

Full Length Research Paper

# The determinants of debt maturity structure in Iranian firms

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The purpose of this research is to test the main theories of firm debt maturity in an emerging economy, including agency conflict; signaling and tax theories. This paper investigates the firm specific determinants of debt maturity structure for a sample of 140 Iranian manufacturing firms listed in Tehran Stock Exchange during the period 2001 to 2009. Employing random effect panel data analysis, and multivariate regression, the study provides empirical evidence that profitability, firm size, tangibility, growth opportunity and financial leverage have significant effects on debt maturity choice in Iranian context however; tax effects and business risk are not significantly related to the debt maturity structure.

**Key words:** Debt maturity structure, profitability, dividend policy, business risk.

## INTRODUCTION

The studies of Modigliani and Miller (1958) presented a basis for modern corporate finance. In their paper (Miller and Modigliani, 1961; Modigliani and Miller, 1963; Miller, 1977), they elaborated on the conditions under which the firm would be largely indifferent to the sources of its financing, in an efficient capital structure. This was also explicitly represented by Stiglitz (1974). In other words, decisions about the debt maturity, can never improve the value of a firm. Nevertheless in a real market especially in developing countries that the capital markets are not efficient, choosing the debt maturity structure can affect the firm value. Some Iranian researches indicate that Iranian capital market have a weak efficiency (Foster and Kharazi, 2008; Hakim and Rashidian, 2009; Jahan-Parvar and Mohammadi, 2011). Additionally in developing countries; firms have some limitations to choose debt maturity structure (Stephan et al., 2011). So the determinants of debt maturity in each country can add to literature. Discriminants of debt maturity are a mixture of specific variables of firm and institutional environment (Fan and Twite, 2010). There are several studies about

capital structure based on Modigliani and Miller's works [(Titman and Wessels, 1988) for American firms; (Campbell and Hamao, 1995) for Japanese firms; (Gatward and Sharpe, 1996) for Australian firms; (Yahiya Zadefar et al., 2010; Ghadiri and Asadiyan, 2010) for Iranian firms]; however, much less attention has been devoted to the debt maturity structure (Terra, 2011; Hajiha and Akhlaghi, 2011), especially in Iranian context as an emerging economy. Hence, the main objective of this research is to examine main firm specific discriminants of debt maturity structure according to different theories in literature, for Iranian firms listed in Tehran Stock Exchange (TSE).

The majority of debt maturity research concentrates on the debt maturity behavior of U.S. firms, some researches are in the U.K and Europe, Latin America, or Australian firms, but there are rare studies on developing and emerging markets, especially in Iranian context. The Iranian firms are important to study, because they have some basic differences from developed markets. Firstly, in Iran the common way that firms provide financial

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resources is borrowing. It means Iranian firms are heavily reliant on bank debt funding rather than public financing (Noravesh and Yazdani, 2010). Tehran Stock Exchange actually is a new, small and developing market. While it was established in 1967, it has so many limitations in comparison with developed capital markets. In Iran capital market is a secondary market. It means a firm should be financed first before it could be eligible to enter to the capital market to trade publicly. In other words, there is not primary publicly capital market that firms can be financed. Therefore, firms that are accepted in Iranian capital market only transfer their resources from a section to another section. They do not finance their primary needs from the market. That is why borrowing from banks and other credit institutions are the most important way to provide financial resources for Iranian firms. On the contrary, in most of developed countries capital market is the most important place to finance the firms. As a result, we expect the debt maturity in Iranian firms becomes even more critical financial decision for firms rather than developed countries.

Secondly, the inflation rate in Iranian economy is rather high; in inflation economy borrowing can be a favorite alternative to provide the resources. Therefore, the firms' managers prefer to borrow from outside to handle their operations and perform new projects instead of using from inside resources. That can be another reason for importance of debt in financial structure of an Iranian firm.

Thirdly, borrowing from banks is more common for public firms than borrowing from other credit institutions; bank debt is associated with higher monitoring of the firm's actions, so agency costs of debt are expected to be lower in Iran. As a result, short-term debt that is typically used to discipline a firm's value-destroying actions might play a less important role in mitigating agency problems in Iran.

Finally, the ownership of many important banks in Iran is governmental; however some private banks have been established in current years. Some private banks are influenced from government decisions to credit offering policies especially for public large firms. There are some facilitations for a firm that fails to meet its obligations (the amount of primary debt and the interest). In some cases the debt can be reduced or even be deleted completely. So the role of banks in monitoring public firms and reducing the agency cost is not clear. All these reasons make the Iranian market unique to study.

In this research, we examine the determinants of debt maturity of Iranian firms, using 976 firm-year observations between 2001 and 2007. We find some support for the signaling hypothesis that Iranian firms issue short-term debt to signal their firm quality.

The rest of the paper proceeds as follows: review of the theoretical framework on debt maturity and develops the hypotheses and review some related literature; research methodology and results and hypotheses testing respectively; discussion and conclusion.

## THEORETICAL FRAMEWORK, HYPOTHESES DEVELOPMENT AND LITERATURE REVIEW

### Theories

There are three leading theories in literature that tried to explain the debt maturity structure namely agency conflicts (Myers, 1977; Jensen, 1986; Barnea et al., 1980), information asymmetry (Flannery, 1986; Kale and Noe, 1990; Diamond, 1991), and taxes (Brick and Ravid, 1991; Mauer and Lewellen, 1987; Emery et al., 1988).

Papers based on agency costs theory (Bolton and Scharfstein, 1990; Jensen, 1986) emphasize the role of debt in reducing agency costs between shareholders and managers. In a seminal paper, Myers (1977) represented that short-term debt mitigates the "underinvestment" problem. Firms do not pursue relatively riskier projects because creditors get more benefits from these investments. This is named "underinvestment problem". The underinvestment problem gets more severe if a firm has more growth opportunities. When firms grow very quickly, their financing needs exceed their internal resources (Demirgüç-Kunt and Maksimovic, 1999). Binks and Ennew (1996) stress that the faster the firm's growth, the more restricted is their access to credit. Therefore, short term debt decreases the agency costs by imposing more frequent monitoring by investors. Barnea et al. (1980) argue that shortening the maturity structure of debts to match the structure of assets (maturity matching) can help to reduce the agency costs of underinvestment. According to this theory the firms try to reduce their debt maturity to solve the conflict problem.

As we discussed earlier, Iranian firms prefer to borrow more in inflation economy of Iran. In particular, long term debt can be preferable alternative to managers, because of some governmental and legal setting supports. So firms have increased their debt levels accordingly and it may be less important that these firms observe the matching principle in mitigating the debt overhang problem. In Iran firms rely on bank debt funds but the Iranian banks cannot monitor like the banks in developed economies. Hence, that is not clear whether banks can reduce the cost of conflicts.

Another theory derives from the asymmetric information. In this theory, the maturity structure is yet another tool that firms can employ to solve the agency problems. Therefore, the signaling hypothesis is also extracted from information asymmetry and it suggests that the maturity choice is used by firms as a way to signal their high quality to the market and as a result this signal reduces the firm's cost of capital (Flannery, 1986). This theory suggests that the issuance of short term debt is a positive signal of good quality of firm (Kale and Noe, 1990; Flannery, 1986). Flannery (1986) derived a separating equilibrium with positive transaction costs in which riskier borrowers are not able to afford costs of short-term debt and prefer long-term debt, while low-risk borrowers prefer

to short-term debt. Kale and Noe (1990) suggested that similar separating equilibrium is possible even in a framework without transaction costs. The theory is also supported by Stohs and Mauer (1996) who find that maturity structure is inversely related to firm quality.

Since the Iranian economy is bank base rather than capital market base, the banks have more ability and knowledge to analyze financial situation of firms than other debt holders, therefore, when the firm makes more long term debt, this may send a good signal to the market than the others. In Iran as an emerging market private and individual debt holders that offer short term debts to firms do not have enough time, information and knowledge to analyze financial and operating situation of firms. Therefore, while the signaling theory of Flannery (1986) suggest short term debts send signal to the market about high quality, the bank position can affect the signaling theory.

Finally, the tax hypothesis analyzes the tax implications of the debt maturity choice. Brick and Ravid (1985) found that the firms use more long-term debt when the term structure of interest has a positive slope. In this situation, issuing long term debt increases value of firms via tax shield. Long-term debt is more expensive so the firm can avoid more taxes while having higher profitability. This theory represents that optimum debt maturity structure is a tradeoff between tax advantages for firm debts and disadvantages of agency costs. Tax regulations in Iran accept the long term debt's interests as an acceptable income tax costs. Therefore, tax advantages would be pursued by Iranian firms managers who have profitable operation. They prefer to issue more long term debts to reduce the income tax. Hence, we expect this hypothesis affect the structure of debts in Iranian context.

## Variables and hypotheses

Although, there are a number of the determinants of debt maturity in literature; some researches indicate another evidence for developing countries (Demirgüç-Kunt and Maksimovic, 1999; Ozkan, 2002; Stephan et al., 2011; Terra, 2011). This suggests that we should examine these variables for individual countries. In this research we want to examine some variables that the literature introduces under the theories in Iranian capital market. We summarize the results of previous empirical studies on these discriminants. Table 1 also indicates the measurement and definition of variables (determinants of debt maturity) and the expected relationships under each hypothesis for our study.

Long term debt is typically defined as debt due after either one year in this research (Scherr and Hulburt, 2001; Alcock et al., 2011). We use the ratio of a firm's long term debt to total debt as our proxy for debt maturity. We extracted the required information from stock exchange data bases and its official web site; we used

also some professional applications to gather our information like Tadbir Pardaz and Rahavard Novin.

### **Profitability**

Myers and Majluf (1984) believed that there is a negative correlation between profitability and debt maturity structure, because more profitable firms will need less debt. They have enough internal resources to projects financing. Rajan and Zingales (1995) also emphasized this finding. Nevertheless, based on tax theory approach, the larger firms should borrow more because they need more tax shields (interest expense) so the positive relationship is expected (Hong and Jason, 2006). However, most of the studies report a negative relation. But in Iranian case managers have tax motivations so we expect that because of tax advantages, more profitable firms have more long term debts (positive correlation). This debate leads to the following hypothesis:

**H<sub>1</sub>:** There is a significant association between debt maturity structure and firm profitability

### **Dividend policy**

We expect a positive correlation between debt maturity structure and dividend policy based on agency theory. Nevertheless, in the signaling theory we expect a negative relation (Bhattacharya, 1979; Miller and Rock, 1985). However, Terra found no significant relationship between these two variables. It leads to the following hypothesis:

**H<sub>2</sub>:** There is a significant association between debt maturity structure and firm dividend policy

Iranian Business Law (article 90) requires public firms to distribute at least 10% of net income (if there is a net income) as a dividend to stockholders. The firms cannot accumulate all net profit as inside resources. Hence, unlike to some developed countries' legal settings, Iranian firms have to have dividend distribution for the operating of each financial year. In other words, dividend policies may have lower effects on financial decisions (at least 10% of divided profit does not follow firms' policies). It means we will expect lower effect for dividend policy on debt maturity structure in Iranian case.

### **Volatility or business risk**

Volatility or business risk is a measure for financial distress, according to agency theory we expect a positive correlation between risk and debt maturity (Terra, 2011). Nevertheless, on the point of view of the signaling

**Table 1.** Definition of research variables and related theories.

<b>Dependent variable</b>	<b>Sample empirical evidence</b>	
Debt maturity structure (Long term debt divided by (Long term debt + Short term debt)).	Antoniou et al.(2006), Magri (2010), Wang et al. (2010), Fan et al. (2010), Terra (2011), Gracia and BarberJ (2011) and (Hajiha and Akhlaghi (2011).	
Determinants	Predicted sign and theories	Sample empirical evidence
Leverage(Long-term debt divided by book value of equity)	Agency costs (-)	Terra (2011)
Firm size(Logarithm of total book value of assets)	Agency(+) Signaling (+)	Gracia and Barber (2011), Chen (2004) and Mustapha et al. (2011).
Tangibility(Net fixed assets divided by total book assets) Net fixed assets equals property, plant and equipment minus accumulated depreciation	Agency(+)	Terra (2011)
Growth opportunity( market value of common equity) divided by (total book value of assets)	Agency(-)	Mustapha et al. (2011) and Booth et al. (2001)
Profitability(profit before return and tax divided by total assets)	Signaling(-) Tax (+)	Myers and Majluf (1984) and Rajan and Zingales (1995)
Dividend Policy( Dividend per share divided by Total assets)	Agency(+) Signaling(-)	Abor and Godfred (2010), Afza and Mirza, (2010) and Ghosh and Ghosh (2009).
Business Risk (Sales divided by operating income)	Agency(+)	Terra (2011) and Mustapha et al.(2011)
Tax effects (the average of effective tax rate) (tax divided by taxable earning)	Agency(+) Tax (-)	Terra (2011) and Gracia and Barber (2011)

approach, riskier firms are not able to cover costs of rolling short-term debt and prefer long-term debt, (Stohs and Mauer, 1996; Stephan et al., 2011) So Third hypothesis of the research is as follows:

**H<sub>3</sub>:** There is a significant association between debt maturity structure and firm business risk

### **Tax effects**

Almost all studies indicate that tax has an impact on capital structure and firms issue more debt when the tax rate is higher to profit from tax shields (Brick and Ravid, 1985). According to agency theory expected relation is positive, while based on tax theory the relation is expected to be negative (Hong and Jason 2006); Terra,

2011). It leads to the following hypothesis:

**H<sub>4</sub>:** There is a significant association between debt maturity structure and tax rate

### **Financial leverage**

Agency theory suggests a negative correlation between leverage and debt maturity (Terra, 2011), because there are two strategies to solve underinvestment problem, reducing leverage or debt maturity. On the other hand, Leland and Toft (1996) posit that firms with a higher degree of leverage tend to choose longer maturity debt. Morris (1992) also emphasizes this debate. Diamond (1991) believes that this is true because firms with higher degree of leverage prefer long term debt to avoid

suboptimal liquidation. They will have more time to repay their debt. This debate leads to the following hypothesis:

**H<sub>5</sub>:** There is a significant association between debt maturity structure and leverage

In Iranian context, the use of leverage is more common to obtain external financing, so we expect the leverage affect debt maturity negatively from agency theory approach.

### ***Growth opportunities***

The researches indicate different findings about the relationship between debt maturity and growth opportunities in different countries (Terra, 2011). Agency theory expects a negative relation. Primary studies on growth opportunities (Myers, 1977) discuss that future investments of firms are as growth opportunities. Sometimes creditors may earn a large portion of earnings from investments and it can cause the stockholders to reject a project with positive net present value. This is an underinvestment problem. In order to solve this problem, short term debt can be used as a tool to reduce agency conflict (Myers, 1977; Barnea et al., 1980). As a result, we developed the sixth hypothesis as follows:

**H<sub>6</sub>:** There is a significant association between debt maturity structure and growth opportunities

### ***Tangibility***

Studies indicate that tangibility of assets is positively related to debt (Rajan and Zingales, 1995). Jensen and Meckling (1976) point out that the agency cost of debt exists when the firm shifts to riskier investment after the issuance of debt, and transfers wealth from creditors to shareholders. If tangible assets are high, then these assets can be used as collateral, diminishing the lender's risk of suffering such agency costs of debt (Hong and Jason 2006). Hence, high tangible assets is expected to be associated with high long term debts, this is constant whit Fan et al.'s finding (2003). However, Abor (2008) reported a negative relation for small and medium-sized enterprise (SMEs) and Terra (2011) found no significant correlation among different countries. So we examine this variable for Iranian context with the following hypothesis:

**H<sub>7</sub>:** There is a significant association between debt maturity structure and tangibility

### ***Firm size***

Some recent studies suggest larger firms have lower agency costs, because they have more access to capital markets (Ozkan, 2002). Hence, it is expected that larger

firms issue more long-term debts. Both agency and signaling theories suggest this positive relation (Terra, 2011). So the final hypothesis of the research is:

**H<sub>8</sub>:** There is a significant association between debt maturity structure and firm size

## **LITERATURE REVIEW**

There are so many studies that focus on firm level determinants of debt maturity. However, we review some related and current studies on emerging markets in this area.

Arslan and Karan (2006) studied on leverage and debt maturity as jointly endogenous under simultaneous equations framework for Turkish firms. The findings showed that firms that are financially strong or have more growth opportunities shorten their firm debt maturity structure. Moreover, despite having a controlling large shareholder or a concentrated ownership structure, firms with growth opportunities still prefer shorter maturities in order to solve the underinvestment problems. Finally, firm size is positively associated with long term debt but taxes do not affect debt maturity structure.

Cai et al. (2008) investigated the determinants of debt maturity of the Chinese listed firms. They found that the size of the firm, asset maturity and liquidity have significant effects on extending the debt maturity in Chinese companies. Tangibility of assets and growth opportunities also are important. However, proxies for a firm's quality and effective tax rate apparently report mixed or unexpected results.

Majumdar (2010) studied the determinants of debt maturity structure of Indian firms, using a sample of companies chosen from two broad indices, viz., the BSE 500 and the CNX 500 index. The findings suggest that tangible assets and leverage are the important determinants of debt maturity. Size and firm quality have the predicted effect on debt maturity; however, results are statistically significant only in the case of fixed effect firm and time model. There was no evidence of the impact of effective tax rate, asset maturity, and growth opportunities on debt maturity in the Indian context.

Stephan et al. (2011) investigated the determinants of debt maturity structure in emerging markets using a panel of 4500 Ukrainian firms during the period 2000 to 2006. The results confirmed the importance of agency costs, liquidity, signaling, and taxes for the debt maturity structure of firms operating in an emerging economy. Firm creditworthiness and access to long-term financing at bond markets are the key drivers of firm's debt structure. The study provided strong evidence that constrained and unconstrained firms react differently on liquidity risk and, hence, pursue different debt maturity strategies.

Alcock et al. (2011) examined the determinants of debt

maturity in the Australian capital market with the top 400 firms listed on the Australian Securities Exchange for the period 1989 to 2006. They found that Australian firms not only exhibit a positive leverage-maturity relationship but also use short-term debt to signal their high quality to the market.

Qiuyan et al. (2012) in their paper employed financial engineering approach to test the influencing factors of debt maturity structure with the data of 202 listed Chinese firms distributed in 11 industries. By the simulation of single equation models and simultaneous equation model, using stepwise multiple regression analysis, the endogenous relationship between capital structure and debt maturity structure was reviewed. They suggest when the firms consider this relationship, the short-term debt maturity will not be an effective way to solve underinvestment problem. In contrast, growth opportunity and leverage rate are significant negative correlation. With the role of leverage, growth opportunity indirectly affected debt maturity structure.

### Tehran Stock Exchange

There has been growing interest in emerging financial markets among both financial academicians and practitioners, since the mid-1990s. One of the least studied emerging or a frontier market is the Tehran Stock Exchange (TSE), the equity market in the Islamic Republic of Iran (Jahan-Parvar and Mohammadi, 2011). The Tehran Stock Exchange (TSE) began operation in February 1967. It experienced increasing growth in its first decade of operation. Its number of listed firms increased from 6 in 1967 to 105 in 1978 and TSE's market capitalization increased from USD 885 million to USD 3.4 billion during that period. Many political and economical factors caused TSE growth like the development of manufacturing sector, rapid rise in oil prices, and tax exemption of listed firms are among the most important contributing factors (Jahan-Parvar and Mohammadi, 2011). The Islamic revolution of 1978 and war with Iraq in 1981 had great influence on TSE activities. By 1982, market capitalization fell to about USD 149 million. However, until 1988 TSE became a mechanism for channeling savings into investment, the place for economic reconstruction and development. As a result, the number of listed companies increased from 56 in 1982 to 306 in 2000. Since 2000, the performance of TSE has followed two patterns (Hakim and Rashidian, 2009). TSE's performance promoted during 2000 to 2004 period, with the market capitalization growing from USD 34 billion to USD 411.5 billion, and the Tehran Price Index (TEPIX) reaching an all time high of 13,882 on August 4, 2004. However, a severe market correction brought the index down 35% to 9069 on July 26, 2006. By 2007, the market capitalization rose above its level in 2004. However the number of listed firms was still below its 2004 values due to merger and acquisition activities. The post-2000 Iranian

economy has been subject to several internal and external shocks which may have influenced TSE's performance. Firstly, the economy has been subject to numerous international sanctions imposed by the United States and/or the United Nations (Hakim and Rashidian, 2009; Jahan-Parvar and Mohammadi, 2011). Secondly, other external events may have also potentially affected the performance, including (a) the sharp rise and the subsequent fall in crude oil prices in 2000 to 2008 period; (b) the September 11, 2001 attacks in the U.S. and (c) the subsequent U.S. war in two of Iran's neighboring countries (Iraq and Afghanistan) and finally, the Iranian economy has also a number of internal financial, policy, and political shocks with potential effects on TSE performance (Jahan-Parvar and Mohammadi, 2011). First, the requirements of stricter disclosure rules on TSE in 2002 to improve transparency. Second, the requirement of following of national accounting standards issued by Iranian Accounting Certified Public Accountants (IACPA) from 2001 for listed firms. Third, the tax law of 2003, which reduced marginal tax rates from 50 to 35%. Finally, the 2004 amendment of Article 44 of the Constitution Law which allowed privatization of 80% of the state assets. Of these, "Justice Shares" scheme gets 40% and the rest are planned to be publicly offered at TSE. The government retains ownership of the remaining 20%. Under the privatization plan, 47 oil and gas companies (including Petrolran and North Drilling companies) worth an estimated USD 90 billion are to be privatized by 2014 (Jahan-Parvar and Mohammadi, 2011).

### RESEARCH METHODOLOGY

#### Sample overview

This study used data from the annual financial reports of Iranian public-listed firms in Tehran Stock Exchange for the period 2001 to 2009. We preferred to exclude the period before 2001, because the year 2001 is the first year that Iranian accounting standards required public firms to trade. From this year, the stock exchange did not accept financial statements that did not meet Iranian accounting standard. So the financial information of firms is more comparable in our sample period. We selected the firms by using the following criteria:

Firms were listed at TSE during years 2001 to 2009. They must have the same financial year to be able to compare their financial statements. All of them must be manufacturing firms (Financial firms are excluded due to their unique regulatory capital requirements and for information homogeneity of the firms). They must have financing through long term debt during research period (2001 to 2009). They do not hold any changes in their financial year in the research period and in this period their stock must be traded at least every three months and finally data were available for all years under study. According to these criteria, we examined 140 firms listed in TSE and 1260 firm-year observations.

#### Research model

We employed multivariate regression analysis in a panel data

**Table 2.** Descriptive statistics.

Variable	Mean	Median	Standard deviation	Kurtosis	Skewness
Debt maturity	0.128	0.116	0.226	7.64	2.022
Profitability	0.339	0.185	0.353	25.33	4.485
Dividend	0.252	0.223	0.266	3.435	0.835
Business risk	4.459	4.545	109.5	1081.7	-29.77
Tax effects	0.145	0.127	0.105	4.802	0.379
Size	5.495	5.495	0.614	3.887	0.668
Tangibility	0.245	0.204	0.176	3.667	1.025
Growth opportunities	8.612	0.83	34.14	82.53	8.086
Leverage	0.667	0.176	15.91	110.7	32.03

framework to investigate the impact of firm specific variables on debt maturity structure. The pool data analysis explores cross-sectional and time series data simultaneously. Pooled regression has been used with assumption of constant coefficients. Constant

coefficient model assumes that intercept and slope terms are constant. In order to analyze the impact, we developed one model as below which is based on literature:

$$\begin{aligned} \text{Debt Maturity} = & \beta_0 + \beta_1 \text{Profit} + \beta_2 \text{Dividend} + \beta_3 \text{Risk} + \beta_4 \text{Tax} + \beta_5 \text{Size} + \beta_6 \text{Tangibility} \\ & + \beta_7 \text{Growth} + \beta_8 \text{Leverage} + \varepsilon \end{aligned} \quad (1)$$

The model presents the impact of firm specific determinants using eight variables namely profitability, dividend policy, business risk, tax rate, financial leverage, growth opportunities tangibility and firm Size. In the model  $\beta_0$  is constant and  $\varepsilon$  is error (All variables have been explained in Table 1).

## EMPIRICAL RESULTS

### Descriptive analysis of variables

Table 2 contains summary statistics for the dependent (debt maturity structure) and explanatory variables (profitability, dividend policy, business risk, and tax effects, leverage, growth opportunities, tangibility and firm size). The table presents the descriptive statistics for each variable in the period 2001 to 2009. The mean and median values of size for sample firms are both 5.4, million Iranian Rials which implies the data is normal. Although according to monetary principle in accounting the comparison of our data (that are in Iranian common monetary unit) with other researches in developed countries cannot be correct, in a glance, we can observe that our sample firms are larger than those of Johnson (2003) with a mean of \$1,506.91 million in constant 1995 dollars and those of Alcock et al. (2011) with a mean of 2,178.58 million in constant June 2000 dollars, but smaller than those of Billett et al. (2007) with a mean of \$4,504 million in constant December 2002 dollars.

Firms have an average debt maturity ratio of 12.8% and an average tax rate of about 14.5%. The standard deviation of debt maturity is 0.226 while the mean of Iranian firms' debt maturity ratio is lower than Australian firms with a mean of 0.74 (Alcock et al., 2011).

Standard deviation for growth opportunities and asset intangibility is 34.14 and 0.176 respectively, that is the highest and the lowest deviation in the variables.

The mean of 8.612, median of 0.83 and standard deviation of 34.14 for growth opportunities indicates that although some Iranian firms have valuable growth opportunities (the mean is 8.6 that is more than some other researches like Johnson (2003) (1.62), Billett et al. (2007) (1.66) and Alcock et al. (2011) (1.63)), the standard deviation of 34.14 suggests deviation in sample firms is high and then there are so many firms that have no growth opportunities or low growth opportunities. That is an important finding about Iranian firms. They are not homogenous in their growth opportunities (Table 2).

Because of high inflation rate in Iranian economy, the distance of market value of equity and book value of equity for firms is high. That may be why the statistics of growth opportunities variable are more than that of other variables.

### Panel data results

To determine which panel data model (panel data or simple pooling, fixed-effects or random-effects) is more appropriate for our data; we employed two statistical tests: the Leamer F-test of simple pooling versus fixed-effects model and the Hausman test of random versus fixed effects. The results are shown in Table 3 (Idris et al., 2011). According to Table 3, since the results of Leamer F-test show p-value  $\leq 0.05$ , we selected panel data method. This method has also two sub methods: fixed-effects and random-effects. Since, the results of Hausman test indicate p-value  $\leq 0.05$ ; we selected fixed-effects, for the research.

One of the assumptions of regression model is the normality of errors. To investigate the errors' normality, we drew the errors plots by the Eviews software and the results supported the normality assumption of errors in panel data level.

**Table 3.** Results of panel data methods selection.

Hausman		Leamer F-test	
Statistic	p-value	Statistic	p-value
15.923	0.004	7.495	0.000

**Table 4.** Results of multivariate regression analysis.

Variable	Coefficient	Standard error	t-Statistic	Prob
Constant	0.1129	0.0216	5.207	0.0000
Profitability	0.2251	0.0104	2.441	0.0039*
Dividend policy	-0.0221	0.0017	-2.172	0.0418**
Business risk	-0.062	0.0533	-0.926	0.3213
Tax effects	-0.0001	0.0003	-0.552	0.5809
Size	0.0111	0.003	3.654	0.0003*
Tangibility	0.3541	0.0173	15.395	0.0000*
Growth opportunities	0.4543	0.0495	3.433	0.0006*
Leverage	-0.0503	0.0051	-5.783	0.0000*
AR (1)	0.4346	0.0224	19.390	0.0000*
F-statistic 19.587		Prob (F-statistic) 0.000		Durbin-Watson 1.912
R-squared 0.7315		Adjusted R-squared 0.6904		

\* Significant at level of 1%; \*\* significant at level of 5%.

We employed Durbin-Watson test to examine autocorrelation between variables for panel data. If there is autocorrelation between variables, we delete it by AR (1) component, that means if Durbin-Watson statistic is less than 1.5, we should add AR (1) component to the model to estimate. In this research the component is less than 1.5, therefore, there is autocorrelation between variables. But after adding AR (1), Durbin-Watson statistic reached to 1.9. In other words, there is no autocorrelation any more. Furthermore, we lunched homoscedasticity test, according to the results of Arch test, the variances are not equal. Hence, we solved this issue through generalized least squares method (GLS). By this method the data have been weighted and so the variances equality has been generated. Finally, as the last hypothesis of regression method, to solve collinearity, we deleted one of the variables from the regression equation. We did not observe significant changes in new equation' coefficients, therefore, the model variables do not have collinearity.

We employed t test to examine our research hypotheses in 95% confidence level, if the significance level is

less than 5%, there is a significant correlation between the independent and dependent variables. As shown in Table 4, profitability, size, tangibility, growth opportunities, leverage (in 1% error level) and dividend policy (in 5% error level) have significant effects on debt maturity. Except dividend policy, all the variables are positively related to debt maturity. Dividend policy is negatively related to debt maturity. However, the impact of the variables is not very strong, for instance, the correlation coefficient between profitability and debt maturity is as high as 0.2251. The strongest and weakest effects on debt maturity belong to growth opportunities and dividend policy variables, respectively. As R-squared and adjusted R-squared statistics indicate, totally the independent variables can present the debt maturity structure of Iranian firms about 73 and 69% respectively. Prob (F-statistic) shows the whole regression model is significant, where the amount of its P-value is 0.000, it means the regression model is very convenient and significant. In brief, the model is as Equation 2:

$$\text{Debt Maturity} = 0.1129 + 0.2251\text{Profit} - 0.0221\text{Dividend} - 0.062\text{Risk} + 0.001\text{Tax} + 0.0111\text{Size} + 0.3541\text{Tangibility} + 0.4543\text{Growth} - 0.0503\text{Leverage} + \varepsilon$$

(2)

## Conclusions

This research investigated the determinants of debt maturity structure in the emerging market of Iran, by applying panel data analysis and multivariate regression

from 140 firms listed in TSE over the period to 2001 to 2009. We found sufficient evidence to support six of our hypotheses relating to the effect of profitability, dividend policy, size, tangibility, growth opportunities and leverage variables on debt maturity structure in Iranian context.



However, business risk and tax effects did not have significant effects.

In the research, profitability positively affects debt maturity in 99% confidence level. So the results support hypothesis 1 from Tax theory approach which suggests that the larger firms borrow more long term debts because they need more tax shields (Hong and Jason 2006). But from the view of agency theory that expects a negative relation, the hypothesis is not supported in Iranian firms. Therefore, the results are inconsistent with discussion of Myers and Majluf (1984) and Rajan and Zingales (1995). Totally, more profitable firms borrow more long term debt. From a case of Iranian situation, as we discussed before, Iranian profitable firms prefer long term debts to avoid more income tax.

The result of test of hypothesis 2 indicates that the relationship between dividend policy and debt maturity is negatively significant. It means the agency theory cannot be supported, while signaling theory is supported in Iranian context. However, the relation is not very strong, as we expected. The firms must at least distribute 10 % of net income, because of requirement of business law. So there is no powerful relationship between debt maturity and dividend policy. However, the results show Iranian firms utilizes dividend policy to signal to the market.

The multivariate regression results do not support hypotheses 3 and 4 (business risk and tax effects). This implies agency theory is rejected (which predicts positive relation (Hong and Jason 2006). and also tax theory cannot support the tax insignificant relation of tax rate variable (tax theory expects a negative relation (Terra, 2011)); this finding is constant with Majumdar (2010). However we expected a positive relation between tax and debt maturity in Iranian context. It may imply that there are some other factors that affect debt maturity rather than tax effect and business risk, for example political and economical factors.

Financial leverage has a negative effect on debt maturity, this supports agency theory, and however the relation is not such strong (about 5% of decrease in debt maturity is represented by the leverage). This result is consistent with Terra (2011), Qiuyan et al. (2012) and Majumdar (2010) while, is inconsistent with Leland and Toft (1996), Morris (1992) and Diamond (1991). As we discussed earlier, the leverage is a favorite alternative for external financing in Iran, however there are some restricted requirements for long term debt (especially by banks).

Our results show that in Iranian emerging market, there is a positive relationship between growth opportunities and debt maturity. It does not support agency theory. This highly positive relationship implies that in Iran, firms rely on credit market (long term debt) more than equity market. Our finding is constant with Cai et al. (2008). But Qiuyan et al. (2012) and Stephan et al. (2011) found a negative relation and no significant relation respectively.

As Table 4 shows, tangibility has positively affect on

debt maturity. This finding is in line with the theoretical and empirical studies (Rajan and Zingales, 1995; Fan et al., 2003; Majumdar, 2010; Cai et al., 2008); however this is not in line whit Abor (2008), who reported a negative relation for SMEs and Stephan et al. (2011) who reported no relation. So the finding supports agency costs theory, by hypothesis 7.

Finally, firm size positively affects debt maturity. It is consistent with Ozkan discussion (2002) and Majumdar (2010). Both agency and signaling theories suggest this positive relation (Terra, 2011). So the final hypothesis of the research supports both theories.

Our study indicates that both traditional and new theories of agency costs and signaling are dominant in Iranian capital market. However, the tax rate is not a significant determinant to present debt maturity; that cannot support tax theory in Iran. It implies that firms do not take advantage of tax shield to debt maturity choice. However, this study does not present a general and complete presentation of a dominant unique theoretical framework for the maturity decision of the Iranian firms, while it seems signaling theory is a more dominant theory.

This study has its own shortcomings: we did not control some annoying variables in the research, so to generalize the findings we should be conservative. In addition, as we stressed earlier, inflation can be an issue in Iranian context, however, we did not adjust our variables for inflation rate in this research, it may affect the findings

Although our results are informative, there are some questions unanswered to future research. First, the reasons why taxes do not matter for debt maturity choice in Iranian context can be explored. Second, some studies present institutional and macro economic variables which affect debt maturity structure. This also can be a topic for further research. Third, we investigated manufacturing firms listed in TSE, in an independent and similar research; researchers can also investigate non manufacturing firms and compare their results with these research findings.

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