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Enterprise Risk Management And Firm Value Empirical Evidence from Turkey in the Post-Global Financial Crisis of 2007-08 Period

Kurumsal Risk Yönetimi Ve Firma Değeri 2007-2008 Global Finansal Krizi Sonrasında Türkiye'ye İlişkin Ampirik Bulgular

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ABSTRACT

Though there is an intense concern of governments, corporations' top managers, business magazines and B2B, professional and trade magazine publishers about risk management practices, both theoretical and empirical research in the field of enterprise risk management (ERM) is still rare. This study aims to fill the empirical research gap by analyzing the possible effects of ERM practices on firm value over the post-Global Financial Crisis of 2007-08 period on a sample of Borsa Istanbul (BIST) SME Industrial Index (XKOBI) firms for the period of 2014.q1-2022.q4. Research model of the study includes one dependent and four independent variables. The dependent variable is the market-to-book value ratio, a widely-used proxy for firm value in finance literature. Considering the literature, four firm-specific factors are included in the research model as independent variables as credit risk, foreign exchange risk, liquidity risk and financial leverage.

The empirical findings provide evidence that financial leverage has statistically significant and positive effect on firm value; while the other independent variables included in the research model as credit risk, foreign exchange risk and liquidity risk have statistically significant and negative effects on firm value.

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ÖZ

Risk yönetimi konusuna yönelik olarak gerek kamu kurumları gerekse de firmaların üst düzey yöneticileri, iş adamları ve basın mensupları tarafından yoğun bir ilgi olsa da özellikle kurumsal risk yönetimi hakkında yapılan teorik ve ampirik çalışmaların sayısı nispeten sınırlıdır. Bu çalışmanın amacı, belirtilen eksikliği de dikkate alarak, 2007-2008 Küresel Krizi sonrasında kurumsal yönetim uygulamalarının firma değeri üzerindeki olası etkilerini irdelemektir. Bu bağlamda, 2014-2022 döneminde Borsa İstanbul (BİST) KOBİ Sanayi Endeksi kapsamında işlem gören firmalardan oluşan bir örneklem üzerinde ekonometrik analizler yapılmaktadır. Oluşturulan araştırma modeli çerçevesinde; kredi riski, döviz kuru riski, likidite riski ve finansal kaldıraç ile ilişkili değişkenlerin firma değeri üzerindeki olası etkileri incelenmektedir.

Elde edilen bulgular; finansal kaldıracın firma değerini pozitif yönde, kredi riskinin, döviz kuru riskinin ve likidite riskinin ise firma değerini negatif yönde etkiledikleri tespit edilmiştir.

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INTRODUCTION

In literature, the concept *risk* refers many different things, so it is difficult to make an exact definition. However, it is obvious that most definitions focus on the probability or likelihood of an event such as loss, danger, injury, etc. The well-known Orange Book (2004: 9) of the United Kingdom defines risk as "uncertainty of outcome, whether positive opportunity or negative threat, of actions and events" and further adds that "it has to be assessed in respect of the combination of the likelihood of something happening, and the impact which arises if it does actually happen". Another definition by OECD (2008) also refers to risk as the probability of deviation of an actual outcome (like sales and profits) from the expected outcome. Today's dynamic business environment has necessitated managing risk efficiently as a fundamental concern. Efficient risk management processes (and practices) should begin with a risk identification and assessment stage to determine and prioritize how the risks should be managed. Then, risk treatment options should be selected, designed and implemented. Finally, integrated, insightful, informative, timely and accurate risk monitoring and reporting procedures should be adopted (Aven, 2016; Maroofi et al., 2017; Maldonado-Guzman et al., 2018).

Though there is an intense concern of governments, corporations' top managers, business magazines and B2B, professional and trade magazine publishers about risk management practices, both theoretical and empirical research in the field of enterprise risk management (ERM) is still rare. The reason may be partly because of the controversies about developing a proper, valid and reliable measure for any ERM framework. For instance, while Nocco and Stulz (2006), Beasley et al. (2008) and, Hoyt and Liebenberg (2011) proxy ERM framework by chief risk officer; Gordon et al. (2009) suggest to develop an ERM index. This study aims to fill the empirical research gap by analyzing the possible effects of ERM practices on firm value over the post-Global Financial Crisis of 2007-08 period on a sample of Borsa Istanbul (BIST) SME Industrial Index (XKOBI) firms. The contribution of the paper to the existing literature is threefold. First of all, to the best of my best knowledge, except for the studies of Sayılır and Farhan (2017), and Şenol and Karaca (2017), this is one of the pioneering studies to analyze the effect of ERM practices on firm value by focusing on an advanced emerging stock market, Borsa Istanbul. Secondly, this study differs from the previous ones by focusing on non-financial firms, as the great majority of the previous studies are mostly about financial services companies including banks, investment banking firms, insurance companies, real estate companies, etc. Thirdly, the effects of ERM practices on firm value is to be discussed a certain period following a devastating financial crisis, i.e., the Global Financial Crisis of 2007-08.

The remainder of this paper proceeds as follows. Section 1 discusses the theoretical background of enterprise risk management in line with the Global Financial Crisis of 2007-08. Section 2 reviews the literature between enterprise risk management practices and firm value. Section 3 explains the research methodology and empirical findings. Finally, Section 4 concludes the paper and suggests further research development.

1. ENTERPRISE RISK MANAGEMENT and THE GLOBAL FINANCIAL CRISIS of 2007-08

It is obvious that the global financial crisis of 2007-08 and the following global recession period were so devastating, but indeed, for those in the financial sector, they all were expected. Warning of Federal Reserve Governor Edward Gramlich about the instabilities in the subprime mortgage and housing markets in January 2005 (Kirchhoff, 2015); reports about the abrupt halt in real estate gains in the first quarter of 2006 and a continual decrease in the median price of a United States home beginning in the fourth quarter of 2005 (Christie, 2006); and mass layoffs in Washington Mutual, Lehman Brothers and National City in 2007 were all signals of the impending crisis. In late 2008 and early 2009, the prices of most stocks and commodities fell dramatically due to lack of confidence, expectations of diminished demand and barriers to credit access. Then, the crisis rapidly evolved into a global economic shock causing several bank failures, tight credit and monetary policies and decline in international trade (Norris, 2008). Household wealth in United States fell from its peak in the second quarter of 2007 at $61.4 trillion to $59.4 trillion by the end of the first quarter of 2009. This resulted in sharp declines in both consumption and business investments. According to Bureau of Labor Statistics and Federal

Reserve Bank; unemployment rate in United States peaked to the highest rate since 1983 of 11.0% in October 2009 and the quarter-over-quarter decline in real GDP became 8.4% in the last quarter of 2008.

In the post-World War II era, United States has not been immune to financial crises and these crises have tendency to be localized and mostly contained (Kaufman, 2010). The very unusual feature of the global financial crisis of 2007-08 is that it started in United States, but very quickly spread and caused significant decline in economic activity in half of all countries in the world. Besides, most of the crises in the post-World War II era have involved less developed economies. Another unusual feature of the crisis is that it has affected advanced industrial economies (particularly in Europe) more severely compared to the less developed ones and since the Great Depression, the advanced industrial economies have gone into a deep and sustained recession all together (Fligstein and Habinek, 2011).

The Crisis also hit the Turkish economy hard in 2008 and spread quickly via financial markets and trade. Similar to many emerging economies, some of the most significant impacts of the Crisis on the Turkish economy included net capital outflows, currency depreciation, a significant decline in stock prices, increase in market risk premia and tightening liquidity in banking system (Rawdanowicz, 2010). Moreover, exports plunged, triggering a massive contraction in industrial output and investment. The elevated uncertainty led to substantial variability in market forecasts, caused sharp drops in business and consumer confidence indexes, amplifying the exceptionally large foreign demand shock. These drops were relatively huge and abrupt in Turkey, compared to some advanced and emerging economies such as United States, United Kingdom, Euro area, Mexico and Poland. Along with the fall in foreign demand, they also forced firms to reduce or cancel their investments (nearly 30% from peak to trough, as one of the largest reductions in the OECD economies) and greatly depleted their inventories. Similarly, dropping consumer confidence caused a huge consumption decline as compared to other OECD economies (nearly 10% from peak to trough).

Following the end of the Crisis and corporate downfalls of the early 2000s, efficient risk management practices gained greater importance among a greater range of actors, including not only shareholders, firm managers and commercial third parties (such as banks, customers, suppliers, etc.), but also for governments and international regulatory authorities. This is because many have blamed the incapability of conventional risk management in financial institutions as one of the main catalysts for the Crisis (Fraser and Simkins, 2010). Moreover, some others have extended this blame by including enterprise risk management (ERM) as a new paradigm superior to conventional risk management, especially within the large financial institutions in the middle of the crisis (Hampton, 2009). Consequently, governments and international regulatory authorities have recommended firms to focus on risk management practices to reduce losses and to manage and mitigate contagion effects during the crisis (Brown et al., 2009). For instance, in October 2008, Unites States government struggled to stabilize the financial system and to support firms in financial distress by enacting the Emergency Economic Stabilization Act, which later created the Troubled Asset Relief Program (TARP). TARP, as a component of the US government's measures to address the subprime mortgage crisis, purchased toxic assets and equity from financial institutions to prevent excessive risk taking. On July 2009, government of the United Kingdom published the Walker Report (2009) as a response to the Crisis. Since the Higgs Report in 2003, this report was the most significant government-sponsored report related to the UK corporate governance system. Later in 2011, 2012 and 2014, the Financial Reporting Council (FRC, 2011, 2012, 2014a, b) suggested that the listed firms should strictly adhere to sophisticated enterprise risk management practices.

Though the origin of risk management can be traced back to the end of 1940s that has primarily focused on traditional insurance (Dickinson, 2001); the first appearance of modern risk management practices of firms may be dated back to early 1990s, as a response to the lack or absence of internal and external risk management processes that mostly create inconsistency among the operational and financial analyses of stakeholders (Hoyt and Liebenberg, 2011). In this period, most firms have preferred to hire specific experts such as Chief Risk Officers (CROs) to manage risks. Thereafter, the severe damage of the 2007-08 Crisis especially on the large (financial) institutions worldwide has triggered a paradigm shift that has entirely changed the traditional silo-based perspective on risk management. The

new trend has been a holistic view of risk management and led the emergence of more contemporary risk management tools such as enterprise risk management (ERM), enterprise-wide risk management (EWRM), corporate risk management (CRM), strategic risk management (SRM), integrated risk management (IRM) and business risk management (BRM), all having quite similar definitions (Kleffner et al., 2003; Liebenberg and Hoyt, 2003; Hoyt and Liebenberg, 2006; Manab et al., 2010). As compared to these risk management tools, ERM has gained greater prominence through Sarbanes-Oxley Act passed in 2002 after accounting scandals and the Dodd-Frank Act passed in 2010 following the 2007-08 Crisis that aims to minimize risks in the financial system by regulating banks and financial institutions. Moreover, its inclusion in ratings agencies' credit assessments; its tendency to focus more on opportunity alongside pure risk rather than to focus on risk avoidance of traditional risk management tools and its competitive advantage by giving firms new ways of managing not only their assets (capital), but also the entire business more effectively have transformed ERM to a more dynamic, future-looking, agile and adaptable risk management tool (Khan et al., 2016; Blanco-Mesa et al., 2019; Anton and Nucu, 2020). Consequently, leading international organizations such as Committee of Sponsoring Organizations of the Treadway Commission (COSO), Casualty Actuarial Society (CAS), International Association of Insurance Supervisors (IAIS) and European Insurance and Occupational Pensions Authority (EIOPA) have developed some instruction tools and made recommendations about ERM's implementation processes. ERM's popularity has also influenced academia positively. The ERM-related academic studies point out a positive relationship between enterprise risk management and firm performance, indicating that ERM offers a systematic and consistent perspective that minimizes the possibility of bankruptcy, while maximizing financial performance and therefore firm value (Barton et al., 2002; Nocco and Stulz, 2006; Gordon et al., 2009; Lam, 2014).

This relationship is clearly expressed in ERM definitions of COSO and CAS. While COSO (2004: 2) defines ERM as:

> "*a process, affected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.*"

CAS (2003: 8) defines it as:

> "*the discipline by which an organization in any industry assesses, controls, exploits, finances, and monitors risks from all sources for the purpose of increasing the organization's short- and long-term value to its stakeholders.*"

From a broader perspective, both definitions define ERM as a process that identifies, evaluates and manages financial, operational and environmental risks such as currency, interest rate, supply chain, distribution system, human resource, reputational, corporate governmental and legal risks individually, but from a coordinated and strategic point of view. Bromiley et al. (2015) consider this point of view as a portfolio view of all risks that *any* firm encounters. ERM provides a systematic and comprehensive understanding of interactions among these risks (McShane et al., 2011) and assists boards in actively identification and evaluation of them (Malik et al., 2020). These benefits of ERM are also supported by Belmont (2004), Brown et al. (2009) and Lam (2014) that effective ERM practices improves the firm's reputation, increases accountability, transparency, assurance and governance and contributes to managerial performance, leading to efficient chain of command and better management of the firm.

Rational ERM practices are also beneficial in terms of finance theory. First of all, they increase investment efficiency by reducing volatility of earnings and share prices (Pagach and Warr, 2010). Finance theory justifies this benefit by the proposition that risk management is a value driver, as it reduces financing costs that mostly derives from financial distress and information asymmetry (Stulz, 1984; Froot et al., 1993). Despite some very rare opposite findings (McShane et al., 2011; Monda and Giorgino, 2013), most studies (Hoyt and Liebenberg, 2011; Baxter et al., 2013; Bertinetti et al., 2013; Farrell and Gallagher, 2015; Silva et al., 2019) provide evidence between ERM adoption and firm value.

2. LITERATURE REVIEW

Modigliani and Miller (1958; 1963)'s proposition of hedging states that the value of firm is independent of whether it hedges or not, because the value of the unhedged, high-risk cash flow equals to the value of the hedged, low-risk cash flow. As the value of the firm is determined by the cash flow stream generated by the firm's assets, hedging does not change the value of the firm. However, beginning with the 1980s, risk management has gained greater popularity and it has been argued that in the presence of capital market imperfections, enterprise risk management adoption may improve firm performance and favor the increase of firm value (Smith and Stulz, 1985; Bessembinder, 1991; Beasley et al., 2005; Aretz et al., 2007; Beasley et al., 2008; Hoyt and Liebenberg, 2011; Paape and Spekle, 2012; Ellul and Yerramilli, 2013; Florio and Leoni, 2017; Iswajuni et al., 2018; Silva et al., 2019).

The review about the literature on the effect of risk management on firm value identifies two primary streams of research (Anton, 2018). The first stream is mostly about the traditional risk management practices and consists of earlier studies on the subject that focus on the effects of financial hedging through derivates on firm value. While studies of Allayannis and Weston (2001), Graham and Rogers (2002), Nelson et al. (2005), Carter et al. (2006) and Bartram et al. (2011) provide evidence that financial derivates usage decreases risk and positively affects firm value; most studies (Guay and Kothari, 2003; Jin and Jorion, 2006; Fauver and Naranjo, 2010; Allayannis et al., 2012) provide either no evidence or only a conditional positive or negative relationship.

The second stream has diverged from the first one as a shift of focus to ERM adoption on firm value (or other financial and accounting performance evaluation measures such as return on assets, excess market return etc.). From this perspective, Hoyt and Liebenberg (2011), Baxter et al. (2013), Bertinetti et al. (2013), Eckles et al. (2014), Farrell and Gallagher (2015) and Grace et al. (2015) concluded that firm performance is positively affected by ERM practices. On the contrary, empirical findings of Beasley et al. (2008), Gordon et al. (2009), Pagach and Warr (2010), McShane et al. (2011) and Milos Sprcic et al. (2016) do not provide such evidence. Therefore, it is obvious that the second stream of research provides scant, mixed and ambiguous empirical results that may sometimes fail to support the argument that ERM adoption increases firm value.

According to Nocco and Stulz (2006), and Ellul and Yerramilli (2013), one reason behind these mixed results is the difficulty in associating a direct relationship between ERM adoption (or risk reduction) and firm value. Another reason is that the focus is generally on United States and Europe (Bromiley et al., 2015; Farrell and Gallagher, 2015), and very little is known about ERM in other developing countries. As clearly known, most firms operating in these countries including Turkey have significantly different characteristics from US and some European firms. According to European Commission's 2021 SME Country Fact Sheet, Turkey has an estimated nearly 2.95 million active small and medium sized enterprises (SMEs), representing 99.8% of all registered entities in the country and generating 52.6% of overall value added in the Turkish non-financial business economy. A great portion of Turkish SMEs are family owned and characterized by close ownership (Çırpan and Alayoğlu, 2018). Though the percentage of US SMEs is closely the same as Turkish SMEs by 99.9%; they account for 44% of US economic activity (SBA, 2021). Compared to US and some European countries, the penetration rates of both equity and debt capital markets in Turkey is significantly lower and especially debt capital markets in Turkey are also much less developed than the size of the economy should require. Other reasons behind these mixed results may be attributed to usage of different samples of firms including financial and non-financial ones; different time spans and different variables that proxy for ERM practices.

3. METHODOLOGY

3.1. Data, Variables and the Research Model

This study aims to analyze the effects of ERM practices on firm value over the post-Global Financial Crisis of 2007-08 period on a sample of Borsa Istanbul (BIST) SME Industrial Index (XKOBI) firms for the period of 2014.q1-2022.q4. This index is composed of stocks of industrial companies traded

in the Star, Main and Sub-Market, which meet any of the criteria of annual net sales or financial balance sheet size (except for the number of employees) specified in the by-law "Regulation on the Definition, Qualifications and Classification of Small and Medium-Sized Enterprises". By the end of 2022, 46 firms are listed in BIST SME Industrial Index in total. However, the sample of the study covers 12 out of 46 firms by the data availability for the 36 quarters from 2014.q1 to 2022.q4.

Research model of the study includes one dependent and four independent variables. The dependent variable is the market-to-book value ratio, a widely-used proxy for firm value in finance literature. MB reflects not only the market value of common equity, but also the ability of firm managers to use its assets effectively (Lee and Makhija, 2009). Besides, it is an indicator of riskiness of the firm (Griffin and Lemmon, 2002).

As stated before, this paper empirically examines the argument that ERM has positive effect on firm value. Therefore, the relationship between ERM and firm value is contingent upon the appropriate match between a firm's ERM practices and several firm-specific factors. Considering the literature, four firm-specific factors are included in the research model as independent variables. These are (1) credit risk, (2) foreign exchange risk, (3) liquidity risk and (4) financial leverage.

One of the most critical risks that many firms confront is the credit risk. The credit risk affects especially the manufacturing firms, as they involve a lot of risks for their production and financial operations. The research model of the study refers to Bessis (2015) in credit risk calculation. So, credit risk is calculated as total sum of default risk (DFR), exposure risk (EXR) and recovery risk (RCR). DFR, is calculated by dividing earnings before interest and taxes (EBIT) to debt interest payments; EXR is calculated by dividing net sales to trade receivables and RCR is calculated by dividing net sales to allowance for bad debts. Foreign exchange risk, also known as currency risk, is the possibility of that a firm may lose money on international trade because of currency fluctuations and can be minimized by using derivates for hedging. Foreign exchange risk occurs when foreign exchange denominated liabilities exceeded foreign exchange denominated assets. Therefore, it is calculated as the ratio of foreign exchange position to total assets. Liquidity risk refers to a firm's ability to meet its real or perceived (mostly short-term) obligations that may threaten its financial position or existence, by quickly selling off its liquid assets to fund any debt. Liquidity risk is proxied by the liquidity ratio in the research model. Liquidity ratio refers to a firm's ability to repay short-term creditors out of its total cash and calculated by dividing the total cash by short-term liabilities. Lastly, the research model includes total debt ratio as a proxy for financial leverage. Total debt ratio indicates the proportion of debt used to finance firm's assets. In spite of vast literature regarding financial leverage, this concept does not have a clear-cut definition. The main issue here is whether or not to use book value or market value of debt in calculations. The defenders of using book value argue that book value is more reliable than market value, as it does not fluctuate over time (Porras, 2011). Besides, calculating the market value of debt is quite difficult, as the number of firms carrying their debt in bond form is relatively rare. Therefore, calculation is made by using the book value of debt. Table 1 summarizes the definitions and calculations about the variables included in the research model.

Table 1.: Variables

Variable name	Symbol	Calculation
Dependent variable		
Firm value	MB	(Market value of common equity)/(Book value of common equity)
Independent variables		
Credit risk	CRERISK	DFR + EXR + RCR
Foreign exchange risk	FXRISK	|FX liabilities − FX assets|/(Total assets)
Liquidity risk	LIQRISK	(Total cash)/(Short term liabilities)
Financial leverage	FINLEV	(Total (short and long term) debt)/(Total assets)

The research model is as below:

$$MB_{it} = \beta_{0i} + \beta_1 CRERISK_{it} + \beta_1 FXRISK_{it} + \beta_1 LIQRISK_{it} + \beta_1 FINLEV_{it} + \varepsilon_{it}$$

where $CRERISK_{it}$ represents credit risk of firm i in year t; $FXRISK_{it}$ represents foreign exchange risk of firm i in year t; $LIQRISK_{it}$ represents liquidity risk of firm i in year t; $FINLEV_{it}$ represents financial leverage of firm i in year t and ε_{it} represents the error term.

3.2. Empirical Findings

This study employs panel data analysis methodology to analyze the effect of ERM adoption on firm value for several reasons. Panel data or longitudinal data typically refer to data containing time series observations of a number of individuals. According to Hsiao (2007: 4-5), panel data has several advantages that they contain more degrees of freedom and more sample variability than cross-sectional data; have greater capacity for capturing the complexity of human behavior than a single cross-section or time series data and simplify computation and statistical inference. Consequently, panel data analyses have been begun to be widely used to analyze the behavior patterns of micro and macro-economic variables in economy; and to perform longitudinal analyses in the area of social science discipline (Arellano and Bond 1991).

3.2.1. Panel Unit Root Tests

Before proceeding panel data analysis, panel unit root tests should be applied to test the stationarity of the series to ensure the reliability of the analysis. This study refers to Levin-Lin-Chu (LLC) panel unit root test of Levin et al. (2002); Im-Pesaran-Shin (IPS) panel unit root test of Im et al. (2003) and Augmented Dickey Fuller (ADF) panel unit root test of by Maddala and Wu (1999) to identify the order of integration of the variables included in the research model. Test results given in Table 2 indicate that the data is conclusively and consistently stationary in first difference.

Table 2.: Results of Panel Unit Root Tests

Variables	LLC		IPS		ADF	
	Intercept	Trend-Intercept	Intercept	Trend-Intercept	Intercept	Trend-Intercept
MB	-1.212 (0.077)	0.302 (0.519)	-1.714 (0.045)	-0.599 (0.114)	22.235 (0.108)	16.418 (0.218)
ΔMB	-9.514 (0.000)***	-8.298 (0.000)***	-11.115 (0.000)***	-9.814 (0.000)***	132.425 (0.000)***	108.895 (0.000)***
CRERISK	0.899 (0.759)	-0.152 (0.301)	0.697 (0.701)	0.704 (0.599)	2.821 (0.771)	2.001 (0.615)
ΔCRERISK	-0.798 (0.000)***	-3.894 (0.000)***	-5.198 (0.000)***	-4.198 (0.000)***	33.978 (0.000)***	22.795 (0.000)***
FXRISK	0.521 (0.671)	2.401 (0.884)	1.452 (0.745)	1.519 (0.875)	12.415 (0.774)	10.145 (0.984)
ΔFXRISK	-7.101 (0.000)***	-7.189 (0.000)***	-5.201 (0.000)***	-6.879 (0.000)***	77.145 (0.000)***	71.486 (0.000)***
LIQRISK	1.115 (0.897)	3.879 (0.715)	1.725 (0.879)	1.315 (0.849)	10.458 (0.845)	16.111 (0.418)
ΔLIQRISK	-10.845 (0.000)***	-7.111 (0.000)***	-9.235 (0.000)***	-8.458 (0.000)***	117.125 (0.000)***	91.759 (0.000)***
FINLEV	-1.489 (0.081)	1.415 (0.901)	-3.129 (0.004)	-2.485 (0.012)	42.145 (0.000)	38.486 (0.025)
ΔFINLEV	-2.555 (0.004)***	-2.189 (0.003)***	-7.089 (0.000)***	-6.145 (0.000)	100.125 (0.000)***	61.111 (0.000)***

Note: Probability values are given in parentheses. *** denotes statistical significance at the 1% level. Δ is the difference operator.

3.2.2. Panel Co-integration Test

Following the panel unit root tests, this study employs Pedroni (1999) panel co-integration test to test the existence of any long-run relationship among the series. Pedroni (1999; 2004) has introduced seven test statistics that test the null hypothesis of no cointegration in non-stationary panels. These test statistics allow heterogeneity in the panel, both in the short-run dynamics as well as in the long-run slope and intercept coefficients. The seven test statistics are grouped into two categories: group-mean statistics that average the results of individual country test statistics and panel statistics that pool the statistics along the within-dimension (Neal, 2014). The proposed within-dimension test statistics are panel v-statistics, panel rho-statistics, panel PP-statistics and panel augmented Dickey-Fuller (ADF)-statistics; while the proposed between-dimension test statistics are group rho-statistics, group PP-statistics and group ADF-statistics. Pedroni (1999) panel co-integration test results are given in Table 3.

Table 3.: Results of Pedroni (1999) Panel Co-integration Test

Test statistics	Intercept	Trend-Intercept
Panel v-statistics	-0.402	-1.089
	(0.498)	(0.714)
Panel rho-statistics	-0.207	0.210
	(0.387)	(0.497)
Panel PP-statistics	-6.456***	-6.018***
	(0.000)	(0.000)
Panel ADF-statistics	-4.510***	-4.562***
	(0.000)	(0.000)
Group rho-statistics	1.792	1.549
	(0.886)	(0.784)
Group PP-statistics	-7.001***	-6.789***
	(0.000)	(0.000)
Group ADF-statistics	-4.429***	-4.888***
	(0.000)	(0.000)

Note: Probability values are given in parentheses. *** denotes statistical significance at the 1% level.

3.2.3. Estimation of Long-run Coefficients

After detecting the co-integration relationship, the next step is to estimate long-run coefficients. This study refers to panel Fully Modified Ordinary Least Square (FMOLS) test of Pedroni (2000). This test corrects deviations in standard fixed effect estimators (such as autocorrelation and varying variance); allows a significant degree of heterogeneity between individual cross-sections and accounts for the existence of a possible correlation between the constant term, the error term and the differences between the independent variables. Co-integration test results are given in Table 4.

FMOLS test results indicate that regarding cross-section dimensions, while financial leverage has statistically significant and positive effect on firm value; the other independent variables included in the research model as credit risk, foreign exchange risk and liquidity risk have statistically significant and negative effects on firm value, in general. These empirical findings are also consistent with the findings regarding overall panel data.

Table 4.: Long-run Coefficients

Firms	Results of panel FMOLS			
	CRERISK	FXRISK	LIQRISK	FINLEV
BFREN	-0.004 (-1.298)	0.033 (0.698)	0.014 (0.226)	0.093 (0.889)
BURCE	-0.007*** (-7.125)	-0.121*** (-6.965)	-0.086*** (-3.001)	0.051 (1.387)
BURVA	-0.007 (-0.398)	-0.004* (-1.911)	-0.041 (-0.693)	-0.072 (-0.745)
DOGUB	-0.512** (-2.114)	-0.007*** (-6.981)	-0.186*** (-3.216)	0.046 (-0.081)
ERSU	-0.068 (-0.498)	-0.088*** (-3.777)	0.099 (1.429)	0.396*** (2.982)
FMIZP	-0.077 (-1.111)	0.191* (1.789)	0.126 (0.496)	0.672 (1.088)
FRIGO	-0.014 (-1.356)	-0.198** (-2.111)	0.379** (2.116)	0.365 (1.181)
LUKSK	0.070*** (3.642)	-0.071 (-0.835)	-0.375* (-1.895)	-0.503 (-0.999)
MAKTK	-0.048*** (-2.899)	0.077 (1.125)	-0.701*** (-3.468)	-0.356 (-1.678)
MERKO	0.007 (0.143)	0.072 (1.444)	-0.011 (-0.054)	0.296 (1.415)
SAFKR	0.008 (0.155)	0.073 (1.487)	-0.019 (-0.069)	0.249 (1.498)
VANGD	-0.081 (-1.086)	0.192* (1.644)	0.113 (0.509)	0.323 (1.055)
Panel results	-0.065*** (-4.444)	-0.024*** (-5.186)	-0.088*** (-2.875)	0.077* (1.609)

Note: Probability values are given in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

CONCLUSION

Though there is an intense concern on risk management practices, it is obvious that both theoretical and empirical research in the field of enterprise risk management (ERM) is still rare. The reason may be partly because of the controversies about developing a proper, valid and reliable measure for any ERM framework. This study aims to fill the empirical research gap by analyzing the possible effects of ERM practices on firm value over the post-Global Financial Crisis of 2007-08 period on a sample of Borsa Istanbul (BIST) SME Industrial Index (XKOBI) firms. This paper is expected to make several contributions to the existing literature. First of all, to the best of my best knowledge, except for the studies of Sayılır and Farhan (2017), and Şenol and Karaca (2017), this is one of the pioneering studies to analyze the effect of ERM practices on firm value by focusing on Borsa Istanbul. Secondly, this study differs from the previous ones by focusing on non-financial firms, because -as to be discussed in Literature Review- the great majority of the previous studies are mostly about financial services companies including banks, investment banking firms, insurance companies, real estate companies, etc. Thirdly, the effects of ERM practices on firm value is to be discussed a certain period following a devastating financial crisis, i.e., the Global Financial Crisis of 2007-08.

Research model of the study includes one dependent and four independent variables. The dependent variable is the market-to-book value ratio, a widely-used proxy for firm value in finance literature. MB reflects not only the market value of common equity, but also the ability of firm managers to use its assets effectively (Lee and Makhija, 2009). Besides, it is an indicator of riskiness of the firm (Griffin and Lemmon, 2002). The relationship between ERM and firm value is thought to be contingent upon the appropriate match between a firm's ERM practices and several firm-specific factors. Considering the literature, four firm-specific factors are as credit risk, foreign exchange risk, liquidity risk and financial leverage are included in the research model as independent variables.

The empirical findings provide evidence that financial leverage has statistically significant and positive effect on firm value; while the other independent variables included in the research model as credit risk, foreign exchange risk and liquidity risk have statistically significant and negative effects on firm value.

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