), who postulated that firm value is a linear function of both earnings and book value. This equation is also specified in Amir (1996). The table contains estimates of the coefficients for the linear form relating $P_{i,t}/B_{i,t-1}$ to $E_{i,t}/B_{i,t-1}$ and $B_{i,t}/B_{i,t-1}$. The results are presented for regressions conducted semi-annually for the period from 1992 to 2001.

Table 7
Market value of Turkish firms as a function of earnings
with dummy variables to represent successful and middle of the road firms (1992-II/2001-II)[1]
Model 4: $P_{i,t}/B_{i,t-1} = \alpha_3 + \beta_5 M + \beta_6 H + \beta_7(E_{i,t}/B_{i,t-1}) + \beta_8 M(E_{i,t}/B_{i,t-1}) + \beta_9 H(E_{i,t}/B_{i,t-1}) + \varepsilon_4$

Period	α_3	$t_{\alpha 3}$	$\alpha_3+\beta_5$	t_5	$\alpha_3+\beta_6$	t_6	β_7	t_7	$\beta_7+\beta_8$	t_8	$\beta_7+\beta_9$	t_9	Adjusted R^2	Cutoff1	Cutoff2
92-II	0.824	2.735***	-0.046	-2.013**	-0.011	-1.756*	3.171	2.149**	6.062	2.133**	8.121	2.922***	0.509	0.243	0.577
93-I	0.787	2.543***	0.559	-0.213	0.124	-2.196**	11.191	2.462***	16.073	4.433***	18.481	7.724***	0.914	0.282	0.544
93-II	1.169	2.218**	1.152	-0.486	-1.759	-3.096***	12.896	5.662***	15.428	1.873*	26.897	5.479****	0.838	0.323	0.740
94-I	0.837	2.317**	0.832	-0.002	0.263	-1.678*	8.896	2.238**	11.589	0.293	12.046	0.407	0.254	0.368	0.794
94-II	1.874	1.657*	1.780	-0.834	1.229	-1.241	14.128	3.394***	11.843	-0.183	19.402	0.722	0.214	0.530	0.948
95-I	1.279	3.460***	-1.661	-3.583***	-1.762	-3.799***	29.100	4.030***	39.553	8.023***	42.139	9.559***	0.864	0.428	0.824
95-II	1.287	3.644***	2.532	1.588*	2.735	1.702*	13.611	4.421***	18.034	3.880***	14.711	2.125**	0.336	0.341	0.838
96-I	0.528	1.047	-0.386	-0.233	-0.061	-2.273**	10.910	2.754***	19.031	3.611***	19.458	3.333***	0.328	0.448	0.800
96-II	1.467	4.797***	-0.116	-3.502***	-0.777	-4.470***	13.146	4.705***	21.180	0.575	20.592	1.284	0.406	0.421	0.751
97-I	1.227	2.468**	2.660	2.189**	2.704	2.910***	15.099	3.088***	18.294	2.786***	25.783	4.767***	0.595	0.382	0.782
97-II	1.191	1.981*	1.013	-0.631	-2.268	-6.436***	12.389	0.673	11.056	-0.068	40.131	1.171	0.230	0.415	0.863
98-I	1.023	1.85*	0.814	0.994	-0.834	-3.729***	18.741	1.422	14.282	1.905*	20.421	1.825*	0.326	0.463	0.812
98-II	1.453	1.99**	0.732	1.228	1.272	2.456**	16.382	2.731***	15.102	1.842*	18.968	2.937***	0.295	0.438	0.856
99-I	0.981	2.42**	0.681	1.642*	2.186	3.081***	13.162	1.854*	18.756	2.551**	16.722	3.453***	0.326	0.490	0.793
99-II	0.875	2.38**	0.662	2.081**	2.024	3.557***	10.455	1.920*	16.205	2.806***	15.082	2.902***	0.349	0.501	0.804
2000-I	1.056	2.05**	0.697	1.752*	1.811	4.286***	11.360	1.861*	18.186	2.928***	14.521	3.886***	0.372	0.449	0.819
2000-II	1.233	3.61***	0.702	1.996**	-0.235	-2.452**	20.421	0.853	19.234	3.456***	16.256	2.998***	0.356	0.375	0.775
2001-I	1.425	2.92**	0.751	2.134**	-1.062	-1.923*	18.182	1.483	14.582	3.828***	14.824	3.234***	0.327	0.403	0.825
2001-II	1.456	3.04**	0.802	2.456**	4.232	2.884**	16.255	2.082**	15.281	4.258***	14.082	2.606***	0.308	0.424	0.845
Mean	1.156	1.047	0.745	0.848	0.516	2.449**	14.183	1.653	16.830	2.001**	19.930	2.285**	0.342	0.406	0.788

1. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t.* Following Bowen (1981), Burgstahler and Dichev (1997) and Bao and Bao (1998), the variables are normalized by beginning book value per share. The table contains estimates of the coefficients for the piece-wise form relating $P_{i,t} / B_{i,t-1}$ to $E_{i,t} / B_{i,t-1}$ after controlling for firm "success" . The samples were classified into successful (H), middle of the road (M), and unsuccessful firms (L). Unsuccessful firms (L) are excluded from the regressions as the base case. The cutoff points for this classification are determined in a way that there will be an equal number of observations in each group using the rankings according to $E_{i,t}/B_{i,t-1}$. The cut-off points for the respective periods are given in the last two columns. Accordingly, the unsuccessful firms (L): firms with $E_{i,t}/B_{i,t-1}$ less than Cutoff1, middle of the road firms (M): firms with $E_{i,t}/B_{i,t-1}$ between Cutoff1 and Cutoff2, and successful firms (H): those with $E_{i,t}/B_{i,t-1}$ greater than Cutoff12. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. All t-statistics are calculated based on the heteroscedasticity-consistent covariance matrix (White, 1980). The t-statistics for the groups H and M are the t-statistics for tests of the hypothesis that the coefficients for the H and M group firms are significantly different from the corresponding coefficient for the L group.

Table 8
Market value of Turkish firms as a function of book values
with dummy variables to represent successful and middle of the road firms (1992-II/2001-II)[1]

$$\textit{Model 5: } P_{i,t}/E_{i,t} = \alpha_4 + \beta_{10} M + \beta_{11} H + \beta_{12}(B_{i,t-1}/E_{i,t}) + \beta_{13} M(B_{i,t-1}/E_{i,t}) + \beta_{14} H(B_{i,t-1}/E_{i,t}) + \varepsilon_5$$

Period	α_4	$t_{\alpha 4}$	$\alpha_4+\beta_{10}$	t_{10}	$\alpha_4+\beta_{11}$	t_{11}	β_{12}	t_{12}	$\beta_{12}+\beta_{13}$	t_{13}	$\beta_{12}+\beta_{14}$	t_{14}	Adjusted R^2	Cutoff1	Cutoff2
92-II	9.015	3.367***	2.765	-1.624*	2.645	-2.123**	-0.945	-1.269	2.012	2.431***	2.628	1.967**	0.482	3.834	8.354
93-I	23.090	4.540***	11.816	-5.614***	13.488	-5.065***	-0.389	-0.267	-0.109	1.283	0.056	1.211	0.601	3.905	7.280
93-II	13.822	5.625***	11.938	0.938	10.694	1.099	-0.621	-0.436	-0.012	1.254	1.248	2.663***	0.427	3.032	6.192
94-I	15.269	1.536	6.940	-2.205**	4.702	-4.867***	-4.105	-3.785***	1.658	2.845***	1.212	1.856**	0.632	2.522	5.444
94-II	19.918	2.379**	8.355	-3.907***	7.626	-3.261***	-2.936	-2.521***	2.051	4.429***	2.433	2.569***	0.726	2.092	3.800
95-I	53.032	2.589**	22.878	-4.262***	29.303	-2.134**	-1.933	-2.641***	-0.772	1.361	-0.251	1.637*	0.642	2.428	4.791
95-II	9.363	1.763*	5.677	-0.632	12.484	0.565	1.436	0.356	3.365	2.101**	2.142	1.329	0.438	2.372	5.852
96-I	19.040	3.994***	18.242	-0.059	13.454	-1.089*	-2.856	-1.942**	-0.056	1.331	0.423	1.601*	0.628	2.454	4.456
96-II	16.185	2.633**	14.924	-0.105	1.853	-5.897***	1.023	0.239	0.083	-0.221	1.446	1.191	0.599	2.612	4.814
97-I	29.478	4.642***	9.542	-2.034**	15.929	-2.083**	-4.328	-3.511***	1.569	1.801*	0.910	1.701*	0.791	2.560	5.229
97-II	45.486	3.079***	32.611	-0.528	30.981	-0.936	-2.524	-1.619*	-0.006	1.949**	0.843	1.982**	0.255	2.318	4.816
98-I	38.452	4.083***	31.582	-0.941	-35.682	-0.854	0.753	2.083**	-0.356	-2.026**	0.751	1.764*	0.303	3.296	4.025
98-II	42.813	3.925***	38.164	-1.806*	-12.516	-2.350**	0.622	1.850*	-0.450	11.82***	0.715	2.820***	0.427	3.001	4.228
99-I	59.527	4.226***	-41.95	-1.271	-30.143	1.040	0.685	1.840*	0.349	1.721*	0.841	2.650***	0.514	3.904	4.109
99-II	41.021	3.616***	-20.21	-1.820*	-28.324	1.150	0.566	1.770*	-0.350	1.630	0.378	2.890***	0.608	2.738	3.904
2000-I	28.151	2.592**	-8.73	-2.040**	-20.955	1.420	0.347	4.103***	0.143	0.855	0.842	0.520	0.563	2.887	4.045
2000-II	24.125	1.893*	-5.402	-3.160***	-15.102	1.690*	0.311	3.730***	0.107	1.890*	0.501	2.010**	0.604	2.904	3.905
2001-I	47.320	3.260***	-11.251	-1.212	-21.821	-3.010***	-8.421	-0.138	2.106	2.450***	1.127	2.810***	0.505	3.002	4.036
2001-II	44.210	3.900***	-10.23	-1.483	-20.432	-2.880***	-8.048	-0.125	2.223	2.670***	1.034	2.900***	0.493	4.103	4.302
Mean	29.728	3.148***	7.105	-1.053	-1.188	-0.019	-1.295	1.375	0.629	1.945*	1.014	1.920*	0.546	2.881	4.962

1. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t*; $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t*; $B_{i,t}$ is book value per share for firm *i* at the end of period *t*. The table contains estimates of the coefficients for the piece-wise form relating $P_{i,t} / E_{i,t}$ to $B_{i,t} / E_{i,t}$ after controlling for firm "success" . The samples were classified into successful (H), middle of the road (M), and unsuccessful firms (L). Unsuccessful firms (L) are excluded from the regressions as the base case. The cutoff points for this classification are determined in a way that there will be an equal number of observations in each group using the rankings according to $B_{i,t}/B_{i,t-1}$. The cut-off points for the respective periods are given in the last two columns. Accordingly, the unsuccessful firms (L): firms with $B_{i,t}/B_{i,t-1}$ less than Cutoff1, middle of the road firms (M): firms with $B_{i,t}/B_{i,t-1}$ between Cutoff1 and Cutoff2, and successful firms (H): those with $B_{i,t}/B_{i,t-1}$ greater than Cutoff12. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. All t-statistics are calculated based on the heteroscedasticity-consistent covariance matrix (White, 1980). The t-statistics for the groups H and M are the t-statistics for tests of the hypothesis that the coefficients for the H and M group firms are significantly different from the corresponding coefficient for the L group.

Table 9 (re-estimation of Table 8 adding capital ratio)
Market value of Turkish firms as a function of book values and capital ratios
with dummy variables to represent successful and middle of the road firms (1992-II/2001-II)[1]

Extension of Model 5: $P_{i,t}/E_{i,t} = \alpha_4 + \beta_{10} M + \beta_{11} H + \beta_{12}(B_{i,t-1}/E_{i,t}) + \beta_{13} M(B_{i,t-1}/E_{i,t}) + \beta_{14} H(B_{i,t-1}/E_{i,t}) + \beta_{15} C(D_{i,t}/E_{i,t}) + \varepsilon_5$

Period	α_4	$t_{\alpha 4}$	$\alpha_4+\beta_{10}$	t_{10}	$\alpha_4+\beta_{11}$	t_{11}	β_{12}	t_{12}	$\beta_{12}+\beta_{13}$	t_{13}	$\beta_{12}+\beta_{14}$	t_{14}	Adjusted R^2	Cutoff1	Cutoff2
92-II	9.215	3.441***	2.760	-1.608	2.607	-2.173**	-0.937	-1.276	2.018	2.476**	2.615	1.978**	0.527	3.839	8.358
93-I	22.063	4.609***	11.821	-5.706***	13.508	-5.109***	-0.398	-0.268	-0.118	1.254	0.059	1.256	0.652	3.912	7.286
93-II	14.023	5.412***	11.942	0.946	10.654	1.095	-0.644	-0.440	-0.016	1.287	1.250	2.677**	0.463	3.039	6.198
94-I	15.451	1.498	6.980	-2.221**	4.728	-4.875***	-4.108	-3.779***	1.665	2.898***	1.217	1.847*	0.661	2.532	5.449
94-II	19.073	2.187**	8.358	-3.931***	7.676	-3.291***	-2.954	-2.508**	2.074	4.403***	2.428	2.578**	0.752	2.107	3.822
95-I	53.078	2.505**	22.781	-4.238***	29.344	-2.156**	-1.973	-2.694**	-0.781	1.386	-0.259	1.650*	0.684	2.435	4.805
95-II	9.651	1.788*	5.608	-0.644	12.409	0.541	1.498	0.365	3.380	2.154**	2.150	1.338	0.465	2.382	5.867
96-I	18.905	4.061***	18.251	-0.058	13.461	-1.054*	-2.867	-1.960**	-0.058	1.353	0.429	1.621*	0.653	2.459	4.462
96-II	16.231	2.701**	14.920	-0.105	1.887	-5.903***	1.034	0.249	0.087	-0.228	1.432	1.197	0.632	2.620	4.826
97-I	29.120	4.606***	9.548	-2.076**	15.905	-2.123**	-4.331	-3.553***	1.570	1.824*	0.923	1.721*	0.834	2.567	5.232
97-II	44.962	3.216***	32.701	-0.521	30.884	-0.909	-2.520	-1.629*	-0.008	1.963**	0.856	1.997**	0.287	2.323	4.821
98-I	38.904	4.009***	31.608	-0.945	-35.783	-0.892	0.765	2.076**	-0.358	-2.057**	0.758	1.782*	0.336	3.306	4.029
98-II	43.031	3.873***	38.221	-1.852*	-12.545	-2.382**	0.629	1.896*	-0.459	11.89***	0.720	2.845***	0.459	3.013	4.233
99-I	58.903	4.298***	-41.959	-1.308	-30.209	1.127	0.678	1.869*	0.350	1.727*	0.849	2.650**	0.543	3.912	4.113
99-II	41.218	3.721***	-20.263	-1.865*	-28.376	1.180	0.587	1.784*	-0.356	1.632	0.382	2.925***	0.649	2.745	3.912
2000-I	28.655	2.606**	-8.764	-2.092**	-20.872	1.500	0.351	4.125***	0.145	0.854	0.842	0.545	0.585	2.892	4.048
2000-II	24.349	1.907*	-5.423	-3.290***	-15.163	1.754*	0.335	3.707***	0.109	1.901*	0.524	2.145**	0.637	2.916	3.912
2001-I	46.894	3.345***	-11.255	-1.108	-22.098	-3.018***	-8.521	-0.129	2.116	2.428**	1.134	2.849***	0.540	3.014	4.039
2001-II	44.762	4.021***	-10.241	-1.541	-20.521	-2.905***	-8.154	-0.129	2.254	2.693**	1.041	2.916***	0.528	4.110	4.316
Mean	30.264	3.164***	7.134	-1.076	-1.190	-0.024	-1.301	1.389	0.638	1.959**	1.019	1.920*	0.579	2.901	4.984

1. $P_{i,t}$ is price per share (market value) of equity for firm *i* at the end of period *t;* $E_{i,t}$ is the annualized earnings per share for firm *i* in period *t;* $B_{i,t}$ is book value per share for firm *i* at the end of period *t*. The table contains estimates of the coefficients for the piece-wise form relating $P_{i,t} / E_{i,t}$ to $B_{i,t} / E_{i,t}$ after controlling for firm "success" . The samples were classified into successful (H), middle of the road (M), and unsuccessful firms (L). Unsuccessful firms (L) are excluded from the regressions as the base case. The cutoff points for this classification are determined in a way that there will be an equal number of observations in each group using the rankings according to $B_{i,t}/B_{i,t-1}$. β_{15} parameter reprsents the debt/equity ratio**.** The cut-off points for the respective periods are given in the last two columns. Accordingly, the unsuccessful firms (L): firms with $B_{i,t}/B_{i,t-1}$ less than Cutoff1, middle of the road firms (M): firms with $B_{i,t}/B_{i,t-1}$ between Cutoff1 and Cutoff2, and successful firms (H): those with $B_{i,t}/B_{i,t-1}$ greater than Cutoff12. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels respectively. All t-statistics are calculated based on the heteroscedasticity-consistent covariance matrix (White, 1980). The t-statistics for the groups H and M are the t-statistics for tests of the hypothesis that the coefficients for the H and M group firms are significantly different from the corresponding coefficient for the L group.