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Industrial Diversification and Performance in an Emerging Market

Summary: In this study, we investigated the relationship between industrial diversification and firm performance using a market-based performance measure and an accounting measure. We used the data of the firms listed on Borsa Istanbul during the period between 2006 and 2012. The results of the panel data indicate that there is a significant positive relationship between diversification and performance. We found that diversified firms outperformed the single firms. As is compatible with a resource-based approach, it was found that diversified firms tended to use their resources more efficiently compared to single firms.

Key words: Industrial diversification, Internal capital market, Agency cost, Return on assets, Tobin's Q, Turkey.

JEL: G30, G34.

In recent years, the impacts of diversification on performance with respect to financial management decisions have been investigated. There have been many studies of the impact of this relation on market imperfections such as agency cost, asymmetric information, cost of financial distress, and bankruptcy in the capital market. The agency theory focuses on the differences of management and ownership in the firm. According to the agency theory, managers can use the firm's resources to decrease their own personal risk or to maximize their personal benefits. The addition of the asymmetric information to agency problems creates suitable conditions for the manager to resort to diversification attempts that might lead to an adverse effect on the firm's performance (Mingfang Li and Yim-Yu Wong 2003). In contrast to the underlying tenets of the agency theory, the resource-based approach states that firms with strategic assets can use these entities in strategic planning and can achieve higher performance levels. Industrial diversification helps firms to use critical resources in an efficient manner, reduces resource dependency and uncertainty, and protects firm-specific information. In the diversified firms, the resources of the segments with higher returns but low investment opportunities are transferred to these segments with higher investment opportunities but a lack of resources. This could improve efficiency. The relationship between diversification and performance is not a uniform one and is under the influence of several factors specific to the firm itself and its environment.

This study investigates the relationship between industrial diversification and firm performance among the firms listed on Borsa Istanbul. We prepared a data set including the diversification degrees of firms to contribute to the applied literature on industrial diversification and firm performance in Turkey. We used return on assets (ROA) as the accounting measure of performance and used Tobin's Q as the market-based measure of performance in the study. As control variables, firm size, investment opportunities, and leverage have been included in the model. According to the results of panel regression analysis, there is a significantly positive relationship between industrial diversification and firm performance. Evidence of a positive relationship was supported by the market-based performance measure.

1. Literature Review

In the literature, the relationship between diversification and performance has been explained using different performance measures. Krishna Palepu (1985) examined the relationship using the Jacquemin-Berry entropy index as a diversification measure and used the return on sales and the growth in sales return as a performance measure. The research ascertained that related diversification provides better performance than unrelated diversification. Jonchi Shyu and Yen-Luan Chen (2009) investigated how these relationships changed depending on the different life stages of firms operating in Taiwan. The study used Tobin's Q as a performance measure, whereas the diversification degree, administrative ownership, administrative board ownership, firm size, growth opportunities, and leverage were used as control variables. The authors found that the firms' life stage is a significant factor in the diversification and performance relationship. Whereas diversification was reducing performance for companies in the process of growing, this was not the case for mature companies. The authors identified that firm performance improved along with related diversification, whereas this performance decreased with unrelated diversification. The study showed that managers would be willing to engage in diversification to reduce their own personal risk, a finding that corroborates the agency theory. The study also found a negative relationship between firm size and performance. Saadet Kasman and Adnan Kasman (2011) investigated stock return performance of listed commercial banks using three measures of bank performance. This study revealed that the changes of technical efficiency and scale efficiency are positively related to stock returns. The authors suggested that the greater the changes in efficiency, the higher the return. Additionally, the efficient and productive banks tended to outperform their inefficient rivals in the industry. They suggested that managerially efficient banks would generate more profits and greater shareholder returns.

Ernest H. Hall (1995) examined the causal relationship between diversification and performance. The study showed that high performance levels occur with high diversification levels. It has been shown that there is a negative relationship between diversification and performance in less diversified firms. The study demonstrated that diversification gives rise to high performance levels, indicating that diversification is necessary but not sufficient for high performance levels. Federico Marinelli's (2011) study is another work examining the causal relationship between diversification and performance. The analysis used data on 317 firms in the period from 1996 to 2006 and used the variables of ROA, ratio of sales to total assets, and

return on sales as performance indicators. The study ascertained that there is no causal relationship between performance and diversification and that there is a negative relationship between size and performance.

Anil M. Pandya and Narendar V. Rao (1998) investigated the impact of the diversification degree on performance levels using the data on 2637 firms in the period from 1981 to 1990. ROA, return on equity, and market return measures were used as performance indicators. Average return on equity was found to be higher in firms engaging with high diversification levels compared to other firms. The study demonstrated a positive relationship between the degree of diversification and performance, in that as the diversification degree increases, firm performance increases too. Meanwhile, whether this relationship is linear or not was examined by Leslie E. Palich, Laura B. Cardinal, and Chet Miller (2000), and the study reached the conclusion that the relationship is not linear. The authors found that firms reached high performance levels at the mid-range of diversification degree. In addition, when a single firm uses related diversification, its performance will improve. However, the study showed that if a firm chooses to change from related diversification to unrelated diversification, its performance level deteriorated. Juan Santalo and Manuel Becerra (2008) examined whether the relationship between performance and diversification differs between industries. The authors carried out their analysis using data from the 1993 to 2001 period. The authors reached the conclusion that diversified firms outperformed single firms and found a positive relation between size and performance.

Abhirup Chakrabarti, Kulwant Singh, and Ishtiaq Mahmood (2007) examined the effects of diversification on performance during crucial macroeconomic changes and during periods of relatively less variability. The authors used data for firms operating in Indonesia, Japan, Malaysia, Singapore, South Korea, and Thailand for the 1988 to 2003 period. In this study, the ROA was used as a performance indicator and the control variables were firm size, age, current assets ratio, and leverage. The study showed that, whereas the effect of diversification on performance was negative in advanced institutional environments, performance was strengthened by means of diversification in less developed areas. Hao Fang, Yang-Cheng Lu, and Chi-Wei Su (2013) studied the effect of the subprime crisis on the financial performance of commercial banks. The authors showed that developed markets suffered a greater negative influence than did emerging markets following the subprime crisis. Their results indicated that all commercial banks showed declines in the ROA following the subprime crisis. They found that bank size helped resist the negative effects of the economic downturn.

Studies reporting the negative impact of diversification on performance exist in the literature. Larry Lang and Rene Stulz (1994) found a negative relationship between the two variables and reached the conclusion, using different performance measures in their analysis, that firms with a high diversification degree had a low Tobin's Q value. Jose M. Campa and Simi Kedia (2002) examined this relationship using panel data for the 1978 to 1996 period and showed that diversified firms have lower performance levels. Wan M. N. W. Daud, Norhana B. Salamudin, and Ismail B. Ahmad (2009) examined the effects of diversification on performance based on data from an accounting and a market measure of performance. The analysis was carried out by making use of panel data obtained from 70 companies in Malaysia for the 2001 to 2005 period. According to the analysis, single firms perform better than diversified firms. The study showed that, after controlling for risk, size, leverage, and

inflation, results obtained from various performance measures differed from one another. It was ascertained that single firms attained higher performance levels when a performance measure based on the market was used. Firm risk and firm size have a significant effect on the accounting measure. On the contrary, market-based measures were shown to be more sensitive to leverage and inflation. The authors reached the conclusion that there is a positive relationship between diversification and size.

Ching-Pu Chiao and Chen Ho (2009) investigated the impacts of diversification on risk and performance using the entropy index. The ROA was used as a performance indicator in the analysis using data on 3500 firms in the United States for the 2000 to 2006 period. The study found a negative correlation between diversification and performance. However, the authors also revealed that diversification might benefit the firm by reducing its variability in profit. The study suggests that managers should establish a good balance between good performance and firm risk using diversification. Maurizio La Rocca and Raffaele Stagliano (2011) analyzed the impacts of ownership structure and financial variables on the relationship between performance and diversification using data obtained from the United Kingdom and Germany in 2005. The authors demonstrated that, whereas diversification improved performance in the United Kingdom, this effect was not observed in Germany.

When studies in the literature of diversification and performance are taken into consideration, it is observed that this relationship is sensitive to performance measures, diversification degrees and directions, periods of analysis, and methods. An analysis of the literature on Turkey shows that there is a limited number of studies on the issue. Tulin Ural and Songul K. Acaravci (2006) investigated product and industrial diversification by taking into account firms that regularly export. They used data on 64 firms operating in Borsa Istanbul for the 1999 to 2004 period. The authors found that both product and industrial diversification have a positive impact on the performance in firms exporting regularly. In contrast, industrial diversification has a negative effect on the performance of firms that cannot export regularly. Ayse Karaveli (2008) examined the diversification strategies of business groups in Turkey. The author investigated the strategies of diversification in developed and developing economies. The study showed that the theory that diversification improves performance is not adequate to explain the diversification strategies of firms in developing economies. Arman Tevfik and Fuat Oktay (2008) studied the impacts of diversification on performance using data on firms operating in Borsa Istanbul for 2005. The return on equity ratio was used as a performance measure, whereas size and industry were used as control variables. The study demonstrated that firms with a low level of diversification degree outperformed those with a high level of diversification.

2. Data and Variables

The data set was prepared based on the firms' financial statements. The sample period spans from 2006 to 2012. Firms with financial services, holding companies, public institutes, and firms with multiple share classes were not included in the analysis. Firm data were gathered from the websites of Borsa Istanbul and Public Disclosure Platform. Firm-specific variables were calculated by the data obtained from the financial statements prepared on an annual basis. The definition of small- and medium-sized corporations was determined according to the net sales revenue as used by

the European Union. The sample was divided into two groups for the purpose of our research objectives. We defined single firms as those operating in a single area, which did not report their segments separately in their financial reports. Meanwhile, the firms operating in more than a single area and reporting their segments separately in their financial statements are categorized as industrially diversified firms. We conducted regression analysis with balanced panel data for these two different groups. Regression analyses with panel data were carried out by means of 728 observations that are obtained from 14 diversified firms and 90 single firms. Firms that underwent change in their status of diversified or single firms were not included in the sample.

The variables of performance, size, investment opportunities, and leverage are calculated using data presented in firms' financial statements. However, the diversification degrees are calculated using the Jacquemin-Berry entropy index. This index is made up of the data of the firms' industrial segments. We used the Standard Industry Classification (SIC) codes, which are based on the major activity of the company. The industrial classification codes of firms operating in the Stock Exchange are presented as two-digit SIC codes as used in their annual reports. We based our study on the two-digit SIC codes presented by Borsa Istanbul, and we developed three- and four-digit SIC codes according to the SIC revision tables, obtained from the website of the Turkish Statistical Institute.

The Jacquemin-Berry entropy index relies on three key factors of firm diversification. These are the operating segments of the firm, the rates of sales according to its segments, and the degree of relationship among various segments. We use the Jacquemin-Berry entropy measure of diversification, which is calculated as follows:

$$Diversification = \sum_{i=1}^{N} P_i \ln(\frac{1}{P_i}), \tag{1}$$

where N is the number of industry segments (four-digit SIC codes the firm is involved in within each two-digit SIC code), P_i is the share of segment i's sales of the total corporate sales, and ln is the natural logarithm.

The Jacquemin-Berry entropy index codes firms operating in a single area as 0. As the calculated degree increases, the diversification degree also rises. The superiority of the entropy index stems from the fact that it provides information on the relatedness within diversification (Palepu 1985, p. 244).

As an indicator of performance, we used the ratio of ROA and the ratio of Tobin's Q. The Tobin's Q reflects the market's expectations about firms' future profitability. The Tobin's Q is calculated as the market value of equity plus the book value of liabilities divided by that of total assets (Kee H. Chung and Stephen W. Pruitt 1994). If the Tobin's Q is high, this indicates that firms are using their assets in an efficient manner; hence, they have better performance levels. The ratio of ROA is calculated as the ratio of net income to total assets. The ratio of ROA represents the ability of a company to use its assets to gain a net profit. Some of the studies in the literature reported a positive relationship between performance and diversification (Palich, Cardinal, and Miller 2000; Santalo and Becerra 2008; Shyu and Chen 2009; Marinelli 2011). In contrast, there are also studies demonstrating a negative relationship between performance and diversification (Lang and Stulz 1994; Grant Fleming, Barry Oliver, and Steven Skourakis 2001; Campa and Kedia 2002).

The firm size is calculated as the natural log of the book value of total assets. The value of total assets is deflated using the Producer Price Index (PPI). Large firm size involves economies of scale and scope. Large firms are considered to encounter fewer problems in fulfilling their obligations. There are studies documenting both statistically significant positive and negative relationships between size and diversification and between size and performance (Chun-Chung Chen, Chadwick Nehrt, and Stephen Guisinger 1998; Santalo and Becerra 2008; Shyu and Chen 2009).

In the research models, the ratio of capital expenditure to sales is used as an indicator of investment opportunities. The ratio also provides a measure of growth opportunities (Philip Berger and Eli Ofek 1995). If the industry in which the firm operates has extremely poor growth opportunities, the firm may choose to diversify into a new industry offering better growth prospects, thus creating more value for shareholders. The firms with better investment opportunities are expected to reach high performance levels. Therefore, a positive relationship between investment opportunities and performance is expected.

The leverage is defined as the book value of total liabilities divided by total assets. The ratio shows the degree to which assets can be financed through debt. If a firm encounters difficulties in fulfilling financial commitments, this will increase financial distress and the probability of bankruptcy. When the debt capacity created by the coinsurance effect in the diversified firms is taken into consideration, it is expected that there will be a positive relationship between diversification and leverage (Pek Yee Low and Kung H. Chen 2004). A positive relationship between performance and leverage can be interpreted as a financial synergy acquired through diversification. A negative relationship between performance and leverage can indicate that managers are trying to avoid the monitoring mechanisms that come with debt financing.

3. Methodology

We performed regression analyses using panel data, which enable us to assess observations belonging to particular groups, such as firms or countries, and for particular periods. The pooled data made up of the combination of time series and cross-sectional observations enable an examination of the heterogeneity among firms, countries, and individuals. The results obtained from pooled data are better than resulting from separate examinations of time series and cross-sectional data. It is necessary to decide whether it is appropriate to use a fixed-effects model or a random-effects model in the panel data analysis. In general, researchers resort to the Hausman test statistic to decide whether they should use fixed-effects model or random-effects model in their analysis (Jerry A. Hausman 1978). In all panel regressions, the standard errors are adjusted for heteroskedasticity using the Halbert White (1980) correction.

Based on the implications of the literature, we generate the null hypothesis that the industrial diversification of the firm is negatively related to its performance. The dependent variable is the firm performance in the research model. Meanwhile, the industrial diversification degree, size, investment opportunities, and leverage are independent variables. The research model is presented as:

$$Performance_{it} = \alpha_{it} + \beta_1 Diversification_{it} + \beta_2 Size_{it} + \\ + \beta_3 Invest.Op._{it} + \beta_4 Leverage_{it} + \varepsilon_{it},$$

(2)

where the *Performance*$_{it}$ variable refers to Tobin's Q and ROA, the *Diversification*$_{it}$ variable refers to the diversification degree of firm *i* at year *t*, the *Size*$_{it}$ variable refers to the natural logarithm of total assets of firm *i* at year *t*, the *Invest.Op.*$_{it}$ variable refers to the ratio of capital expenditures to sales of firm *i* at year *t*, the *Leverage*$_{it}$ variable refers to the ratio of total debt to total assets of firm *i* at year *t*, α_{it} is the constant term, and ε_{it} is the error term.

To ascertain whether or not the data belonging to the variables in the research model are appropriate for analysis, we analyzed whether or not the data are stagnant using the Andrew Levin, Chien-Fu Lin, and Chia-Shang James Chu (2002) panel unit root test, a frequently used test in the literature. The results of the panel unit root test are presented in Table 1.

Table 1   The Results of Levin, Lin, and Chu Panel Unit Root Test

Variables	Levin, Lin, and Chu
	Intercept
Tobin's Q	-12.5203 (0.000)***
ROA	-31.7607 (0.000)***
Diversification	-19.2431 (0.000)***
Size	-1.5675 (0.058)*
Investment opportunities	-31.3993 (0.000)***
Leverage	-12.6860 (0.000)***

Note: Tobin's Q is equal to the market value of equity plus the book value of liabilities divided by that of total assets. The ROA is a ratio of net income to total assets. Diversification is industrial diversification, which is calculated Jacquemin-Berry entropy index. Size is equal to the natural logarithm of the book value of total assets. Investment opportunities are calculated as the ratio of capital expenditures to sales. Leverage is the ratio of the book value of total liabilities to total assets. ***p < 0.001 and *p < 0.10.

Source: Results obtained by the authors.

The result of the panel unit root test points to the fact that there is no unit root in the series in general. Before carrying out the analyses, we examined whether there was a strong linear relationship between the independent variables. Whether there is a strong linear relationship among independent variables is defined as multicollinearity. It is examined using the variance inflation factor (VIF) test. Strong multicollinearity is indicated if the value of VIF is larger than 2. In this study, all VIF values belonging to the variables are smaller than 2, and the average VIF value stands at 1.01. There is no multicollinearity among the variables used in the model. Additionally, the correlation coefficients among the independent variables in the study are low. These results support the VIF test results.

4. Empirical Results

We performed linear regression analysis with balanced data to test the relationship between performance and diversification. The descriptive statistics of the variables of Tobin's Q, ROA, diversification, size, investment opportunities, and leverage are reported in Table 2.

Table 2 Descriptive Statistics

	Mean	Median	Minimum	Maximum	Standard deviation
Tobin's Q	0.5255	0.4446	0.0157	6.8271	0.5711
ROA	0.0253	0.0293	-0.5419	0.5328	0.0992
Diversification	0.1084	0	0	1.3119	0.2985
Size	18.6121	18.6593	10.8977	23.2472	1.6856
Investment opportunities	0.1355	0.0425	-4.8464	11.2446	0.7709
Leverage	0.4410	0.4312	0.0064	0.9406	0.2266
Number of observations	728	728	728	728	728

Note: Tobin's Q is equal to the market value of equity plus the book value of liabilities divided by that of total assets. The ROA is a ratio of net income to total assets. Diversification is industrial diversification, which is calculated Jacquemin-Berry entropy index. Size is equal to the natural logarithm of the book value of total assets. Investment opportunities are calculated as the ratio of capital expenditures to sales. Leverage is the ratio of the book value of total liabilities to total assets.

Source: Results obtained by the authors.

The findings in Table 2 show the firm characteristics and diversification measure in the analysis. The median value of Tobin's Q is 44.4% and ROA is 2.9%. The variability in ROA is less than Tobin's Q level. The mean of the diversification degree stands at the 0.10 level. The median value of the investment opportunities ratio stands at 4.25%. It is shown that firms have debt financing at approximately 43.12% in their capital structure.

We distributed the firms into two groups: industrially diversified firms and single firms. We analyzed whether there is a statistically significant difference between two groups with respect to Tobin's Q, ROA, size, investment opportunities, and leverage. At this stage, we used the nonparametric Mann-Whitney test to compare the median values of the two groups. The findings of the test are reported in Table 3.

The findings in Table 3 demonstrate that diversified firms have statistically greater Tobin's Q and ROA than single firms. This evidence may suggest that diversification improves the performance of firms. These results confirm the findings of Santalo and Becerra (2008). The analysis also showed that diversified firms tend to be larger-sized enterprises than single firms. There are no statistically significant differences between the leverage ratio of diversified firms and single firms. Additionally, the capital expenditure-to-sales ratio in diversified firms is statistically greater than that of single firms. If the industries that the firm is currently operating in have extremely poor growth opportunities, the firm may choose to diversify into a new industry that embodies better growth prospects, thus creating more value for shareholders. Firms with better investment opportunities are expected to reach high performance levels. This finding may suggest that diversified firms have reached high performance levels through operating in different segments.

The Pearson's correlation coefficients between Tobin's Q, ROA, diversification, size, investment opportunities, and leverage is presented in Table 4.

Table 3 The Differences in Variables between Industrially Diversified Firms and Single Firms

	Whole sample		Industrially diversified firms		Single firms		
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Difference**
Tobin's Q	0.5255	0.4446	0.6459	0.5226	0.5067	0.4371	0.0855 (0.007)***
ROA	0.0258	0.0293	0.0603	0.0443	0.0198	0.0247	0.0196 (0.000)***
Size	18.6121	18.6593	18.9399	19.6628	18.5611	18.5555	1.1073 (0.000)***
Investment opportunities	0.1355	0.0425	0.1355	0.0838	0.1354	0.0357	0.0481 (0.000)***
Leverage	0.4410	0.4312	0.4227	0.3985	0.4439	0.4354	-0.0369 (0.370)
Number of observations	728	728	98	98	630	630	

Note: Tobin's Q is equal to the market value of equity plus the book value of liabilities divided by that of total assets. ROA is a ratio of net income to total assets. Diversification is industrial diversification, which is calculated Jacquemin-Berry entropy index. Size is equal to the natural logarithm of the book value of total assets. Investment opportunities are calculated as the ratio of capital expenditures to sales. Leverage is the ratio of the book value of total liabilities to total assets. Industrially diversified firms are equal to one if firm is multi-segment business. Single firms are equal to 0 if firm is single-segment business. The significance of the difference in medians is obtained using the nonparametric Mann-Whitney test. The numbers inside the parentheses refer to the probability (p) values for the related coefficients. ***$p < 0.001$.

Source: Results obtained by the authors.

Table 4 The Pearson's Correlation Coefficients

	Tobin's Q	**ROA**	**Diversification**	**Size**	**Investment opportunities**	**Leverage**
Tobin's Q	1					
ROA	0.030 (0.424)	1				
Diversification	0.108 (0.003)***	0.099 (0.008)***	1			
Size	-0.323 (0.000)***	0.147 (0.000)***	0.100 (0.007)***	1		
Investment opportunities	-0.035 (0.343)	0.060 (0.105)	-0.004 (0.921)	0.046 (0.216)	1	
Leverage	0.482 (0.000)***	-0.278 (0.000)***	0.019 (0.605)	0.074 (0.045)**	-0.067 (0.069)*	1

Note: Tobin's Q is equal to the market value of equity plus the book value of liabilities divided by that of total assets. The ROA is a ratio of net income to total assets. Diversification is industrial diversification, which is calculated Jacquemin-Berry entropy index. Size is equal to the natural logarithm of the book value of total assets. Investment opportunities are calculated as the ratio of capital expenditures to sales. Leverage is the ratio of the book value of total liabilities to total assets. The whole sample comprised 728 observations. The value of the first row in each column is Pearson Correlation coefficient index, and the second row is the probability (p) values for the related coefficients. ***$p < 0.001$, **$p < 0.05$ and *$p < 0.10$.

Source: Results obtained by the authors.

Table 4 reports the correlation coefficients for the whole sample. We used a bivariate correlation higher than 0.80 as a benchmark for multicollinearity. The data do not suggest problems with multicollinearity among the independent variables. We found that there was a statistically significant positive correlation between diversifi-

cation and performance for the market-based performance measure and the accounting measure. The highest positive correlation coefficient was the one between Tobin's Q and leverage. We found a negative correlation between Tobin's Q and size, whereas there was a positive correlation between ROA and size. We found a statistically significantly positive correlation between industrial diversification and size. These statistically significant correlation coefficients are compatible with the corporate diversification theory. There are contradictory findings between the accounting measure and the market-based measure of performance (Daud, Salamudin, and Ahmad 2009).

We performed regression analyses with the estimation method of ordinary least squares on the balanced panel data in the period from 2006 to 2012. The results of the regression analyses are reported in Table 5.

Table 5 The Diversification's Effect on Tobin's Q and ROA

Independent variables	Whole sample				Industrially diversified firms				Single firms			
	Tobin's Q		ROA		Tobin's Q		ROA		Tobin's Q		ROA	
Diversification	0.0964 (0.170)	0.2616 (0.003)***	0.0003 (0.990)	0.0172 (0.198)	0.1622 (0.116)	0.3715 (0.001)***	-0.0044 (0.881)	-0.0335 (0.076)*				
Size	-0.0643 (0.000)***	-0.0609 (0.000)***	0.0069 (0.005)***	0.0060 (0.015)**	-0.0827 (0.000)***	-0.0884 (0.000)***	0.0013 (0.686)	0.0029 (0.333)	-0.0304 (0.001)***	-0.0074 (0.230)	0.0153 (0.002)***	0.0112 (0.000)***
Investment opportunities	0.0039 (0.000)***	0.0026 (0.712)	0.0125 (0.192)	0.0116 (0.270)	-0.0749 (0.146)	0.0259 (0.730)	-0.0266 (0.657)	-0.0800 (0.205)	0.0018 (0.028)**	-0.0010 (0.897)	0.0122 (0.207)	0.0113 (0.294)
Leverage	0.9951 (0.000)***		-0.2766 (0.000)***		0.9737 (0.0140)**		-0.2131 (0.000)***		0.9737 (0.000)***		-0.2882 (0.000)***	
Constant	1.2727 (0.000)***	1.6309 (0.000)***	0.0167 (0.709)	-0.0898 (0.059)*	1.6794 (0.000)***	2.0167 (0.000)***	0.1336 (0.015)**	0.0423 (0.497)	0.6380 (0.000)***	0.6445 (0.000)***	-0.1385 (0.092)*	-0.1903 (0.002)***
F-test	73.69 (0.000)***	70.20 (0.000)***	5.92 (0.000)***	5.56 (0.000)***	17.12 (0.000)***	24.98 (0.000)***	4.45 (0.000)***	7.10 (0.000)***	92.32 (0.000)***	83.12 (0.000)***	5.79 (0.000)***	5.13 (0.000)***
F-statistic	117.985 (0.000)***	21.6423 (0.000)***	7.1824 (0.000)***	5.1274 (0.002)***	45.0411 (0.000)***	21.8737 (0.000)***	4.9874 (0.001)***	6.8696 (0.000)***	139.6259 (0.000)***	89.2847 (0.000)***	6.9516 (0.000)***	8.8945 (0.000)***
Hausman test	9.6413 (0.047)**	4.9229 (0.176)	25.1296 (0.000)***	5.9858 (0.112)	13.8803 (0.008)***	3.3746 (0.337)	6.5390 (0.162)	9.9775 (0.019)**	9.8729 (0.020)**	8.0830 (0.018)**	27.8727 (0.000)***	4.8420 (0.0888)*
R-squared	0.95	0.08	0.48	0.02	0.88	0.39	0.14	0.49	0.95	0.92	0.46	0.02
Number of observations	728				98				630			

Note: The table reports the fixed-effects model and random-effects model regressions' estimates and the results of coefficient estimates. Coefficients estimates: $Performance_{it} = \alpha_{it} + \beta_1 Diversification_{it} + \beta_2 Size_{it} + \beta_3 Invest.Op._{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$. Tobin's Q is equal to the market value of equity plus the book value of liabilities divided by that of total assets. The ROA is a ratio of net income to total assets. Diversification is industrial diversification, which is calculated Jacquemin-Berry entropy index. Size is equal to the natural logarithm of the book value of total assets. Investment opportunities are calculated as the ratio of capital expenditures to sales. Leverage is the ratio of the book value of total liabilities to total assets. Numbers inside the parentheses refer to the probability (p) value for the related coefficients. ***$p < 0.001$, **$p < 0.05$ and *$p < 0.10$.

Source: Results obtained by the authors.

In Table 5, the F-statistics, which provide information on the validity of the model, show that our models are valid. The results of the regression analyses demon-

strate that there is a significant positive relationship between diversification and performance for Tobin's Q models. The results of the regression analyses reject the null hypothesis that the industrial diversification of the firm is negatively related to its performance. This means that the firm performance levels increase as the diversification degree rises. The finding that there is a statistically significant positive relationship between performance and industrial diversification is only supported in Tobin's Q models. It seems that diversification has an effect on Tobin's Q as a market-based performance measure. The results indicate that diversified firms outperform single firms. This finding suggests that investors should consider diversification when buying shares. The results of the regressions support the findings of the correlation analyses. Additionally, the regression results showed that there was a negative relationship between Tobin's Q and size. It is understood that this positive effect on the performance of the firm is not attained through the creation of economies of scale and scope. Contrary to Tobin's Q models, the ROA model presents a positive relationship between performance and size. Tobin's Q models present a positive relationship between performance and leverage. Moreover, it shows that the positive effects of diversification on performance stem from financial synergy. Firms tended to improve their performance by increasing their capacity of debt finance. On the contrary, these positive relationships might indicate that diversification causes the efficient use of the total assets. These gathered findings are compatible with the resource-based approach. Firms have achieved efficiency through diversification and therefore have used the internal capital market efficiently. Shyu and Chen (2009), Marinelli (2011) have reached similar results in their study. We could not find a statistically significant relationship between investment opportunities and performance for ROA models. In contrast to the ROA model, the Tobin's Q model indicates that there is a statistically significant positive relationship between investment opportunities and performance. This result means that managers have avoided debt financing. The analysis showed that, after controlling for diversification, size, investment opportunities, and leverage, the results obtained from various performance measures differed from one another. The market-based measure was shown to be more sensitive to diversification.

5. Conclusion

This study examined the effects of firm diversification on firm performance using different performance measures for the firms listed on Borsa Istanbul. Panel regression analyses were conducted using data from the 2006 to 2012 period. The analysis demonstrated that diversified firms have higher Tobin's Q, ROA, size, and investment opportunities values in comparison to single firms. The regression analyses showed a statistically significant positive relationship between industrial diversification and performance. Accordingly, we can conclude that firms can improve their efficiency and performance using the internal capital market, which results from diversification. The internal capital market makes possible the formation of a resource pool in firms and the efficient use of resources. In this way, firms' performance can be enhanced. The finding that there is a positive relationship between diversification and performance lends credence to the resource-based approach's previsions. We

found a positive relationship between performance and leverage, whereas we detected a negative relationship between performance and size. These results indicate that the firms in the sample did not obtain scope or scale economies to enhance their performance.

This study seeks to contribute to the literature on firm diversification using data on the industrial diversification of firms operating in Turkey. In light of the findings of this study, it is shown that single firms operating in Borsa Istanbul can improve their investment opportunities and reach better performance levels by making use of industrial diversification. Overall, this study provided a general perspective about the relationship between diversification and performance. We hope that it will guide and influence further research on firm diversification. Future research may include data gathered over long-term periods and different regions to remedy some of the drawbacks of this research.

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