

The Effect of Corporate Social Responsibility Performance on Financial Distress over the Life Cycle Using the Directional Distance Function

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Abstract

Rising inflation in recent years has caused financial distress and many problems for companies. Most of these problems are affected by life cycle stages. One way out of these problems is to increase corporate social responsibility (CSR) performance. Therefore, our aim in this study is to investigate the effect of CSR performance on financial distress over the life cycle of the company for a period of 10 years. Data collection was done through the website of the Tehran Stock Exchange and related software for a sample of 112 companies during the period 2009 to 2019. The mathematical method (directional distance function) is used to evaluate the CSR performance, and the models of Berger et al., Almida, Campello, and Altman are used to measure financial distress. The research hypotheses are tested using panel data and fixed effects by multivariate regression statistical method. The results show that CSR performance alone does not affect financial distress. The combination of CSR and life cycle in the growth and maturity phases has a significant and negative effect on financial distress. The CSR performance and life cycle together reduce financial distress. The combination of CSR performance and life cycle in the recession phase has a positive and significant effect on financial distress and in the fall phase, does not affect it. Given that companies compete more in the phase of growth and maturity than other phases of the life cycle, they also pay more attention to CSR. Therefore, according to these results, it can be concluded that the life cycle of the company and the CSR performance together, reduce financial distress.

Keywords: Corporate Social Responsibility Performance, Financial Distress, Life Cycle.

Introduction

Companies try to satisfy their shareholders and stakeholders by reducing the company's risk and increasing its value. There are different solutions to reduce a company's risk and prevent financial distress. In today's economy, one of the most important ways to satisfy shareholders, stakeholders, and institutions is to provide CSR performance and pay attention to it.

One of the most important financial issues today is the issue of CSR and financial distress. But unfortunately, these issues have not been sufficiently addressed (Deegan, C. 2002, Al-Hadia A. et al.2017). Financial distress weakens financial performance and thus reduces employment and investment. By reducing corporate risk, the impact of financial distress on investment can

be reduced (Apergis, N et al.2019).

Given the importance of the issue and recent research on financial distress and its prediction (Wang et al.2016), and on the other hand, stakeholder concerns about financial distress, which is considered a positive factor in improving financial distress, managers need to be driven to find the right solution and, in this way, the profits of the stakeholders are protected (Mashayekhi, b; Ganji, H. 2014). Social responsibility reduces the risk of financial distress. Companies with high social responsibility performance have high credibility and can finance more easily (Boubaker, S. et al.2020). Given that the CSR performance improves financial distress, and financial distress also is depended on the life cycle of the company, it is possible that both social responsibility and life cycle in parallel and jointly affect the financial distress (Al-HadiaA et al.2017), it is necessary for the researcher to examine the effect of CSR performance on financial distress during the life cycle of the company in the Tehran Stock Exchange.

From the management point of view, the report on social responsibility activities in the first stage is used as a strategy to apply risk management and increases the company's reputation, thereby protecting the company from political and social sanctions (Godfrey, P. C. 2005, Minor, D. B. and J. Morgan. 2011, Al-HadiaA et al.2017). On the other hand, companies' political relations with regulatory agencies can improve financial distress and compensate for the company's lack of financial resources to pay off debts (He et al.2018). In this case, having social responsibility can bring many benefits such as reducing associated costs or tax exemptions for the company. In this way, companies can manage the company's financial situation by increasing social responsibility performance (Godfrey, P. C. 2005) to reduce the possibility of predicting the company's collapse in financial distress time (Al-HadiaA et al.2017). Previous studies have examined the relationship or impact of social responsibility disclosure with the variables of stock risk (Mousavi, Seyed Ahmad et al.2016, Zabihi, Ali, et al.2017), life cycle (Rezazadeh, Javad, et al.2019), tax compliance (Hejazi, Rezvan, et al. 2015), institutional ownership (PoorAli, Mohammad Reza, et al.2013), company's governance and financial performance (Garmsiri et al.2016), investment efficiency (Fakhari et al.2015), profitability index (Shafi'i, et al.2015), dividend policy (Barzegar et al.2016), financial distress (Zhao et al. 2018, Al-HadiaA et al.2017), earning management (Grougiou et al.,2014), management characteristics (Borghesi et al.2014), and financial performance (Arab Salehi et al.2013, Hou et al.2019) and in and the effect of social responsibility performance on financial distress over the life cycle has not been addressed.

Therefore, we assume that the impact of CSR performance on financial distress over the life cycle is variable and this is because any impact of social responsibility performance on financial distress depends on the change in economic fundamentals, as well as the opportunities that arise throughout the life cycle of the company will be different. Now we are about to see if the performance of social responsibility affects financial distress? And does the company's life cycle moderate the effect of social responsibility performance on financial distress? Answering such questions can help stakeholders to evaluate the CSR performance in addition to financial performance in decision making and investments so that the investments are beneficial to them (Alexander Dyck et al.2018).

Research Background

Corporate social responsibility performance

In defining CSR, it can be said that this factor can have a significant impact on a company's business through the performance of various dimensions (Deegan, C. 2002, Al-HadiaA et al.2017). The role of CSR is to establish a relationship between the business unit and the stakeholders, which has been considered by investors and is referred to as a legal right. The company having and disclosing the performance of social responsibility can respond to the community and users and reduce risks (Zabihi, et al.2017). CSR can be considered a successful driver for the promotion and survival of the company (Hoi et al.2013). Growth of awareness and society's culture and on the other hand rising the need to respond to investors and stakeholders have led to social responsibility to be considered an important factor (Hou, 2019) and it is mentioned as a dominant indicator (Zabihi et al.,2017), so that it is known as an integral part of the economy (Rezazadeh et al, 2019). CSR as an accelerator stimulates the company's financial performance (Zhao and Xiao, 2018) and reduces financial distress (Al-HadiaA et al., 2017).

Financial distress

Financial distress is a complex issue that includes four concepts of Disability, helplessness, bankruptcy, and financial turmoil (Altman et al. 2006). In recent years, the excessive rise in inflation in Iran's economy has challenged some companies and brought them to the brink of bankruptcy. In this situation, the companies are unable to pay their debts they are in financial distress (Zamani, et al2018). Financial distress has caused companies to lose their value due to

the imposition of capital costs and the inability to attract external capital, and gain a poor ranking over competitors, so in this case, managers tend to increase the company's risk (Edwards, et al.,2013). Companies that are in financial distress cannot meet their debts with available cash resources (Apergis et al., 2019) for example; Small companies are more exposed to financial distress and take more risks to compensate for it (Salehi et al., 2019).

Corporate social responsibility and financial distress

Boubaker, et al,2020 in their research, concluded that CSR reduces the risk of financial distress. The results of Safari Graili,2018 indicate that social responsibility leads to increased liquidity of the company and causes investors and stakeholders to pay more attention to such companies. They can prevent financial distress by investing and providing financial support.

Attig, et al.,2018 and Godfrey, 2009 concluded that companies that base their activities on social responsibility can increase their revenues by using the psychological aspects and the relationships established with people outside the organization, and on the other hand, the government's positive view of these companies. Cheng, et al,2014 found that Companies that have set their sights on social responsibility and transparency, have created a mutual interaction between stakeholders and the company, and such companies are no longer concerned with investing. El Ghouli et al.,2011 and Faff, et al.,2016 indicate that Companies that do not care about social responsibility are exposed to greater risk. Minor, et al 2011, and Hoi et al, 2013 believe that companies need to update their methods and activities and move towards CSR reports because they can manage a large portion of corporate risk. According to risk management logic, companies that provide social responsibility reports are concerned with the interests of their shareholders, thereby reducing the risk of financial distress. Given that social responsibility affects a wide range of stakeholders and is considered a protector against financial constraints and barriers, the relationship between the company and the stakeholder can solve the problems caused by financial distress (Al-HadiaA. et al. 2017).

Although companies seek financial stability, they are also required by law to comply with social responsibility and business ethics (Avi-Yonah., 2008). This point of view makes the company's strategy and goals in line with social responsibility to be able to work in the current competitive and economic environment. As a result, according to this view, increasing the social responsibility performance will reduce financial distress (Al-HadiaA. et al. 2017).

Social responsibility, financial distress, and company life cycle

According to life cycle theory, the progress of companies takes place in several stages (Helfat, et al,2003, Al-HadiaA et al.2017). Many studies have shown that the companies in the emerging stage are less risky due to low profits, but the companies that are in the maturing stage are riskier due to their high profits (Habib and Hasan 2015, Dickinson, 2011)

In the emerging stage, companies are looking to attract cash resources and capital, so they may incur high costs in the future to attract more capital (Jenkins, et al 2004, Hasan et al, 2015, Kim and Suh 2009) but large business units that are in the maturing stage are more concerned with losing reputations, major investors, and regulatory interactions, so they offer social responsibility activities more than small units to protect their interests (Habib and Hasan 2017). CSR activities in the emergence and decline stages of the life cycle are less than in other stages of the company's life cycle because companies need more investment to survive in the early stages and need innovation and sustainable financing in the decline stages. Expanding social responsibility activities in Large, mature companies are less likely to lead them to financial distress due to the capital they have and the reputation they gain. It depends on companies being able to maintain relationships with key investors, the community, and regulators during the maturity stage, as it will maintain credibility, competition, and financial resources (Al-HadiaA. et al. 2017) the maturity stage, it is possible for companies to use the advantages of their financial resources and the ability of their managers to compete in the market (Gray, and Ariss 1985, Helfat, and Peteraf 2003) so that they are less exposed to financial distress (Al-HadiaA et al 2017). Resource allocation and paying attention to social responsibility activities at the maturity stage help to increase the company's investment and reputation (Habib and Hasan 2017, Javanovic, 1982) so, it can be said that the financial distress of the company is different at different stages of the life cycle (Al-HadiaA et al 2017).

Empirical background

He et al. (2018) found that political relationship plays a very small role in the emergence of financial distress, but it also helps companies raise funds and improve their financial distress.

Zhao and Xiao (2018) have researched the role of the company life cycle on the relationship between CSR, and financial constraints. In this study, companies were classified based on their life cycle. The results show that the relationship between social responsibility and financial constraints of

companies that are in the stage of growth, maturity, and decline is negative, but it does not include companies that are in the emergence stage.

Apergis, et al. (2019) examined the relationship between financial distress and performance, employment, and Research and development investment. The results show that financial distress has weakened the company's performance and reduced the employment rate and investment.

Hoi (2019) in a study entitled "Study of the Relationship between Social Responsibility and Corporate Performance", concluded that companies that provide good social responsibility reports, perform better.

Shafiei et al. (2016) have conducted a study on the level of social responsibility disclosure and profitability index and have concluded that social responsibility disclosure increases the profitability index and also the company's reputation.

Zabihi and Daryabari (2017) argue that social responsibility reduces the risk of stock falls. CSR can reduce corporate financial distress. In their research, they concluded that there is a negative relationship between CSR and stock risk. In other words, the higher the social responsibility, the lower the risk of the stock falling. It prevents the company from being financially distressed.

Rezazadeh and Yarahmadi (2019), their studies showed that there is a positive relationship between disclosure of social responsibility and life cycle. Their research shows that companies that are in the maturing stage pay more attention to social responsibility than other companies because according to resource-based theory, matured companies pay more attention to social responsibility and spend more on it to stay competitive in the market and retain customers.

Ataabadi and Mir Lohi (2019), examined the role of life cycle and financial helplessness on restructuring strategy in a study with a sample of 180 companies, and concluded that financial helplessness affects managerial restructuring both financially and operationally. As a result, life cycle and helplessness both affect the strategy of financial structure.

Research hypotheses

One of the main concerns of stakeholders today is the financial distress of companies and they are worried about the future of their investment. Therefore, to help the investors and stakeholders, we have stated our hypotheses in this research during the life cycle of the company as follows:

Hypothesis 1: social responsibility performance has a significant effect on financial distress.

Hypothesis 2: Corporate life cycle modulates the effect of social responsibility performance on financial distress.

Research Methodology

Statistical Population and Sample Selection

This research is a kind of experimental research that is in the category of post-event research. In this research, a mathematical method called directional distance function has been used to evaluate the performance of social responsibility, regression analysis has been used to test the models and combined models have been used to analyze the data.

The statistical population of the study includes 112 companies listed on the Tehran Stock Exchange, which have been selected by a systematic elimination method from 2009 to 2018 with the following limitations:

- Their fiscal year should end on March 20;
- Their information should be available;
- Their fiscal year should not be changed during the research period;
- Industries with less than five members each year are excluded from the sample;
- Companies do not have a trading interruption of more than 3 months;
- Companies are not financial intermediation companies (banks, investments, leasing, insurance, etc.).

Research models

$$FD_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV + \beta_4 INVREC_{i,t} + \beta_5 LOSS_{i,t} + \beta_6 ROA_{i,t} + \beta_7 TURN_{i,t} + \beta_8 QUICK_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$FD_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 LCM_{i,t} + \beta_3 (CSR * LCM)_{i,t} + \beta_4 (CSR * LCG)_{i,t} + \beta_5 (CSR * LCD)_{i,t} + \beta_6 (CSR * LCR)_{i,t} + \beta_7 SIZE_{i,t} + \beta_8 LEV + \beta_9 INVREC_{i,t} + \beta_{10} LOSS_{i,t} + \beta_{11} ROA_{i,t} + \beta_{12} TURN_{i,t} + \beta_{13} QUICK_{i,t} + \varepsilon_{i,t} \quad (2)$$

Research Variables

Research Dependent Variables

Financial Distress: As stated in the research question and models, financial distress is considered a dependent variable. In this study, the following models have been used to measure the financial distress of companies:

1. Financial Distress Mode of Berger, Ofek, and Swary (1999);

$$BOS - DIS = \frac{0.715 * Re\ civable + 0.547 * Inventory + 0.535 * NetPPE}{TotalAssets}$$

2. Altman Z Model of financial distress, Firoozian et al. (2011);

$$AltmanZ = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 0.999 X_5$$

Where:

X_1 : working capital in total assets; X_2 : accumulated profit in total assets; X_3 (profit ratio before interest and taxes to the total assets; X_4 book value of equity to book value of total debts; X_5 : total sales ratio to all assets.

3. Almida and Camplo R financial distress model (2007);

$$AC - DIS = \frac{Cash + 0.715 * Re\ civable + 0.547 * Inventory + 0.535 NetPPE}{TotalAssets}$$

Where:

Net PPE is net equipment and machinery.

After estimating the above models and determining the financial distress of companies, we used a virtual variable to estimate the models. If the company is in financial distress in all three models, the variable is set to 1 and otherwise 0.

Independent Variables of Research

CSR Performance: To determine the dimensions of CSR in this study, following the research of Grougiou, et al. (2014) 6 dimensions have been used for social responsibility disclosure. These dimensions include; Society, the

environment, employee relationships, products, diversity of governance, and human rights.

1. Society includes 7 indicators such as; Charity, innovation, humanitarian aid, housing assistance, education assistance, volunteer programs, etc.
2. The environment includes 6 indicators such as; Useful products and services include pollution prevention, waste recycling, clean energy, management systems, etc.
3. Employee relationships, including 6 indicators such as; Union relations, employee participation in cash benefits, employee participation, employee health and safety, employee retirement benefits, etc.
4. Products include 4 indicators such as; Product quality, product innovation, helping the poor economy, etc.
5. Diversity of governance, including 6 indicators such as; Change of chief executive officer, promotion, diversity of the board of directors, diversity of work and life benefits, employment of the disabled, and other items.
6. Human rights, including 3 indicators; providing rights of the people of the region, providing labor rights, and other matters.

Totally 32 indicators have been considered for social responsibility performance, after analyzing the content of the directors' board report, if the company has complied with any of the indicators, it will be set as 1, and otherwise, it will be 0.

After collecting social responsibility data, to determine the performance of social responsibility and ranking companies, the Directional Distance Function (DDF), is used according to the research of Portella et al (2004), Aparicio, J, Kapelko, M. (2019). Since the weaknesses of social responsibility are not reported in Iran, the formula of the negative points section of the social responsibility report has been removed from the following models.

Model 1: Take M to be the observation of the social responsibility performance, which is represented by y in the following formula for each unit of study (DMU)³⁵ in size of k^h of each company and industry of h , ($h = 1, \dots, H$). Using the mathematical method, a special observation such as j is separated from the belongings of company j in industry h , thus $Y_{j1}^h, \dots, Y_{jM}^h$. According to these notations, the following model can measure a large set of related data

with a combined index. To measure each DMU of a certain industry boundary, we follow this formula:

$$D_0^h(y_0^h; g_0^y) = \text{Max } \beta \quad (1-1)$$

$$\sum_{k=1}^{k^h} z_k y_{km}^h \geq y_{0m}^h + \beta g_{0m}^h, \quad m=1, \dots, M \quad (1-2)$$

$$\sum_{k=1}^{k^h} z_k = 1 \quad (1-3)$$

$$K=1, \dots, k^h \quad (1-4)$$

vector $g = (g_0^y)$ indicates that

$$g_{0m}^y = \max_{1 \leq h \leq H} \{ \max_{1 \leq k \leq k^h} \{ y_{km}^h \} \} - y_{0m}^h, \quad m = 1, \dots, M \quad (1-5)$$

Model 2: Model (2) evaluates the performance in terms of distance and boundary of a company's belongings of industry h, which is obtained by total observations in different industries.

$$\rightarrow D_0^{1, \dots, H}(y_0^h; g_0^y) = \text{Max} \quad (2-1)$$

$$\sum_{p=1}^H \sum_{k=1}^{k^p} z_k^p y_{km}^p \geq y_{0m}^h + \beta g_{0m}^h, \quad m=1, \dots, \quad (2-2)$$

$$\sum_{p=1}^H \sum_{k=1}^{k^p} z_k^p = 1 \quad (2-3)$$

$$z_{km}^p \geq 0, \quad k=1, \dots, k^p, \quad p = 1, \dots, h, \dots, H \quad (2-4)$$

→

If h is constant in vector $D_{0, \dots, H}^1(y_0^h; g_0^y)$, Indicates the distance and boundary **between** two companies in the industry h. p is written in top in y_{km}^p and z_k^p and k^p in second model. y_{0m}^h while h is constant and y_{0m}^p when $p = 1, \dots, h, \dots, H$ should not be confused.

Finally, according to the vector $(y_0^h; g_0^y) D_0^{1, \dots, H}$, If a company does not have the capacity for social responsibility, it may be due to the disintegration of the industry.

Also, the lack of CSR capacity due to the vector $(y_0^h; g_0^y) D_0^b$ in the non-negative residual sector is related to the gap between industry and social responsibility. After ranking the social responsibility performance using the

Directional Distance Function (DDF), a virtual variable is used to estimate the model. If the CSR performance score has exceeded the limit of the directional vector, it will be considered as 1 and otherwise 0.

Company life cycle: Dickinson (2011) in his research has used cash flows to separate the stages of the company's life cycle. Based on his method and considering the cash flow of operating activities (CFO), investment activities (CFI), and financing activities (CFF), life cycle stages are divided into 5 stages including emergence, growth, maturity, decline, and recession (Rezazadeh et al, 2019, Rezazadeh et al, 2016)

1. If $CFO < 0$, $CFI < 0$ and $CFF > 0$, the company is in the emergence stage.
2. If $CFO > 0$, $CFI < 0$ and $CFF > 0$, the company is in the growth stage.
3. If $CFO > 0$, $CFI < 0$ and $CFF < 0$, the company is in the maturity stage.
4. If $CFO < 0$, $CFI > 0$ and $0 < CFF \leq 0$ or $CFF \geq 0$, the company is in the decline stage.
5. If the company is not in any of the mentioned classes, it will be in the recession stage.

Since companies have not been listed on the stock exchange earlier and have less risk-taking at the beginning of their activity due to low profits (Ataabadi, et al,2019) the emergence stage has been removed from the company's life cycle in this research. Therefore, to test the hypotheses, according to the background and studies that state social responsibility reduces financial distress in the maturity period, Al-HadiaA et al,2017, Zhao and Xiao 2018) divide companies into two groups (maturity stage and other stages), if the company is in the maturity stage the variable is considered 1 and if it is in other stages of the life cycle, 0 is considered.

Control Variables

SIZE: The size of the company which is equal to the natural logarithm of the total assets of the company.

LEV: The ratio of short-term plus long-term debts divided by total assets.

INVREC: Total inventory and receivable accounts divided by total assets.

ROA: The rate of return on assets which is obtained by dividing the net profit by the total assets of the company at the end of the year.

TURN: total sales divided by total assets at the end of the year

LOSS: If the company makes a loss in the year under review, 1 and otherwise 0 is considered.

QUICK: Cash and non-cash receivables divided by total debts.

Research Findings

Descriptive statistics

The process of data analysis was started by obtaining the descriptive statistics measures for the collected data.

Table 1. Descriptive statistics of research variables

Variable	Mean	Median	Max	Min	Standard deviation	Skewness	Kurtosis
ABS_AM	0/111	0/072	0/419	0/008	0/110	1/494	4/489
ABS_EM	0/262	0/199	0/868	0/022	0/226	1/355	4/111
LDEBT	0/608	0/602	1/069	0/231	0/223	0/223	2/415
FDEBT	0/529	0/516	0/929	0/195	0/201	0/194	2/229
CYCLE	0/337	0/273	1/003	0/082	0/230	1/432	4/658
RG	0/182	0/129	0/935	-0/349	0/334	0/564	2/760
SDCFO	0/081	0/073	0/187	0/021	0/044	0/857	3/099
SDSALES	0/177	0/127	0/525	0/042	0/133	1/280	3/764
SIZE	14/328	14/246	16/896	12/289	1/200	0/407	2/689

Source: research findings

As shown in Table 4-1, the mean value of accrual-based earnings management was calculated to be 0.111. This means that when presenting earning reports, firms conduct on average 11% accrual-based earnings management with the purpose to achieve their desired earning levels. The median of this variable is 0.072, which means half of the firms have had an accrual-based earnings management level of less than 0.072 and the other half have had an accrual-based earnings management level of more than 0.072. The maximum and minimum values of this variable were 0.419 and 0.008, respectively, and its standard deviation was 0.110, which indicates a relatively

small difference in the level of this practice among listed firms. The results also showed that the average earnings management through real activities is equal to 0.262. This means that on average firms make 26% manipulation in their real activities to achieve their desired earning level, which is consistent with the findings of (Shekari Dogh Abadi and Moradi, 2019).

The median of this variable is 0.199, meaning that half of the firms have had a lower level of real earnings management and the other half have had a higher level of real earnings management. The maximum and minimum values of this variable are 0.022 and 0.868, respectively. The standard deviation of this variable is 0.220, which shows a moderate level of difference in the level of this practice among listed firms.

The statistical results of Table 4-1 also show that the current and total debt ratios are 60% and 52%, respectively, meaning that on average 60% of the firms' financial resources are financed through debt, or in other words, 60% of the firms' have accepted a high level of financial risk.

Good examples of firms with a debt ratio of higher than 1 include Saipa in 2014, Saipa Diesel in 2018-2019, and Gaz Louleh in 2014, which have a negative debt on account of having high amounts of accumulated losses in their equity account. The average operating cycle of the surveyed firms was 0.337, meaning that on average these businesses required 337 days to receive inventory, sell inventory and collect money from inventory sales.

Also, on average, firms had a sales growth of 0.18, an operating cash flow fluctuation of 0.08, and sales of 0.17. The mean firm size was 14.32 which was very close to the median firm size, i.e. 14.24, showing the fairly limited dispersion of this variable.

As shown in Table 4-1, all variables had a kurtosis of about 3, with the most normal being related to operating cash flow fluctuations.

Sub-hypothesis 1-1

The results of the test of the first sub-hypothesis that "there is a non-linear relationship between current debt structure and accrual-based earnings management" are presented in Table 4-8.

Table 2. Results of the regression model for the first sub-hypothesis

Variable	Coefficient	Error	t statistic	Probability of t statistic
FDEBT	-0/266	0/076	-3.520	0.001
2^FDEBT	0/434	0/104	4.171	0.000
CYCLE	0/017	0/028	0.593	0.553
RG	-0/009	0/011	-0.841	0.400
SDCFO	0/359	0/057	6.267	0.000
SDSALES	0/024	0/026	0.936	0.350
SIZE	-0/028	0/027	-1.048	0.295
C	0/599	0/391	1.533	0.126
Coefficient of determination			0,388	
The adjusted coefficient of determination			0,361	
F statistic			2,101	
Probability of F statistic			0,000	
Durbin Watson statistic			2,014	

Source: research findings

As shown in Table 4-8, the probability value (or significance level) of F for this sub-hypothesis is 0.0000, which is smaller than 0.05. Therefore, the null hypothesis is rejected at the 95% confidence level, meaning that the model is statistically significant. The Durbin-Watson statistic for this sub-hypothesis is 2.014, indicating that there is no autocorrelation between the research variables. The obtained R-squared and adjusted R-squared show that about 36% and 38% of the variability of the dependent variable of the model are explained by its independent and control variables. Since the model is statistically significant, one can comment on the statistical significance of each variable.

According to the results of Table 4-8, the coefficient of the current debt ratio is -0.266 and its t statistic is significant at the 95% probability level. For the current debt ratio squared, the coefficient is 0.434 and the t statistic is significant at the 95% probability level. Therefore, there is an inverse non-linear relationship between the current debt ratio and accrual-based earnings management. Given the negative sign of the coefficient for this debt ratio and the positive sign of the coefficient for the debt ratio squared, one can mathematically infer that the corresponding parabolic curve will be facing upwards, or in other words, the parabolic function will be u-shaped. Therefore, the first sub-hypothesis that “there is a non-linear relationship between current debt structure and accrual-based earnings management” is confirmed.

Sub-hypothesis 1-2

The results of the test of the second sub-hypothesis that “there is a non-linear relationship between total debt structure and accrual-based earnings management” are provided in Table 4-9.

Table 3. Results of the regression model for the second sub-hypothesis

Variable	Coefficient	Error	t statistic	Probability of t statistic
FDEBT	-0/240	0/068	-3.533	0.000
2^FDEBT	0/514	0/100	5.140	0.000
CYCLE	0/022	0/023	0.941	0.347
RG	-0/011	0/012	-0.928	0.354
SDCFO	0/259	0/065	3.981	0.000
SDSALES	0/025	0/021	1.215	0.225
SIZE	-0/005	0/007	-0.697	0.486
C	0/270	0/096	2.825	0.005
Coefficient of determination			0,330	
The adjusted coefficient of determination			0,327	
F statistic			17,200	
Probability of F statistic			0,000	
Durbin Watson statistic			1,694	

Source: research findings

In Table 4-9, it can be seen that the probability value (or significance level) of F for this sub-hypothesis is 0.0000. Being smaller than 0.05 this probability value indicates that the null hypothesis is rejected at the 95% confidence level, meaning that the model is statistically significant. For this sub-hypothesis, the Durbin-Watson statistic is 1.694, showing that there is no autocorrelation. According to the obtained R-squared and adjusted R-squared, the independent and control variables of the model explain 13% and 12% of the variability of the dependent variable. Again, since the model is statistically significant, it is possible to comment on the statistical significance of each variable.

As the results of Table 4-9 show, for the total debt ratio, the coefficient is -0.240 and the t statistic is significant at the 95% probability level. The coefficient of the total debt ratio squared is 0.514 and its t statistic is significant at the 95% probability level. The sign of the coefficient for the total debt ratio squared indicates that as the total debt ratio increases, accrual-based earnings management first decreases and then increases. Therefore, there is an inverse non-linear relationship between the total debt ratio and accrual-based earnings management. Overall, given the negative sign of the coefficient for the total debt ratio and the positive sign of the coefficient for the total debt ratio

squared, the corresponding parabolic curve will be u-shaped. Therefore, the second sub-hypothesis that “there is a non-linear relationship between total debt structure and accrual-based earnings management” is confirmed.

Regarding these results, it can be generally stated that when firms operate with a low level of debt, there tend to be fewer or no restrictive terms in their debt contracts, which means they can operate with a lower risk of breaching these contracts, and this reduces the incentive to manage earnings reports through accrual manipulation. However, when firms accumulate large amounts of debt, the relationship between debt and accrual-based earnings management becomes reversed. In firms with large debts, managers are incentivized to report good earnings so that the firm can meet the terms of its debt contracts as they are under pressure to avoid the penalties of breaking these terms. Therefore, these managers are more inclined to resort to accrual-based earnings management.

Sub-hypothesis 2-1

The results of the test of the third sub-hypothesis that “there is a non-linear relationship between current debt structure and real earnings management” are given in Table 4-10.

Table 4. Results of the regression model for the third sub-hypothesis

Variable	Coefficient	Error	t statistic	Probability of t statistic
FDEBT	-0/125	0/062	-1.993	0.047
2^FDEBT	0/151	0/071	2.114	0.035
CYCLE	0/171	0/027	6.369	0.000
RG	0/104	0/028	3.761	0.000
SDCFO	0/676	0/106	6.355	0.000
SDSALES	0/225	0/043	5.286	0.000
SIZE	0/076	0/037	2.031	0.043
C	-0/943	0/529	-1.781	0.076
Coefficient of determination			۰,۶۱۸	
The adjusted coefficient of determination			۰,۵۱۶	
F statistic			۶,۰۴۲	
Probability of F statistic			۰,۰۰۰	
Durbin Watson statistic			۲,۰۰۶	

Source: research findings

As Table 4-10 shows, the probability value (or significance level) of F for this sub-hypothesis is 0.0000, which is less than 0.05. Therefore, the null hypothesis is rejected at the 95% confidence level, indicating that the model is statistically significant. The Durbin-Watson statistic for this sub-hypothesis is 2.006, which shows that there is no autocorrelation between the variables. The obtained R-squared and adjusted R-squared show that the independent and control variables explain 61% and 51% of the variability of the dependent variable. Given the statistical significance of the model, the statistical significance of individual variables can be discussed.

In Table 4-10, it can be seen that the coefficient of the current debt ratio is -0.125 and its t statistic is significant at the 95% probability level. For the current debt ratio squared, the coefficient is 0.152 and the t statistic is significant at the 95% probability level. This means that there is an inverse non-linear relationship between the current debt ratio and real earnings management. Given the negative sign of the coefficient for the current debt ratio and the positive sign of the coefficient for the current debt ratio squared, it can be mathematically inferred that the corresponding parabolic curve will be u-shaped. Therefore, the third sub-hypothesis that “there is a non-linear relationship between current debt structure and real earnings management” is also confirmed.

Sub-hypothesis 2-2

The results of the test of the fourth sub-hypothesis that “there is a non-linear relationship between total debt structure and real earnings management” are presented in Table 4-11.

Table 5. Results of the regression model for the fourth sub-hypothesis

Variable	Coefficient	Error	t statistic	Probability of t statistic
FDEBT	0/037	0/270	0.136	0.892
2^FDEBT	-0/047	0/177	-0.265	0.792
CYCLE	0/185	0/028	6.666	0.000
RG	0/129	0/017	7.580	0.000
SDCFO	0/452	0/224	2.017	0.044
SDSALES	0/261	0/046	5.676	0.000
SIZE	0/027	0/034	0.794	0.428
C	-0/291	0/474	-0.614	0.540
Coefficient of determination			0,077	
The adjusted coefficient of determination			0,487	
F statistic			7,440	

Descriptive statistics

After evaluating the CSR performance and identifying life cycle periods, descriptive statistics of other research variables are shown in Table 1.

The results show that on average 40% of the social responsibility performance of the sample companies is at a higher level than the directional distance function and 36% of this amount belongs to the maturity period of the company life cycle. Also, the level of significance of the variables indicates that they are normal.

Table 6. Descriptive statistics of research variables

variable	mean	median	max	min	standard deviation	observation	P-Value
Financial distress	0/59	1	1	0	0/49	1120	0/0000
Social responsibility performance	0/40	0	1	0	0/49	1120	0/0000
Life cycle	0/80	1	1	0	0/39	1120	0/0000
social responsibility performance (maturity stage)	0/36	0	1	0	0/48	1120	0/0000
social responsibility performance (growth stage)	0/001	0	1	0	0/04	1120	0/0000
social responsibility performance (decline stage)	0	0	1	0	0/02	1120	0/0000
social responsibility performance (recession stage)	0/04	0	1	0	0/02	1120	0/0000
Size of company	14/15	13/76	18/82	11/04	1/59	1120	0/0000
The ratio of total debts to total assets	0/59	0/59	1/57	0/02	0/21	1120	0/0000
variable	mean	median	max	min	standard deviation	observation	P-Value
The ratio of goods and receivable accounts to total assets	0/49	0/51	0/88	0	0/19	1120	0/0000
loss	0/09	0	1	0	0/28	1120	0/0000
return on assets ratio	0/15	0/14	0/63	0	0/14	1120	0/0000
Sales to total assets ratio	1/05	0/84	6/84	0/09	0/80	1120	0/0000
total receivables to total assets ratio	0/28	0/27	0/78	0/01	0/17	1120	0/0000

Chow test or F-Limer

Before estimating the hypotheses, an appropriate test method is needed to be selected to obtain the desired results. We first determined whether the data is pooling or panel using the Chow or f-Limer test.

If the significance level of this test is less than the error considered in the research, the data is a panel and otherwise, the data is polling. The results of Table 2 show that the significance level of the f-Limer test in all models is less than 0.05 error. H0 assumption based on Pulling data is then rejected and the panel data is selected as a result. Next, we use the Hausman test to determine the type of test (fixed or random effects).

Table 7. Chow (F-Limer) test results

H0: Data is pooling				H1: Data is a panel	
Model	Statistic F	P-Value	Degrees of freedom	Test result	Approved method
Model 1	12/81	0/0000	111/99	H0 rejected	Data is panel
Model 2	13/32	0/0000	111/99	H0 rejected	Data is panel

Hausman test

According to the results of the Chow test and the approving the data is a panel, it is possible to determine the estimation method with fixed or random effects performing the Hausman test. If the significance level is less than the desired error, the pattern of the fixed effects should be used, but if it is greater than the research error level, the pattern of the random effects is used. Table 3 shows that the significance level in all models is less than 0.05. As a result, the H0 hypothesis is rejected and the model estimation must be performed with fixed effects.

Table 8. Hausman test results

H1: Data is tested with fixed effects				H0: Data is tested with random effect	
Model	Statistic χ^2	P-Value	Degrees of freedom	Test result	Approved method
Model 1	47/68	0/0000	8	H0 rejected	Fixed effects
Model 2	53/39	0/0000	13	H0 rejected	Fixed effects

Hypothesis test results

The first hypothesis test on the social responsibility performance has a significant effect on financial distress, with the fixed effects of panel data, the results of which are presented in Table 4. The statistic of F is equal to 50.6343 and the significance level (0.0000) indicates the high reliability of the model at the 99% confidence level. Durbin Watson's (DW) statistic with a value of 2.24 shows no autocorrelation in the remainder of the model. The adjusted coefficient of determination indicates that the independent variables cover about 84% of the dependent variable changes.

Table 9: Test results of the first hypothesis using panel data and fixed effects

$FD_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV + \beta_4 INVREC_{i,t} + \beta_5 LOSS_{i,t} + \beta_6 ROA_{i,t} + \beta_7 TURN_{i,t} + \beta_8 QUICK_{i,t} + \varepsilon_{i,t}$				
variables	symbol	coefficient	t-statistic	P-Value
Constant	C	1/3551	3/4148	0/0007
Social responsibility performance	CSR	0/0152	0/4604	0/6453
Size of company	SIZE	-0/0513	-1/9203	0/0551
The ratio of total debts to total assets	LEV	0/8402	6/9015	0/0000
The ratio of goods and receivable accounts to total assets	INVREC	-0/4025	-3/3536	0/0008
loss	LOSS	-0/2667	-6/4796	0/0000
return on assets ratio	ROA	-1/3092	-8/9215	0/0000
Sales to total assets ratio	TURN	-0/0942	-3/5162	0/0005
total receivables to total assets ratio	QUICK	0/1086	0/7496	0/4537
Weight statistics				
R ²	0/86	Statistic f(50/9581) Significance level (F)		(0/0000)
Adj. R ²	0/84	Durbin Watson (DW) statistic		2/23

The t-statistic with a value of 0.4604 and a significance level of 0.6453 for CSR in the first hypothesis test shows that social responsibility performance does not affect financial distress. The results also show that the value of t-statistic for SIZE, LEV, INVREC, ROA, TURN, LOSS, and QUICK are -1.9203 (negative and significant), 6.9015 (positive and significant), -3.3536 (negative and significant), 8- 9215 (negative and significant), -3.5162 (negative and significant), -6.4796 (negative and significant) and 0.7966 (no relationship) respectively. The t-statistic for the width of the origin is equal to 3.4148 and the significance level with the value of 0.0007 indicates a significant relationship with the dependent variable; Therefore, according to the obtained

results, the first hypothesis is rejected.

The test of the second hypothesis, that the life cycle of the company moderates the effect of social responsibility performance on financial distress has been performed with fixed effects, the results of which are presented in Table 5. According to the f-statistic with a value of 50.6856 and a significance level of 0.0000 and also with the value of Durbin Watson (DW) statistic which is close to 2, it can be claimed that the model has a high level of reliability. Also, the value of the adjusted coefficient of determination shows that about 84% of the changes in the dependent variable can be explained by independent and control variables.

Table 10. Test results of the second hypothesis using panel data and fixed effects

$FT_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 LCM_{i,t} + \beta_3 (CSR * LCM)_{i,t} + \beta_4 (CSR * LCG)_{i,t} + \beta_5 (CSR * LCD)_{i,t} + \beta_6 (CSR * LCR)_{i,t} + \beta_7 SIZE_{i,t} + \beta_8 LEV + \beta_9 INVREC_{i,t} + \beta_{10} LOSS_{i,t} + \beta_{11} ROA_{i,t} + \beta_{12} TURN_{i,t} + \beta_{13} QUICK_{i,t} + \varepsilon_{i,t}$				
variables	symbol	coefficient	t-statistic	P-Value
constant	C	1/5416	4/0160	0/0001
Social responsibility performance	CSR	0/1946	2/8629	0/0043
Life cycle (maturity)	LCM	0/0045	0/1649	0/8690
Social responsibility performance in the maturity stage	CSR*LCM	-0/2094	-3/3116	0/0010
Social responsibility performance in the growth stage	CSR*LCG	-0/3188	-1/9381	0/0529
Social responsibility performance in the decline stage	CSR*LCD	-0/1416	-0/6782	0/4977
Social responsibility performance recession stage	CSR*LCE	0/1121	2/0883	0/0370
Size of company	SIZE	-0/0633	-2/3808	0/0175
The ratio of total debts to total assets	LEV	0/8184	6/8171	0/0000
The ratio of goods and receivable accounts to total assets	INVREC	-0/4814	-4/0328	0/0001
loss	LOSS	-0/2597	-6/3129	0/0000
variables	symbol	coefficient	t-statistic	P-Value
return on assets ratio	ROA	-1/2441	-8/5256	0/0000
Sales to total assets ratio	TURN	-0/1323	-4/8427	0/0000
total receivables to total assets ratio	QUICK	0/1483	1/0320	0/3023
Weight statistics				
R ²	0/86	Statistic f(50/6856) Significance level (F)		(0/0000)
Adj. R ²	0/84	Durbin Watson (DW) statistic		2/26

The results of Table 5 show that t-statistic with a value of 2.8629 and a significance level of 0.0043 is positive and significant for the CSRP variable at an error level of 0.05. The results also show that the value of t-statistic for LCM is -0.1649 (no correlation), for CSRP * LCM, is -3.316 (negative and significant), for CSRP * LCG, is -1.9381 (negative and Significant), for CSRP * LCD is -0.6782 (no relationship), for CSRP * LCE is 2.083 (positive and significant), for SIZE is -280.380 (negative and significant), for LEV is 6.8171 (positive and significant), for INVREC is -0.328 (negative and significant), for ROA is 8-5256 (negative and significant), for TURN is -4.2749 (negative and significant) , For LOSS is -6.29595 (negative and significant) and for QUICK is 1.0320 (no relationship). The t-statistic for the width of the origin is 4.0160 and the significance level with the value of 0.0001 indicates a significant relationship with the dependent variable; The results indicate that the life cycle has moderated the effect of social responsibility performance on financial distress. Therefore, according to the obtained results, the second hypothesis is confirmed.

Conclusion

Previous literature shows that companies can reduce business risk and financial distress through social responsibility management (Zabihi et al, 2017, jo et al.,2012, Al-HadiaA et al, 2017, Boubaker et al.,2020). Also, companies with high social responsibility performance have more credibility (Jiraporn et al, 2014, Boubaker et al, 2020). This makes it easier for companies to access financial resources (Safari Graili 2018, Cheng et al, 2014, He, et al, 2018), On the other hand, past research shows that the performance of social responsibility varies throughout the life cycle of the company (Dickinson, 2011, Habib and Hasan 2015, Al-HadiaA et al.,2017).

To answer the research questions, we divided the life cycle of the company into 5 stages according to the model (Dickinson, 2011): emergence, growth, maturity, decline, and recession. we removed the emergence stage in this study because the companies are not listed in the stock market from the beginning and their data is not available; By testing the first hypothesis that states social responsibility performance has a significant effect on financial distress, we conclude that social responsibility performance at 95% confidence level does not affect financial distress; Thus the first hypothesis is rejected; But by testing the second hypothesis that says life cycle of the company moderates the effect of social responsibility on financial distress, we came to different results.

Findings show that the combined variables of social responsibility performance and life cycle in growth and maturity stages, at 99% confidence level, have a negative and significant effect on financial distress; That is, they are jointly reducing financial distress. The combined variable in the decline stage indicates the absence of a relationship and the combined variable in the recession stage shows a positive and significant relationship with the dependent variable. In other words, companies pay more attention to social responsibility because they compete more in the stages of growth and maturity than in other stages of the life cycle. Therefore; According to the results, it can be interpreted that the company's life cycle and social responsibility performance together have a negative and significant effect on financial distress and reduce it So the second hypothesis is confirmed. The results of this study are consistent with the results of Boubaker et al. (2020), Zhao and Xiao (2018); Al-HadiaA et al. (2017), and Rezazadeh and Yarahmadi (2004).

According to the obtained results, it is suggested to investors pay more attention to companies that are in the stage of growth and maturity and have high social responsibility performance to reduce their investment risk. One of the limitations of this study is the inconsistency of the social responsibility reports of the companies listed on the Tehran Stock Exchange. There is no specific standard for the activity reports of the board of directors. Therefore, it is suggested to the stock exchange as an observer to establish a specific standard for social responsibility classification and reporting so that companies can be ranked and compared in terms of social responsibility performance. It is also suggested to measure the financial distress by other methods to examine their effect on CSR performance.

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