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Corporate derivatives use and firm value: Evidence from Turkey

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Abstract

This paper examines use of financial derivatives (currency, interest rate and commodity) and its effect on firm value of non-financial Turkish firms for period of 2007–2013. Only 36.41% of companies in our sample use derivatives to hedge their currency, interest rate or commodity price risks. We have used Tobin's Q ratio analysis with panel data models, Fama-French three-factor time-series analysis and single sector analysis to investigate whether corporate derivatives use is value relevant or not. Except Tobin's Q ratio analysis with system GMM estimators, we cannot find significant hedging premium or discount for all Turkish non-financial firms. We find a positive relationship between derivatives use and firm value, only when we use Tobin's Q ratio analysis with system GMM estimators. We also test the effects of currency hedging, interest rate hedging and commodity price hedging separately and find similar results as in the case of general derivatives use. Overall, majority of our results imply that use of financial derivatives does not affect firm value in Turkish market.

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1. Introduction

In contemporary business environment, risk management has become one of the most important business drivers, especially during the recent financial crisis. More companies have been conducting risk management systems and more non-financial firms have been using financial derivatives intensively to manage their financial risks, recently. Hence, they are able to focus on their main operating activities. Considering the popularity of risk management activities in practice, we can argue that risk management practices contradict Modigliani and Miller (1958) proposition on risk management. Smith and Stulz (1985) started to question this conflict and theoretically have proven that risk management is beneficial to firms in presence of market imperfections. Theoretically proven value-increasing channels of hedging are tax incentives to hedge, decreased expected costs of financial distress, decreased underinvestment costs, managerial compensation and asymmetric information (Dadalt, Gay, & Nam, 2002; Demarzo & Duffie 1995; Froot, Scharfstein, & Stein, 1993; Leland, 1998; Ross, 1996; Smith & Stulz, 1985; Stulz, 1996).

After theoretical studies, researchers have started to investigate the relationship between derivatives use (a strong proxy for risk management) and firm value empirically by collecting data with questionnaires. Next, introduction of advanced financial reporting standards and disclosure requirements in the US and EU countries after early 1990s has encouraged scholars to investigate the value relevance of derivatives use directly by using data reported in financial statements. So far, empirical studies on risk management

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practices have focused only on the developed markets data set. The main reason of this situation is that advanced reporting requirements have not been applied in most emerging markets. Consequently, there has been little discussion on value relevance of derivatives use in emerging markets. The main aim of this study is to investigate effects of risk management activities (derivatives use) on firm value in non-financial companies by using an emerging market (Turkey) data set. In this study, parallel to the classical value relevance of derivatives use phenomenon, we examine whether financial derivatives use (currency, interest rate or commodity) is associated with higher firm value in Turkey. Similar to most emerging markets, risk management practices of Turkish non-financial firms are not known well. To our knowledge, this research is the first detailed investigation to identify levels of derivatives use for Turkish listed non-financial firms by constructing a unique hand-collected data set for the period of 2007–2013.

Our first targeted contribution to the literature is that we present a new detailed evidence on value relevance of hedging in Turkey (an emerging economy) so that we can compare the hedging premium/discount level of an emerging economy with findings of developed economies. Turkish data has certain unique characteristics in comparison to data sets of developed countries. Firstly, ownership concentration is very high among Turkish publicly held firms and investor protection systems are also relatively weak. As Khediri (2010) explains, existence of insider blockholders can affect behaviour of investors in such a way that they might not value hedging policies of Turkish firms fairly because investors think that insider blockholders may be risk averse or insiders have other motives to use derivatives rather than risk management and value maximization. Hence, we expect relatively lower level of hedging premium (or no hedging premium) in such an environment that investors are not sure about the real motive of derivative use among Turkish companies with highly concentrated ownership structures. Second unique characteristic of Turkish data is related to the reporting quality of financial derivatives use. Turkish publicly held companies do not submit a separate form to capital markets authority and investors for their use of derivative instruments. Although they conduct International Financial Reporting Standards, there is no standart application of IFRS 7 which requires the reporting of financial derivative use and risks related to these instruments. Because of limited and nonstandardized information, investors might not be able to understand crucial details of financial derivative use and not be able to use related information in their investment decisions. Demarzo and Duffie (1995) and Dadalt et al. (2002) emphasize that hedging and proper disclosure of hedging activities improves informational quality of financial reports and reduce information asymmetry between managers and outsiders. Hence, we expect relatively lower level of hedging premium (or no hedging premium) in such an environment that managers and owners do not report derivatives use properly which leads to asymmetric information. By examining the unique Turkish data, we seek to investigate the effects of highly concentrated ownership structure and poor reporting requirements on the value relevance of corporate derivatives use. Because of these two unique characteristics of Turkish data set, there might be no hedging premium or a relatively lower level of hedging premium for Turkish non-financial firms.

Our sample period (7 years) is relatively longer than most of the studies in this field. Most of the studies generally use a data set covering only one or two fiscal years because of the demanding data collection process (For example, Khediri, 2010; Bartram, Brown, & Conrad, 2011; Belghitar, Clark, & Mefteh, 2013 cover 3 years, 2 years and 4 years respectively). From this aspect, we have a more comprehensive data set in comparison to other studies.

Another innovation of this study is that we construct a new derivatives use dummy variable by using quarterly financial data. In addition to collecting data from annual reports by searching for derivatives-related words, we collect information from hedging accounts reported at quarterly financial statements. According to hedging accounting rules in IFRSs, firms must recognize changes in fair value of derivatives as asset, liability or equity at each financial reporting period including interim quarter periods. We construct a dummy variable if a firm uses one of these derivatives-related accounts reported at statement of financial position during any of four quarterly periods. This is an alternative measure of corporate derivative use. One drawback related to using such a dummy variable is that we cannot distinguish the type of derivatives use (currency, interest rate or commodity). However, this data collection methodology enables us to collect information from interim reporting periods easily without reading annual reports and searching for derivatives-related words.

We have used Tobin's Q ratio analysis with panel data model, Fama-French three-factor time-series analysis and single sector analysis to investigate whether corporate derivatives use is value relevant or not. Except Tobin's Q ratio analysis with system GMM estimators, we can not find significant hedging premium or discount for Turkish non-financial firms.

In Section 2, we critically review the related literature on direct relationship between use of financial derivatives and firm value. Section 3 describes variables, data set and our sample that we use in this study. We report and discuss the results of our study in Section 4. In the last section, we conclude our study and present some implications.

2. Literature review

Related literature on corporate risk management and value relevance of derivatives use is very rich and diversified. As stated by Lookman (2004) scholars generally use two different approaches to examine empirically the value relevance of corporate hedging. In the first methodology, determinants of hedging are tried to be found and these determinants are generally explanatory variables. These independent variables are proxies for frictional costs in the financial markets. In these studies, derivatives use is a dependent variable. For example, if there is a negative relationship between financial leverage and derivatives use, this indicates the existence of

value relevance. In the second approach, which has been more widely used in recent studies, researchers directly investigate the effects of corporate hedging on firm value. Derivatives use, a proxy for hedging, is one of explanatory variables and there are also other control variables in empirical models. In these models, firm value (measured as Tobin's Q ratio) is dependent variable. A hedging premium is calculated by using the regression coefficient of derivatives use variable. We also preferred this approach in our study.

Berkman and Bradbury (1996) examined the relationship between extent of hedging and different variables by using data set of the New Zealand. The study of Berkman and Bradbury (1996) is important, because they are the first to mention about calculation of the extent of hedging. The study of Allayannis and Weston (2001) investigated the effect of foreign currency hedging on firm value by using a large US non-financial firms' data set from 1990 to 1995. They found a statistically and economically significant positive relationship between derivatives use and firm value by conducting univariate analysis, pooled OLS and fixed-effects panel data models. They also found that on average, the value of firms which are exposed to currency risk and use derivatives, is 4.87% higher than non-hedgers. Khediri (2010) investigates value relevance relationship by using only French data set. He investigates foreign exchange hedging and interest rate hedging excluding commodity price risk hedging. He emphasizes the heteroskedasticity problem for dependent variable (Tobin's Q) and uses panel data with fixed effects rather than pooled OLS. He finds no statistically significant relationship between derivatives use and firm value. He suggests that reasons for this result are high ownership concentration and weak investor protection in France. Bartram et al. (2011) present the first international evidence on value relevance issue. They examine the effects of derivatives use on firm value and risk by using a data set of non-financial firms from 47 countries. They find that there is a positive relationship between derivatives use and firm value. Recently, Panaretou (2013) investigates the effects of hedging activities on firm value for the U.K. large non-financial companies. She finds that the hedging premium is 6% for foreign currency hedging. However, she does not find any evidence of value relevance for the use of interest rate and commodity derivative instruments.

Another group of studies investigating the value relevance of derivatives use focuses on specific industries. Some industries such as gold mining, airline, oil and gas exploration are directly exposed to certain risks. Perez-Gonzalez and Yun (2013) have recently investigated the value relevance of risk management by using weather derivatives for the first time. They show that the use of weather derivatives in the U.S. electric and gas utility firms increases the firm value at economically and statistically important levels.

Mackay and Moeller (2007) test valuation effects of risk management by relating revenues and costs to product and output (energy) prices for 34 U.S. oil refiners during the period of 1985–2004. They introduce a new measure of hedging by avoiding the data from financial statement footnotes. They find that risk management with derivatives can increase firm value. Specifically, they document 2% increase in firm value if the firm manages risks by hedging concave revenues and leaving concave costs as exposed. Mackay and Moeller (2007) also conclude that the market rewards firms that hedge when hedging creates value and penalizes firms that hedge when hedging destroys value. In the same vein, Phan, Nguyen, and Faff (2014) has recently reinvestigated the value relevance of hedging with financial derivatives for U.S. oil and gas exploration and production companies over the period of 1998–2009. They define two sources of value relevance as the lower volatility of cash flows and the lower cost of equity. Phan et al. (2014) argue that hedging is expected to be value relevant in presence of downside risk which is related to behaviour of the underlying asset, but hedging might not enhance firm value when there is no bankruptcy risk and volatility of underlying assets is on the upside. They use both cross-sectional and time-series analysis. Their results indicate that there is significant hedging discount (negative relationship between hedging and firm value) during the periods characterized with high oil and gas prices, but hedging is value irrelevant when oil and gas prices decline. Both Mackay and Moeller (2007) and Phan et al. (2014) emphasize that market prices of underlying assets (exchange rate, interest rate and commodity) which lead to risks in firms' main operations should be included in empirical methodologies.

The number of studies that examine value relevance of derivatives use in emerging countries is very limited due to data limitations. Berrospide, Purnanandam, and Rajan (2008) study the effect of foreign currency derivatives usage on firm value in Brazil for the period of 1997–2004. Results of pooled OLS and fixed effects model regression analyses indicate a relatively large value premium for hedgers that is 6.7–7.8% meaning that there is a positive relationship between derivatives use and firm value in Brazil.

Last group of studies in the literature criticizes the existing papers in terms of measurement of hedging and research methodology. In their study, Guay and Kothari (2003) argue that findings of Allayannis and Weston (2001) are not robust and other risk management tools like operational risk management techniques that are highly correlated with derivatives use is the source of hedging premium found. Aretz and Bartram (2010) give a detailed and critical overview on theoretical and empirical evidence of the existing literature related to corporate risk management and its role in value creation. They conclude that empirical evidence is mixed on value relevance of derivatives use and it is only a part of the whole risk management strategy in a firm. They assert that operational hedging and foreign currency debt are another important facets of hedging strategies. Jin and Jorion (2006) emphasize endogeneity problem of the relationship between derivatives use and market value of firms. Magee (2009) revisits the relationship between foreign currency derivative usage and firm value for the U.S. non-financial firms. Magee (2009) also emphasizes the endogeneity problem. In examining the value relevance of derivative usage, Magee (2009) shows that currency derivative usage variable is not strictly exogenous. Therefore, he employs a dynamic panel with

system GMM estimators to overcome possible endogeneity problems. Magee (2009) finds no relationship between derivative usage and firm value by using dynamic panel data model with system GMM estimators.

3. Variables, data set and sample

For our investigation of the relationship between derivatives use and firm value, we collected the data from Borsa Istanbul web site (www.borsaistanbul.com), Public Disclosure Platform (www.kap.gov.tr) and Datastream financial database. Our sample captures the period of 2007–2013. The reason why our sample period begins in 2007 is related to the effective date of IFRS 7 – Financial Instruments: Disclosures. IFRS 7 requires companies to disclose information about the nature and extent of risks arising from use of financial instruments so that we are able to detect the derivatives use of a company by reading its financial reports. In IFRS 7, the risks related to financial instruments are listed as credit risk, liquidity risk and market risk. IFRS 7 requires entities to disclose both qualitative and quantitative knowledge on the nature and extent of three risks. This knowledge includes fair value, nominal value, maturity, type and purpose of derivatives use. Before the introduction of IFRS 7, companies did not have to report such details in their financial reports.

We examine annual reports and collect the derivatives use data of 1905 year-firm observations. Our sample consists of all non-financial Turkish firms that have 7 years non-missing data during the sample period. There are 1589 year-firm observations that meet this criteria. Lastly, we also drop the outliers exceeding 1% and 99% percentiles for Tobin's Q ratio. Our sample includes the data of total 204 firms that meet related criteria so that we obtain a balanced panel data of 1428 firm-year observations in total. We do not use any size threshold to include only large firms. We include all non-financial firms instead. We exclude financial firms from our sample because financial firms actively use derivative instruments for the purpose of trading or speculation and their motivation for derivatives use is very different from non-financial firms. Non-financial firms may also use the derivative instruments for the purpose of speculation. In our data collection process, we also check that none of the Turkish non-financial firms included in our sample uses the derivatives for speculative purposes.

We accept financial derivatives use as a strong proxy for hedging and main risk management practice in Turkish non-financial firms. Turkish non-financial firms may also use operational hedging and/or natural hedging for risk management purposes. However, generally there is no information about operational hedging in financial reports. In this study, hedging means the use of financial derivatives. We also consider three sub-samples of currency, interest rate and commodity derivatives use to investigate value relevance of different hedging strategies separately.

Table 1 Panel A provides frequency of derivatives usage among Turkish non-financial firms by year and by industry. Of the 1428 firm-year observations, we identify 520 (36.41%) derivatives usage observations. This ratio is lower than developed countries derivatives usage levels. When we review hedging purposes, we identify 32.98%, 13.59% and 3.29% for currency risk, interest rate risk and commodity price risk hedgers respectively. Table 1 Panel B shows hedgers and nonhedgers by industry classification.

3.1. Dependent variables

In our empirical models, dependent variable is the firm value and we measure the firm value by using Tobin's Q ratio. As emphasized by Wernerfelt and Montgomery (1988), Tobin's Q ratio is a good proxy for firm value measurement. In empirical studies, an approximation of Tobin's Q ratio is generally used. In this study, Tobin's Q ratio is defined as [(Market value of equity + Preferred stocks + Total debts)/ Total assets]. Chung and Pruitt (1994) introduced this widely used robust approximation of Tobin's Q ratio. Allayannis and Weston (2001), Jin and Jorion (2006) and Panaretou (2013) also used the same definition. We use the natural logarithm transformation of Tobin's Q ratio since log-transformed Tobin's Q ratios have better statistical distribution properties than raw Tobin's Q ratios as suggested by Hirsch and Seaks (1993).

Wernerfelt and Montgomery (1988) claim that the industry in which a firm operates may be an important factor to determine Tobin's Q ratio of the firm. Depending on this view and following Panaretou (2013), we also use industry adjusted Tobin's Q ratios to control industry effects on the firm value. Industry adjusted Tobin's Q ratio is calculated as the difference between natural logarithm of firm's Q ratio and industry median of log-transformed Tobin's Q ratio.

Table 2 Panel A reports descriptive statistics of dependent variables in our sample. Tobin's Q ratio has mean value of 1.36, median of 1.14 and standard deviation of 0.76 and it is skewed.

3.2. Independent variables

We use three different measures for use of financial derivatives: (a) *Derivatives Use* is a dummy variable that equals to 1 if a firm uses any kind of derivative instruments and 0 otherwise. (b) *Extent of Hedging* is a continuous variable that is measured as ratio of total notional value of derivative instruments to book value of total assets. (c) *Hedging Accounting based Derivatives Use* is a dummy variable that equals to 1 if the firm reports any of the financial derivatives accounts in the statement of financial position at any quarter within a year, 0 otherwise.

We collected the data of derivatives use (hedging activity) from the annual reports. At the end of our data collection process, we constructed a unique data set for the use of financial derivatives in Turkish non-financial firms. Following Nelson, Moffitt, and Affleck-Graves (2005) and Panaretou (2013), specifically we accept exchange rate forwards, currency swaps and currency options as currency derivatives; interest rate swaps, caps, collars and other options as interest rate derivatives; commodity price forwards and options as

Table 1
Hedgers by year and industry.

	N	All derivatives (%)	Currency derivatives (%)	Interest rate derivatives (%)	Commodity derivatives (%)
Panel A: firms by year					
2007	204	24.51	21.57	8.82	2.94
2008	204	39.71	36.27	13.73	3.92
2009	204	39.22	36.76	15.69	2.45
2010	204	39.22	35.29	14.22	3.43
2011	204	37.25	33.33	15.2	3.43
2012	204	38.24	33.82	13.73	3.92
2013	204	36.76	33.82	13.73	2.94
Total	1428	36.41	32.98	13.59	3.29
Panel B: firms by industry					
Applied resources	98	14.29	14.29	6.12	0.00
Automobiles & auto parts	63	50.79	39.68	23.81	0.00
Chemicals	91	40.66	38.46	18.68	0.00
Cyclical consumer products	273	29.67	27.11	4.76	3.30
Cyclical consumer services	98	22.45	21.43	13.27	0.00
Energy-fossil fuels	42	47.62	33.33	21.43	30.95
Food & beverages	147	44.90	33.33	26.53	4.76
Food & drug retailing	21	42.86	42.86	23.81	0.00
Industrial & commercial serv.	56	28.57	28.57	5.36	0.00
Industrial goods	105	48.57	45.71	0.95	7.62
Mineral resources	175	29.71	29.14	6.86	0.00
Personal & household prod.	14	100.00	100.00	42.86	0.00
Real estate	42	11.90	9.52	7.14	0.00
Retailers	42	38.10	38.10	16.67	0.00
Software & IT services	14	14.29	14.29	0.00	0.00
Technology equipment	63	49.21	49.21	0.00	0.00
Telecommunications serv.	7	100.00	100.00	42.86	0.00
Transportation	42	50.00	50.00	47.62	16.67
Utilities	35	68.57	57.14	62.86	8.57

commodity derivatives. To collect hedging data, we searched footnotes of financial statements for text strings of “derivative”, “hedge”, “forward”, “swap”, “option”, “futures” and “financial risk”. If we found any searched term in the footnotes, careful reading was done to confirm that the firm uses derivative instruments. We use the net position of each type of risk in this study.

As an alternative measure, we also collected data of *Hedging Accounting based Derivatives Use* dummy variable from quarterly financial statements. We examined the values of quarterly reported derivatives accounts in balance sheets and income statements. These accounts are current derivative assets, noncurrent derivative assets, current derivative liabilities, noncurrent derivative liabilities, unrealised valuation gain/loss on hedging derivatives equity account and comprehensive income − hedging gain/loss. If any of these accounts has a value in any quarterly financial statement within a year, this means that examined firm uses a financial derivative instrument during relevant fiscal year. Because of differences in data collection process, percentage of hedgers based on hedging accounts is lower than that of our hand-collected derivatives use. The main difference of using quarterly hedging accounts as proxy for derivatives use is that we can detect interim use of financial derivatives without reading footnotes. In other words, if a firm reports changes in fair value of financial derivatives as asset, liability or equity in its interim financial statements, then this firm is accepted as hedger. However, if a company does not hold any financial derivatives position at the end of quarterly reporting period, there is no need to use a hedging account in financial statements. Hence, we cannot detect any derivatives use of such company, if this company has closed its positions before quarterly reporting period. On the other hand, reading year-end financial reports enables us to pick derivatives use information from footnotes even if companies have no open derivative positions at the date of financial reporting. In other words, if a firm declares use of financial derivatives as risk management tool in footnotes of financial statements, we accept this firm as hedger in our hand-collected data set.

Table 2 Panel B presents descriptive statistics of derivatives use variables. In addition to derivatives use independent variables, we use several control variables that can explain firm value based on the existing literature. These control variables are listed below:

Firm size: Firm size variable is the natural logarithm of total assets adjusted for inflation.
Profitability: This variable is calculated as net profit divided by total assets (return on assets, ROA).
Leverage: This variable is defined as long-term debts divided by market value of total shareholders' equity.
Investment growth (opportunities): Future investment opportunities affect firm value. Following Yermack (1996) and Allayannis and Weston (2001), we calculated a

Table 2
Descriptive statistics.

	N	Mean	Median	Std. Dev.	P1	P99
Panel A: descriptive statistics of Tobin's Q ratios						
All firms						
Tobin's Q ratio	1428	1.36	1.14	0.76	0.54	4.72
ln Tobin's Q ratio	1428	0.20	0.13	0.42	−0.62	1.55
Industry adjusted Tobin's Q ratio	1428	0.06	0.01	0.39	−0.70	1.41
Non-hedgers						
Tobin's Q ratio	908	1.42	1.14	0.88	0.54	5.38
ln Tobin's Q ratio	908	0.22	0.13	0.46	−0.63	1.68
Industry adjusted Tobin's Q ratio	908	0.07	0.01	0.43	−0.74	1.55
Hedgers						
Tobin's Q ratio	520	1.26	1.13	0.50	0.57	3.16
ln Tobin's Q ratio	520	0.17	0.12	0.34	−0.57	1.15
Industry adjusted Tobin's Q ratio	520	0.04	0.01	0.32	−0.62	0.95
Panel B: descriptive statistics of derivatives use						
General derivatives use dummy	1428	0.36	0.00	0.48	0.00	1.00
Extent of general derivatives	1365	0.03	0.00	0.11	0.00	0.52
General derivatives use dummy (Hedging accounts)	1428	0.22	0.00	0.42	0.00	1.00
Panel C: non-hedgers						
Total assets (million TRY)	908	555.21	218.15	1278.41	10.83	4492.88
Sales (million TRY)	908	419.51	110.41	1641.16	0.13	5028.77
MV of equity (million TRY)	908	366.08	87.03	996.29	5.05	4076.88
Long term debt (million TRY)	908	44.13	1.42	188.74	0.00	700.00
BV of equity (million TRY)	908	215.20	75.96	457.57	−92.84	1707.51
ROA	908	0.018	0.022	0.180	−0.477	0.361
Dividend dummy	908	0.319	0.000	0.466	0.000	1.000
LT debt/equity	908	0.233	0.021	0.751	0.000	3.181
Capex/sales	908	0.089	0.034	0.203	−0.013	0.983
Foreign sales/sales	908	0.173	0.070	0.222	0.000	0.876
Diversification dummy	908	0.222	0.000	0.416	0.000	1.000
Currency position/total assets	908	0.203	0.089	0.576	0.000	1.193
Cash/current liabilities	908	0.851	0.118	4.178	0.000	13.193
Panel D: Hedgers						
Total assets (million TRY)	520	2835.48	776.81	4490.96	41.22	20,075.79
Sales (million TRY)	520	2382.82	651.27	4705.34	11.58	22,527.95
MV of equity (million TRY)	520	1708.03	379.72	3684.59	8.68	19,536.00
Long term debt (million TRY)	520	395.14	61.52	870.70	0.00	3328.73
BV of equity (million TRY)	520	993.51	297.69	1878.45	−3.20	9571.65
ROA	520	0.024	0.033	0.098	−0.284	0.233
Dividend dummy	520	0.490	0.000	0.500	0.000	1.000
LT debt/equity	520	0.350	0.149	0.585	0.000	3.135
Capex/sales	520	0.067	0.034	0.120	0.000	0.635
Foreign sales/sales	520	0.245	0.167	0.242	0.000	0.835
Diversification dummy	520	0.412	0.000	0.493	0.000	1.000
Currency position/total assets	520	0.165	0.125	0.151	0.001	0.585
Cash/current liabilities	520	0.771	0.162	7.173	0.001	10.090

capital expenditures ratio that is capital expenditures divided by sales.

Access to financial markets: This dummy variable is 1 if the firm pays dividend during the fiscal year, 0 otherwise. If a firm is able to pay dividend, it is less likely to be capital constrained.

Industrial Diversification: This dummy variable is 1 if the firm operates more than one product segments, 0 otherwise. We used Thomson Reuters Business Classification's business sector codes to create our industry diversification control variable.

Geographic Diversification: The ratio of foreign sales to total sales is a proxy for geographic diversification.

Currency Position: Currency position gap as reported in financial reports is an indicator of ex-ante foreign currency risk. This gap can be positive or negative, but in either case currency position gap causes currency risk. Therefore, we calculate currency position variable as absolute currency position that is monetary amount divided by total assets.

Liquidity: Liquidity is measured with ratio of cash and cash equivalents to current liabilities.

Industry Effect: A firm may have a higher market value because of the industry in which the firm operates. We use both industry adjusted Tobin's Q ratios and industry dummies.

Table 2 Panel C and Panel D show descriptive statistics of control variables. As reported in Table 2 Panel D, hedgers are

larger, higher levered, more profitable and more diversifiable firms compared to non-hedgers. Hedgers also have higher foreign sales/sales ratio and currency position/total assets ratio; they are more likely to pay dividend. On the other hand, hedgers have lower capital expenditures/sales ratio (growth opportunities).

We initially compare hedgers and non-hedgers in terms of firm value (Tobin's Q ratio) and several control variables by using two sample t-test of mean values. Table 3 reports differences in mean and related t statistics for several variables. Hedgers have lower Tobin's Q ratio (firm value) and capital expenditures/sales ratio in comparison to non-hedgers, while they have higher total assets, market value, foreign sales/net sales, financial leverage, dividend payment propensity, diversification in their operations in comparison to nen-hedgers. The difference between Tobin's Q ratios of hedger and non-hedgers is −0.15 and it is statistically significant at 5% level. This finding is a sign of hedging discount, but it is important to emphasize that we can not control effects of other determinants of firm value in univariate analysis.

We report correlation coefficients between independent variables in Table 4. Correlation coefficients are relatively low implying that possibility of facing multicollinearity problem is low.

4. Analysis and results

4.1. Tobin's Q analysis

Similar to recent studies of Allayannis and Weston (2001), Carter, Rogers, and Simkins (2006), Allayannis, Lel, and Miller (2012) and Panaretou (2013), we have used multivariate models to investigate the direct effect of derivatives use on firm value. In multivariate structure, we estimated the models below to investigate value relevance of derivatives use.

$$y_{it} = \alpha + \beta \times \text{Derivatives Use}_{it} + \delta \times X'_{it} + u_{it}. \quad (1)$$

$$y_{it} = \alpha + \beta \times \text{Extent of Hedging}_{it} + \delta \times X'_{it} + u_{it}. \quad (2)$$

Table 3
Comparison of hedgers and non-hedgers.

	Hedgers	Non-hedgers	Difference	t-statistic
Tobin's Q	1.26	1.42	−0.15***	−4.20
Total assets	2835	555	2280***	11.32
Market value of equity	1708	366	1342***	8.14
Foreign sales/net sales	0.24	0.17	0.07***	5.57
LT debt/equity ratio	0.35	0.23	0.12***	3.28
ROA	0.02	0.02	0.01	0.76
Dividend dummy	0.49	0.32	0.17***	6.37
Cap. exp./sales	0.07	0.09	−0.02**	−2.54
Cash & cash equ./current liabilities	0.77	0.85	−0.08	−0.23
Diversification Dummy	0.41	0.22	0.19***	7.37
N	520	908		

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively.

y_{it} is firm value (natural logarithm of Tobin's Q ratio or industry adjusted Tobin's Q ratio), α is the intercept term, *Derivatives Use* is our dummy variable to measure derivatives use, X'_{it} is vector of all control variables that we explained earlier and u_{it} is error terms. However, a dummy variable does not measure the exact level of hedging. In order to distinguish the value effect of being fully hedger or partially hedger, we use a continuous variable for derivatives use and estimate model 2. *Extent of Hedging* is our continuous variable to measure extent of hedging.

First, we used panel data with fixed effects method to estimate our models in Equations (1) and (2). In order to control for possible endogeneity concerns, we also used dynamic panel with system GMM estimators in estimation of model 2.

Table 5 indicates regression results for all hedgers including currency risk, interest rate risk and commodity price risk hedgers. Following studies in the literature, we estimate fixed effects panel data model with time dummies for Ln Tobin's Q ratio and industry adjusted Tobin's Q ratio as dependent variables and derivatives use and extent of hedging as independent variables. The number of observations for extent of hedging (1365) is lower than observations of derivatives use dummy variable (1428). Because some firms do not report notional values of derivatives although they use derivatives as a risk management instrument. If a firm does not report notional value of its derivative instruments, we accept this observation as missing data in our analysis.

Our preliminary results for multivariate analysis present weak evidence of hedging premium for Turkish non-financial hedgers. Coefficients of derivatives use dummy variable are positive in models 1 and 3, but they are not statistically significant. These results can be misleading, because derivatives use dummy variable does not measure exact level of hedging. To solve this issue, we also use a continuous variable of extent of hedging. Coefficients of extent of hedging variable are positive and higher in models 2 and 4, which means that there is a positive relationship between firm value and hedging. In other words, hedgers have higher firm values than non-hedgers. The coefficients are 7.11% and 13.36%. However, only the coefficient of model 4 is statistically significant at 10% level indicating weak evidence of hedging premium for Turkish non-financial hedgers during the sample period. In other words, there is only weak evidence for the value relevance of derivatives use. When we consider the results of model 4, the coefficient for extent of hedging variable is 0.1336 and it is statistically significant at 10% level. Depending on this coefficient, one unit increase in extent of hedging variable increases industry adjusted Tobin's Q ratio by 14.29% ($e^{0.1336*1}-1$). Following Panaretou's (2013) calculation method, we can also calculate magnitude of hedging premium. Because mean of extent of hedging variable is 0.0304, an average hedger firm in our sample has a value premium of 0.41% ($e^{0.1336*0.0304}-1$). As risk management theory suggests, the use of financial derivatives as risk management instrument is value relevant. Our results imply that non-financial companies can increase their value by hedging

Table 4
Pearson correlation coefficients among independent variables.

	Ln total assets	Foreign sales/sales	Leverage	ROA	Dividend	Capex/sales	Research	Diversif.	Currency	Cash ratio
Ln total assets										
Foreign sales/sales	0.14									
Leverage	0.20	−0.03								
ROA	0.26	0.12	−0.19							
Dividend	0.43	0.06	−0.12	0.34						
Capex/sales	0.16	−0.09	0.25	0.03	0.01					
Research exp./sales	−0.10	−0.05	−0.06	0.02	−0.06	−0.02				
Diversification	0.40	0.11	0.02	0.05	0.17	0.08	−0.04			
Currency position	−0.13	−0.04	0.13	−0.21	−0.13	0.00	−0.02	−0.08		
Cash ratio	−0.03	−0.09	−0.07	0.11	0.08	0.12	0.01	−0.06	−0.04	
General derivatives use	0.46	0.18	0.17	0.07	0.20	−0.03	−0.07	0.18	−0.03	−0.07
Extent of general derivatives	0.16	0.20	0.24	−0.07	0.01	0.04	−0.01	0.04	0.03	−0.05
Currency derivatives use	0.39	0.16	0.16	0.05	0.16	−0.03	−0.07	0.21	−0.03	−0.07
Extent of currency derivatives	0.12	0.26	0.08	−0.05	0.03	−0.03	0.00	0.07	0.01	−0.04
Interest rate derivatives use	0.43	0.01	0.31	0.03	0.14	0.03	−0.04	0.11	0.02	−0.04
Extent of interest rate derivatives	0.14	−0.05	0.43	−0.06	−0.05	0.15	−0.02	−0.04	0.06	−0.03
Commodity derivatives use	0.28	0.18	0.09	0.02	0.10	−0.03	−0.02	0.16	0.00	−0.02
Extent of commodity derivatives	0.07	0.04	0.00	−0.01	0.03	−0.03	−0.01	0.04	0.00	−0.01
General derivatives use	0.52	0.15	0.21	0.06	0.18	0.05	−0.05	0.23	−0.03	−0.02

with financial derivatives. However, this hedging premium is very low compared to findings of Allayannis and Weston (2001) for the US data (5%) and Panaretou (2013) for the UK data (6%).

Our results also indicate that some control variables can explain firm value. Firm size is negatively related to firm value and coefficients are statistically significant in all models. Dividend dummy variable hasa statistically significant positive coefficient and it implies that easy access to financial markets

Table 5
General derivatives use and firm value regression results.

Dependent variable	Ln Tobin's Q	Ln Tobin's Q	Industry adjusted Tobin's Q	Industry adjusted Tobin's Q
Models	(1)	(2)	(3)	(4)
Independent variables				
Derivatives use	0.0334		0.0412	
	(1.15)		(1.41)	
Extent of Hedging		0.0711		0.1336*
		(1.17)		(1.73)
Ln total assets	−0.1901***	−0.1890***	−0.1791***	−0.1753***
	−(4.39)	−(4.26)	−(4.56)	−(4.34)
ROA	−0.0896	−0.0886	−0.0957	−0.0975
	−(0.96)	−(0.91)	−(1.36)	−(1.32)
Dividend dummy	0.0397*	0.0348	0.0311	0.0314
	(1.78)	(1.48)	(1.43)	(1.35)
Leverage	0.0084	0.0016	0.0133	0.0089
	(0.61)	(0.12)	(1.09)	(0.67)
Cap. exp./sales	0.0065	0.0041	−0.0077	−0.0145
	(0.10)	(0.06)	−(0.14)	−(0.25)
Diversification	0.0534	0.0540	0.0396	0.0377
	(1.24)	(1.21)	(0.90)	(0.82)
Foreign sales/sales	0.0642	0.0564	0.0566	0.0450
	(0.70)	(0.51)	(0.57)	(0.39)
Currency position	0.0247	0.0246	0.0121	0.0122
	(1.09)	(1.11)	(0.58)	(0.60)
Liquidity	−0.0011	−0.0014	0.0007	0.0003
	−(0.68)	−(0.83)	(0.80)	(0.35)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No
Intercept	1.3420***	1.3460***	1.0524***	1.0411***
	(5.33)	(5.21)	(4.59)	(4.43)
R^2	33.71%	32.42%	7.83%	7.53%
N	1428	1365	1428	1365

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. t-statistics are reported in parentheses. Models are estimated by using fixed-effects panel data regression.

Table 6
Currency, interest rate and commodity derivatives use and firm value regression results.

Dependent variable	Currency Hedging		Interest rate Hedging		Commodity Hedging	
	Ln Tobin's Q		Ln Tobin's Q		Ln Tobin's Q	
Models	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables						
derivatives use	0.0238		−0.0447		−0.0218	
	(0.88)		−(1.38)		−(0.37)	
Extent of Hedging		0.1369		−0.0438		3.0841**
		(1.21)		−(0.49)		(2.16)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	1.34***	1.34***	1.33***	1.33***	1.33***	1.34***
	(5.33)	(5.20)	(5.30)	(5.26)	(5.32)	(5.34)
R^2	33.66%	32.66%	33.70%	32.96%	33.62%	33.56%
N	1428	1376	1428	1401	1428	1418

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. t-statistics are reported in parentheses. Models are estimated by using fixed-effects panel data regression.

increases firm value. Coefficients of all other control variables are statistically insignificant.

Next, we investigate the value relevance of currency, interest rate and commodity derivatives use separately. As we have stated earlier, most of the hedgers are currency hedgers in our sample, therefore we expect to find similar results for currency hedging as we have found for general derivatives use in the preceding section. Following the same methodology, we estimate fixed effects panel data model with time dummies for Ln Tobin's Q ratio as dependent variable and curreny, interest rate and commodity derivatives use as independent variables. Table 6 presents analysis results for currency, interest rate and commodity price risk hedging. The results for currency and interest rate hedging (models 1–4) are very similar to the results of general hedging, showing no statistically significant relationship between firm value and hedging. However, we identified a positive and statistically significant relationship between firm value and the extent of commodity price risk hedging in model 6.

Table 7
General derivatives use and firm value regression results (with alternative variable).

Dependent variable	Ln Tobin's Q	Industry adjusted Tobin's Q
Models	(1)	(2)
Derivatives use	−0.0012	−0.0122
	−(0.04)	−(0.42)
Control variables	Yes	Yes
Year dummies	Yes	Yes
Intercept	1.33***	1.04***
	(5.32)	(4.56)
R^2	33.61%	7.65%
N	1428	1428

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. t-statistics are reported in parentheses. Models are estimated by using fixed-effects panel data regression.

Table 7 reports the results for general hedging measured with alternative hedging accounting dummy variable. Similar to our previous estimations, we have used fixed effects panel data model and included all same control variables. We do not identify any evidence of hedging premium or discount for Turkish non-financial hedgers by using our alternative derivatives use dummy variable.

We use further econometric methods to check robustness of our results against endogeneity concerns documented in the literature. To control for endogeneity problem, we employ dynamic panel with system GMM estimators as suggested by Magee (2009).

Endogeneity concerns are serious and this problem can affect interpretation of our results. For example, Jin and Jorion (2006:894) discuss possible endogeneity between firm value and hedging. They suggest that selecting firms within the same industry solves endogeneity problem. Bartram et al. (2011) also emphasize how important endogeneity issues are to investigate value relevance of derivatives use. Magee (2009:2) defines two possible sources of endogeneity as reverse causality and unobserved heterogeneity. Studies on value relevance of hedging accept derivatives use as independent variable, while other studies that examines determinants of hedging find that higher market value is a significant factor to determine propensity to hedge. In addition, some firm characteristics can affect both firm value and derivatives use (Allayannis et al., 2012:70). In other words, an omitted variable may affect both firm value and derivatives use. Similarly, by definition some omitted factors may affect total assets, return on assets and financial leverage and firm value. In these

Table 8
Extent of hedging and firm value results with system GMM dynamic model.

Panel A: *dependent variable*	Ln Tobin's Q	Industry adjusted Tobin's Q
Models	(1)	(2)
Lagged dependent variable (Y_{t-1})	0.7001***	0.7016***
	(14.69)	(16.04)
Extent of Hedging	0.1740***	0.2059***
	(2.76)	(3.30)
Control variables	Yes	Yes
Year dummies	Yes	Yes
Industry dummies	Yes	No
Intercept	0.2871**	0.2604***
	(2.49)	(2.74)
N	1172	1172
Panel B: *diagnostic test results*		
Number of groups	204	204
Number of instruments	154	154
Arellano-Bond test for AR(1) statistic	−5.4***	−6.1***
Arellano-Bond test for AR(2) statistic	0.1	0.5
Hansen's test statistic	135.7	129.5

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. Standard errors are reported in parenthesis. Models are estimated by using dynamic panel data regression with system GMM estimators.

situations, independent variables can be correlated with error terms in regression models.

As suggested by Magee (2009), if firm value is correlated with its lagged values, we can use a dynamic model with system GMM estimators. Lagged dependent variable as an independent variable (dynamic model structure) considers a possible autoregressive feature of the data. System GMM estimators were developed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). This model is suitable for small T and large N panels (Roodman, 2006). System GMM estimators of Blundell and Bond (1998) employ a first-difference transformation and use lagged values of endogenous variables in first differences equation.

In our dynamic models with system GMM estimators, we accept first lag of dependent variable (natural logarithm of Tobin's Q ratio or industry adjusted Tobin's Q ratio), extent of hedging variable, natural logarithm of total assets, return on assets and financial leverage ratio as endogenous, while all other variables are accepted as exogenous.

Table 8 reports the results of dynamic models with system GMM estimators. Similar to our previous findings, coefficients of the extent of hedging are positive, but there is a considerable improvement in statistical significance of coefficents. They are stastistically significant at 1% level. These results strengthen our previous findings on the presence of hedging premium for Turkish non-financial firms. We identify that derivatives use increases firm value of Turkish non-financial firms.

The coefficients of the extent of hedging variable are 17.40% and 20.59% in models 1 and 2 respectively. When we consider the results of model 1, the coefficient of the extent of hedging variable is 0.1740 and it is statistically significant at 1% level. Depending on this coefficient, one unit increase in the extent of hedging variable increases Tobin's Q ratio by 19.01% ($e^{0.1740*1}-1$). Following Panaretou's (2013) calculation method, we can also calculate magnitude of hedging premium. Since the mean value of the extent of hedging is 0.0304, an average hedger firm in our sample has a value premium of 0.53% ($e^{0.1740*0.0304}-1$). This hedging premium is very low compared to the findings of Allayannis and Weston (2001) for the US data (5%) and Panaretou (2013) for the UK data (6%). In addition, the extent of hedging also increases industry adjusted Tobin's Q ratios of Turkish non-financial firms. The results of diagnostic tests are reported at Table 8 Panel B and they are satisfactory for validity of system GMM dynamic model. Our results of dynamic model also indicates that non-financial hedgers are rewarded with higher firm values by the market.

4.2. Fama-French three-factor time-series analysis

In addition to panel data analysis presented in the preceeding subsection, we use portfolio formation methodology with Fama-French three-factor model to examine the relationship between firm value and hedging by comparing stock performance of hedgers and non-hedgers. Following Phan et al. (2014), we construct a portfolio in which stocks of hedgers are longed and stocks of non-hedgers are shorted and investigate whether this portfolio generates a positive alpha or not. Phan et al. (2014) assert that alpha coefficient is superior measure of firm value in comparison to Tobin's Q. Similar to Phan et al. (2014), we use the following model:

$$R_{Hedger,t} - R_{Non-hedger,t} = \alpha + \beta_1(R_{M,t} - R_{F,t}) + \beta_2 SMB_t + \beta_3 HML_t + u_{it}. \quad (3)$$

$R_{Hedger,t}$ is equal weighted monthly portfolio return of hedgers at month t and $R_{Non\text{-}hedger,t}$ is equal weighted monthly portfolio return of non-hedgers at month t. $R_{M,t}$ is monthly return of market index and $R_{F,t}$ is monthly risk free rate of return. SMB_t is monthly return difference between the portfolio of small stocks and the portfolio of big stocks. HML_t is monthly return difference between the portfolio of stocks with high book-to-market value ratio and the portfolio of stocks with low book-to-market value ratio. A statistically significant positive alpha coefficient means hedging premium. On the other hand, a negative alpha coefficient indicates hedging discount.

Table 9
Results Fama-French three-factor time-series model.

Dependent variable	$R_{Hedger,t} - R_{Non\text{-}hedger,t}$
α (Alpha Coefficient)	0.0023
	(0.99)
β_1 (Excess Market Index Return)	0.0329
	(1.28)
β_2 (SMB)	−0.4759***
	(−5.08)
β_3 (HML)	−0.0651
	(0.99)
F Statistics	15.11***
R^2	39.18%
N	84

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use robust standard errors for heteroskedasticity and autocorrelation. t-statistics are reported in parentheses. Models are estimated by using OLS regression.

The results of Fama-French time-series analysis are reported in Table 9. Alpha coefficient indicates value of corporate derivative use as it is the difference between returns of two portfolios (hedgers and nonhedgers). Although sign of alpha coefficient is positive, it is not statistically different from zero at 5% significance level. In other words, hedging with financial derivatives cannot create positive alpha in Turkish stock market over the period of 2007–2013. This result is consistent with our previous findings of fixed-effects panel data model documenting no hedging premium or discount for Turkish non-financial firms.

4.3. Single sector analysis

In this section, we analyse one specific industry to increase robustness of our general results reported in the

Table 10
Currency derivatives and firm value regression results for food and beverages industry.

Dependent Variable	Ln Tobin's Q	Ln Tobin's Q
Models	(1)	(2)
Independent variables		
Currency derivatives use	−0.1297*	
	(-1.90)	
Extent of currency Hedging		−0.4763
		(-0.77)
Ln total assets	−0.1639	−0.1547
	(-1.48)	-(1.46)
ROA	−0.2714	−0.2535
	-(0.87)	(-0.76)
Dividend dummy	0.1248**	0.1265**
	(2.15)	(2.55)
Leverage	0.0105	−0.0027
	(0.14)	(-0.04)
Cap. exp./sales	0.6064*	0.6476**
	(1.89)	(2.50)
Foreign sales/sales	0.0944	0.1766
	(0.33)	(0.44)
Liquidity	0.1947	0.1959
	(1.62)	(1.61)
Year dummies	Yes	Yes
Intercept	1.2222*	1.1238*
	(1.96)	(1.84)
R^2	45.60%	43.00%
N	168	168

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. t-Statistics are reported in parentheses. Models are estimated by using fixed-effects panel data regression.

Table 11
Currency derivatives and firm value regression results for food and beverages industry.

Dependent variable	Ln Tobin's Q
Panel A: *estimation results of Equation 4*	
Currency derivatives use * D_d	−0.0751
	(−1.21)
Currency derivatives use * (1 − D_d)	−0.0961
	(−1.40)
D_d	−0.2535**
	(−2.49)
Control variables	Yes
Year dummies	Yes
Intercept	−0.0294
	(−0.23)
R^2	32.33%
N	168
Panel B: *Estimation Results of Equation 5*	
Currency Derivatives Use * R_{TL}	−0.2396
	(−0.87)
R_{TL}	−0.6032**
	(−2.03)
Control variables	Yes
Year dummies	Yes
Intercept	−0.1118
	(−0.92)
R^2	31.57%
N	168

***, **, and * indicates statistically significant levels of 1%, 5% and 10%, respectively. We use firm level clustered robust standard errors for heteroskedasticity and autocorrelation. t-statistics are reported in parentheses. Models are estimated by using Pooled OLS regression.

preceeding subsections and to cope with possible endogeneity problems might appear as a result of using sample firms from different industries. Food and beverages is the industry of our choice for several reasons. The number of firms operating in food and beverage industry is high among industries in our sample (24 firms with 168 firm-year observations). Most companies in this industry have foreign currency position gaps over the sample period. Homogeneity among firms in this industry is strong to analyse effects of hedging on firm value.

Firstly, we estimate Equations (1) and (2) based on Tobin's Q analysis for this specific industry, food and beverages, by using fixed effects panel data model. Table 10 presents the results that show no statistically significant (at 5% level) relationship between currency hedging and firm value. These results are consistent with our preliminary results reported in Table 5 for our full sample. These results also state that currency hedging is value irrelevant for food and beverage companies in Turkey.

Following Phan et al. (2014), we also examine effects of local currency (underlying asset) depreciation or appreciation on the relationship between currency hedging and firm value. We expect that Turkish lira depreciation against foreign currency (mainly US dollar and Euro) has negative effect on firm value because most Turkish food and beverage firms have foreign currency position gaps. Hedging foreign exchange risks during the periods of Turkish lira deprecation should enhance firm value, whereas hedging during the periods of Turkish lira appreciation should lower firm value. To test this reasoning, firstly we calculate annual depreciation or appreciation rates for local currency, Turkish lira, against the US dollar and Euro and then take average to construct R_{TL} continuous variable which is positive when Turkish lira depreciates against US dollar and Euro during a particular year, negative otherwise. We also construct depreciation dummy variable (D_d) that is 1 if R_{TL} is positive for a particular year, 0 otherwise. Following Phan et al. (2014) we use two alternative models stated below to examine effects of local currency apprecation or depreciation on firm value.

$$y_{it} = \alpha + \beta_1 \times \text{Derivatives Use}_{it} \times D_d + \beta_2 \times \text{Derivatives Use}_{it} \times (1 - D_d) + \beta_3 \times D_d + \delta \times X'_{it} + u_{it}. \quad (4)$$

$$y_{it} = \alpha + \beta_1 \times \text{Derivatives Use}_{it} \times R_{TL} + \beta_2 \times R_{TL} + \delta \times X'_{it} + u_{it}. \quad (5)$$

In Equation (4), we expect that β_1 will have a positive value, but β_2 will have a negative sign because hedging is expected to enhance (reduce) value when Turkish Lira depreciates (appreciates) against US dollar and Euro. In Equation (5), we use a continuous variable (R_{TL}) and its interaction

with currency derivative use. We expect a negative relationship between firm value and degree of depreciation/appreciation in Turkish Lira.

Table 11 indicates effects of change in value of Turkish Lira on the relationship between currency hedging and firm value. In Table 11 Panel A, the sign of dummy variable D_d's coefficient (−0.2535) is negative showing that depreciation of Turkish Lira has statisticaly significant negative effect on firm value for Turkish food and beverage firms. More importantly, we document that hedging does not affect firm value during both Turkish Lira appreciation period and depreciation period. Insignificant coefficients of interacted terms support our previous findings that corporate derivatives use are not associated with higher or lower firm value. Table 11 Panel B shows estimation results of the model with continuous variable, R_{TL}, which measures changes in value of Turkish Lira currency. Similar to Panel A, we find that firm value is significantly affected by depreciation in Turkish Lira (coefficient of −0.6032). Interacted term between corporate derivative use and movement of Turkish Lira does not have statistically significant effect on firm value. This result strengthens our previous findings on value irrelvance of hedging.

5. Conclusions

In this study, we have investigated the relationship between derivatives use and firm value for Turkish non-financial firms during the period of 2007–2013. We introduced characteristics of hedgers and the extent of hedging as a first time in Turkey. Only 36.41% of the companies in the sample use financial derivatives to hedge their currency, interest rate or commodity price risks. We have used Tobin's Q ratio analysis with panel data model, Fama-French three-factor time-series analysis and single sector analysis to investigate whether corporate derivatives use is value relevant or not. Except Tobin's Q ratio analysis with system GMM estimators, we can not find significant hedging premium or discount for all Turkish non-financial firms. By using Tobin's Q ratio analysis with system GMM estimators, we find a positive relationship between derivatives use and firm value; hedging premium is 0.53% for an average Turkish non-financial firms. However, level of hedging activity (36.41%) and level of hedging premium (0.53%) is very low compared to findings in developed countries. We also test the effects of currency hedging, interest rate hedging and commodity price hedging separately. We find similar results as in the case of general derivatives use. Overall, majority of our results imply that use of financial derivatives does not affect firm value in Turkish market.

There are several possible reasons for our finding of limited or no hedging premium in Turkish case. As Guay and Kothari (2003) question, derivatives use is not the only way to manage corporate risk. There may be other risk management tools conducted by Turkish non-financial firms. Operational hedging and natural hedging are two possible alternative risk management tools that can be used instead of derivatives use. The second explanation is related with the disclosure quality of derivatives use. As we discussed earlier, low reporting quality of derivatives use leads to information asymmetry between owners, managers and investors. We identify that most companies report limited information on their derivatives use in Turkey. Therefore, for an average investor, it is very hard to read risk management policies and hedging strategies from financial reports and use this information during investment decision process. Investors may not reward hedging with higher market values (or they reward derivatives use up to a limited point) because they do not understand hedging policies of Turkish non-financial firms. Another possible explanation for no hedging premium is related with ownership structure of Turkish non-financial firms. Ownership concentration is very high among Turkish publicly held firms and investor protection systems are also weak. As Khediri (2010) explains, investors may not value hedging policies of Turkish firms fairly because investors think that insider blockholders may be risk averse or have other motives to use derivatives rather than risk management and value maximization.

We could not consider effects of operational hedging and natural hedging due to data unavailability. In future research, in addition to derivatives use, operational hedging and natural hedging should be considered in search for value relevance of hedging. Lastly, authorities in Turkey should improve reporting quality of derivatives and companies must be encouraged to disclose detailed derivatives use information.

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