Impact of Judicial Efficiency on Debt Maturity Structure: Evidence from Judicial Districts of Pakistan

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The debate over 'why capital and bond markets remain under-developed in Pakistan' is more than two decades old. Several conceptual papers have highlighted causes responsible for the underdevelopment of these markets; however, not enoughempirical evidence exists to support the theoretical claims. This paper tries to fill in this gap. Specifically, this paper draws on the recent developments in the area of law and finance to develop several hypotheses related to maturity of corporate debt and judicial efficiency. These hypotheses are tested using data of 370 firms listed at the Karachi Stock Exchange (KSE) and 27 districts high courts of Pakistan over the period 2000 to 2006. Results indicate that corporate debt-maturity decreases with the inefficiency of judiciary. Furthermore, results show that worsening judicial efficiency has greater negative effect on debt-maturity of small firms than on debt-maturity of large firms. Similarly, worsening judicial efficiency negatively affects debt-maturity ratios of firms with fewer tangible assets than debt-maturity ratio of firms with more tangible assets.

Keywords: Judicial efficiency, debt-maturity, KSE, capital market development, law and finance.

1. Introduction

Broadly there are two theories about the determinants of maturity of credit in a financial system. These two theories are related to the power of creditors and information availability. The pioneers and proponents of the first theory are Townsend (1979), Aghion and Bolton (1992), and Hart and Moore (1999). The power theory of creditors postulate that if creditors are powerful, can enforce contracts through judicial system at lower cost and in a short time, get hold of the collateral, or get control of the firm, they will be more willing to increase volume and maturity of loans. On the other hand, the information theory emphasizes on the importance of availability of information about the borrower in the lending decisions. It suggests that lenders will not be too much worried about adverse selection problems if adequate information is available. The second theory was developed by Jaffee and Russell (1976) and Stiglitz and Weiss (1981).

Inefficient judicial system lowers the probability of loan's recovery from opportunistic borrowers or those borrowers who are in financial distress. This probability sinks further low

when the loan has a long maturity. In case of short-term loans, lenders can monitor and review the behavior and financial health of the borrowers at frequent intervals and may refuse to renew the loan upon maturity if the need arises. This ability of the short-term lenders reduces the need of using judicial system for loan recovery. In contrast, lender of long-term loans will have to wait until the maturity of the loan i.e. cannot call back the loan before maturity even if he knows that the financial health of the borrower is deteriorating with the passage of time. This means that lenders of long-term loans cannot employ the early preventive measures of defaults like the lenders of short-term loans do. Rather long-term lenders will have to resort to a court of law if the borrower defaults at the time of maturity. Resultantly, the law protecting the rights of the lenders and the judicial system enforcing the loan contracts will be one of the major determinants of long-term financing. Based on the above arguments, it is hypothesized that the maturity of a firm's debts is positively correlated with efficiency of justice.

In the presence of inefficient judicial system that makes the enforcement of contracts difficult or costly, lenders will prefer to issue short-term debt than long-term debt. Short-term debt leaves borrowers with little opportunity to indulge in activities that can create moral hazards for creditors (Diamond 1991, 1993; Rajan 1992). Specifically, when the maturity of debt is short, borrowers have limited time for opportunistic behavior. If they violate the terms and conditions of the loan contract, creditors will review their behavior upon maturity of the loan, and if necessary, may deny renewal of the credit. Such frequent monitoring lowers the probability of greater losses, which is not possible in long-term loans because in long-term loans the borrowers have sufficiently long period during which their opportunistic behavior may increase the probability of default to a greater extent.

The objective of this paper is to test hypotheses derived from the above discussion, using corporate financial data and judicial efficiency data collected from judicial districts of Pakistan. Specifically, we test two broader hypotheses. The first hypothesis to be tested is that short-term financing ratio will be higher where judicial efficiency is low. And thesecond hypothesis to be tested is that the straight-forward relationship between judicial efficiency and debt-maturity as portrayed above can be moderated or strengthened by several firm-specific variables such as firm size and the ratio of fixed assets-to-total assets. The second hypothesis is based on the information asymmetry problems and the fact that some firm-specific features are additional guarantees that a firm will not default on its loan. Since lending to undesirable borrowers is more costly in an inefficient judicial system, information availability about borrowers is crucial in lending decisions where judicial efficiency is low. When lenders cannot effectively distinguish between desirable and undesirable borrowers due to asymmetric information, lenders rely on some firm characteristics to derive information about the borrowers. Specifically, firm size and availability of collateral can eliminate or mitigate problems engendered by asymmetric information (Magri, 2006).

The above two hypotheses suggest that debt-maturity of a firm depends not only on the institutional settings around the firm, but also on the firm specific characteristics and the interaction between firm-specific and institutional features.

The motivation for this research comes from the observation of a large number of firms with negative equity figures, and yet a few cases of forced bankruptcies among Pakistani listed firms. The firms with negative equity figures are presumably in financial distress. Theoretically, the large number of firms in financial distress should have led to a higher incidence of forced

bankruptcies. However, data from the Securities and Exchange Commission of Pakistan (SECP) show that cases of forced bankruptcies are negligible. The question is "why do creditors of the financially-distressed firms hesitate to go to court against these firms in Pakistan and force their liquidation through judicial process?" One explanation might be that the judicial system is inefficient and the court process is slow and costly in Pakistan. The empirical research shows support for this argument. For example, Claessens, Djankov and Klapper (2003) used data of 1472 listed firms in five East Asian countries and found that judicial efficiency was an important determinant of whether creditors forced firms into liquidation or not. They argue that creditors use judicial system for firms' bankruptcies only when they know that the loan features and judicial process present good probability of recovery of the loan amount. A direct measure of judicial efficiency in one country relative to other countries is provided by the World Bank in its "Doing Business" report which is published annually to present various analytical accounts of a country's business environment such as how easy or difficult it is to start business in the country, to get credit, to enforce contracts and many other aspects of doing business. The "Doing Business 2010: Pakistan" ranks Pakistan 158 out of 183 countries for overall contract enforcement. The report shows that average number of days taken by courts in resolving commercial disputes is 978 days and cost is 23.8% of the claim. The comparative statistics in the report show that Pakistan is too low on the ranking scale when compared to good countries that have best practices.

Both the negligible number of forced bankruptcies and the World Bank report "Doing Business 2010: Pakistan" indicate that judicial efficiency is low across the board in Pakistan. But it is reasonable to expect that judicial efficiency will vary across different districts because of demand pressure and limited judicial resources in these districts. If judicial efficiency is low or high in different districts in Pakistan, has it anything to do with the pattern of financing of listed firms in these districts? Both theoretical and empirical research imply that content and enforcement of law have both direct and indirect impact on the financial structures of firms. With all of the above facts and assumptions, Pakistan is a good candidate for testing the impact of within-country judicial efficiency on various aspects of corporate financial decisions. Thus, this study exploits the variation in judicial efficiency across different districts of Pakistan and relates these variations to corporate financial decisions. Specifically, this study quantifies the impact of judicial inefficiency on debt-maturity structure.

The rest of the paper is organized as follows. In next section, we review the extant literature and draw implication of poor judicial process for debt maturity decisions. Also in this section, we discuss control variables that have widely been identified as determinants of debt-maturity structure. In Section 3, we discuss the model specifications. Section 4 presents and discusses results of the empirical models. And Section 5 concludes the paper.

2. JUDICIAL EFFICIENCY, FIRM-SPECIFIC CHARACTERISTICS AND DEBT-MATURITY

Besides the direct relationship between debt-maturity and judicial efficiency as discussed in the Introduction, several firm-specific attributes determine the maturity structure of a firm's debt. At the same time, these attributes serve as intervening variables to change the role played by judicial efficiency in debt-maturity structure. For firm specific variables, there are four major theories that try to explain the maturity-structure of a firm's debts. These theories are the agency theory, the maturity-matching theory, the signaling and liquidity risk theory, and the tax advantage theory. The proxies suggested by these theories and philosophical arguments in support of these proxies are discussed next.

2.1.1 Firm size

Smith and Warner (1979) argue that smaller firms face higher agency costs because shareholders and creditors in these firms have more conflicts due to risk shifting and claim dilution. Short-term debt can be an effective tool to control such agency costs (Barnea et al., 1980). Furthermore, small firm do not have as much information in hard form as large firms do because it is relatively costly for small firms to generate and distribute information (Pettit and Singer, 1985). Lack of information creates severe information asymmetry problem for small firms. The information asymmetry limits the ability of small firms to access capital market for long-term debt. Besides the above, Easterwood and Kadapakkam(1994) argues that small firms cannot access capital markets for long-term debt because large-fixed-flotation costs of fixed securities render this option less economical for them.

2.1.2 Firm size and judicial efficiency

In the presence of asymmetric information problems, lenders are usually more exposed to adverse selection problems. The expected costs of adverse selection are high when judicial efficiency is low. Since information asymmetry problem is severe with small firms as mentioned above, lenders will hesitate to advance long-term loans to small firms.

Moreover, Titman and Wessels (1988) argue that large firms can withstand large negative external shocks because they are more diversified and have large capital base. This is why the expected probability of financial distress of large firms is lower than the small firms. Recovering loan from a financially-distressed firm requires the involvement of judiciary. If judicial process is costly or inefficient, long-term loans to small firms will not be easily available.

Both of the above arguments about firm size suggest that judicial efficiency could impact small firms more. Where judicial efficiency is low, small firms will have more short-term loans on their balance sheets. There is some empirical evidence to support the above arguments. Demirguc-Kunt and Maksimovic (1999) studied empirically the maturity of firms' liabilities in thirty developed and developing countries over the period 1980-1991. They showed that only large firms had higher long-term external financing to total assets in countries where judicial efficiency was higher. They found that the effect was also economically very significant. For example, the size of the coefficient suggested that the incremental effect of judicial efficiency on debt-maturity was 0.25.

2.1.3 Assets maturity, collateral and judicial efficiency

Myers (1977) suggests that solution to the well-known under-investment problem of agency theory is to match the maturity of a firm's debt to that of its assets. The maturity matching makes it sure that payments of loan are scheduled to correspond with the decline in the value of assets in place. It suggests that current assets should be financed with short-term debt and long-term assets with long-term debt. Stohs and Mauer (1996) also suggest maturity matching but give a different explanation. They say that when a firm has longer maturity of assets than that of its debt, the cash flow from its assets will not be sufficient to meet the debt obligation. Demirguc-Kunt and Maksimovic (1999) add another aspect of asset maturity in relation to debt maturity. They suggest that fixed assets facilitate borrowing by serving as collateral. The above arguments suggest that a positive relationship is expected between the ratio of fixed-assets-to-total-assets and the maturity structure of debt.

2.1.4 Collateral and judicial efficiency

As argued in the preceding section 2.1.1.2, collateral solves many asymmetric information problems in credit contracts, such as issues related to project valuation, uncertainty about quality of the project, riskiness of the borrower, and moral hazards. As collateral mitigates the severity of these issues, the impact of judicial inefficiency could not be the same on the debt-maturity of firms that have more fixed assets to offer as collateral for the loan as compared to firms that have few fixed assets.

2.1.5 Growth opportunities

Myers (1977) identified some unique circumstance where a firm mightabandonpositive NPV projects in the presence of risky debt. This is phenomenon was named as the underinvestment problem. He suggested that underinvestment problems can be controlled with short-term debt because the debt will mature before the expiration of the growth options. His arguments imply a negative relationship between debt-maturity and the firm's growth rate. Consistent with the above, Barclay and Smith (1995), Guedes and Opler (1996), Barclay, Marx, and Smith (2003) and Varouj, Ying, and Jiaping (2005) all find a negative relationship between proxies for growth and corporate debt maturity.

For the measurement of growth variable, previous research studies have used both book-value and market-value based approaches. This paperprefers the book value-based approach (geometric mean of the annual percentage increase in assets). The reason why we prefer book value approach is that the data period covers the years 2001 to 2006. KSE experienced a phenomenal increase in 2002 and onward. The market-value based proxy might unnecessarily indicate that the listed companies experienced abnormal growth in 2002 and onward. In contrast, the book-value approach provides a stable measure of growth. Under book-value approach, growth opportunities are denoted by the variable $GROWTH_i$, which is a time series mean of annual percentage increases in the total assets of a firm. The time series mean of annual

percentage increases in the assets of firm i is calculated to smooth the year-to-year extreme variations. This is why the variable $GROWTH_i$changes in cross-sections but remains constant over time for firm i.

2.1.6 Firm quality

Flannery (1986) stated that debt maturity can be used as a signaling device. Since frequency of monitoring increases with short-term financing, lower-quality firms will not prefer to use more short-term debt and subject themselves to more monitoring. However, Mitchell (1991) disagreed with Flannery (1986) by highlighting the importance of transaction costs of short-term debt. He argued that lower-quality firms cannot afford high transaction costs of rolling over short-term debt as could high-quality firms. Consequently, lower-quality firms have to prefer long-term debts. In support of Mitchell (1991), Jun and Jen (2003) argued thata stronger and financially healthier firm can use more of short-term debt as the firm is likely to be less affected by refinancing and the interest risk.

We follow Barclay and Smith (1995) for the measurement of firm's quality. Their proxy assumes that higher-quality firmsnormally have positive future abnormal profits. Abnormal profit is the difference between current earnings and one period lagged earnings. Since year to year fluctuations in percentage terms may be arbitrary and confusing for the debt-maturity regressions, this is why a firm's quality is proxied by a variable $QUALITY_i$ which takes the value of 1 if a firm has positive abnormal profit in most of the sampled years, otherwise 0.

2.2 Testable Hypotheses

In view of the above theoretical framework and empirical evidences, the following set of testable hypotheses is developed where only the alternative hypotheses are listed. The null hypotheses can be derived in usual manner where no relationship is expected between the explained and the explanatory variables.

The following set of testable hypotheses is developed for debt-maturity ratios of listed firms.

H_1 Short-term financing ratio is higher in districts where judicial efficiency is low

H_2 In districts where judicial efficiency is low, small firms have higher short-term financing ratios than large firms

H_3 In districts where judicial efficiency is low, firms with little collaterals have higher short-tem financing ratios than firms with more collateral

H_4 Growing firms have higher short-term financing ratio than non-growing firms in districts where judicial efficiency is low

H_5 Judicial inefficiency has greater negative impact on the debt-maturity ratios of firms with more volatile cash flows than on debt-maturity ratios of firms with stable cash flows

H_6 Debt-maturity ratio increases with the size of the firm

H_7 Firms with more collaterals have higher debt-maturity ratios

H_8 Growth opportunities decreases debt-maturity ratio

H_9 debt-maturity ratios is negatively associated with volatility of firm's cash flows

3. METHODOLOGY

3.1 Sample and Data Sources

The sample of years for judicial statistics is primarily determined by the availability of data on judicial districts. The four provincial High courts resumed the publication of their annual reports in the year 2001, while this practice was discontinued for several years. At most, annual reports of the High courts could be obtained up to the year 2003. Hence in this study, the sample period for judicial statistics is from 2001 to 2003. Judicial districts to be included in the sample were determined by location of the head offices of the listed firms. Out of a total of 104 judicial districts, the listed firms were found to be concentrated in 27 districts. Expecting that judicial efficiency remains somehow constant in short period of time in a given district, a time series average of judicial efficiency ratio for each district was calculated based on its three years of judicial efficiency ratios.

The source for the financial data of listed firms is "Balance Sheet Analysis of Stock Exchange Listed Firms" a publication of the State Bank of Pakistan (SBP). To synchronize the financial data of firms with judicial statistics, the starting year of firms' data was taken to be the year 2000. As it will be discussed in the coming paragraphs, the variables *GROWTH* and *VOL* needed to be calculated from the average of yearly change in total assets and profitability-to-total assets respectively, the year 2000 was taken as a base year for these calculations and was dropped in all other calculations. Resultantly, the financial data for listed firms come from the years 2001 to 2006.

For the sample of firms to be included in the analysis, the study initially planned to include all listed firms. However, firms in financial industries were dropped as their capital structures and debt-maturity structures are totally different from non-financial firms. Also, to remove outliers, the study dropped all firm-year observations that were below 1 percentile or above 99 percentile. The study also removed firms that were presumably in financial distress as denoted by their negative equity figures. Specifically, firms were excluded that had the ratio of total-debt-to-total-assets above 0.95. Finally an unbalanced panel of 370 firms with 1976 firm-year observations could be saved.

3.2 Measurement of Variables

3.2.1 The measure of debt-maturity

Empirically, different proxies have been used for debt-maturity. For example, some studies have used the ratio of debt maturing in more than one year and five years to total debt e.g. Ozkan (2000). Others have used the ratio of debt maturing in more than 3 years to total debt (Barclay and Smith 1995; Varouj, et al., 2005). Given the structure of available data, this study can use only the ratio of debt maturing in more than one year to total debt because the State of Bank of Pakistan's publication '*Balance Sheet Analysis of Joint Stock Companies Listed on the Karachi Stock Exchange*' does not provide data on different maturities of debt. Thus the debt-maturity is the ratio of debt maturing in more than one year to total debt.

3.2.2 The measure of judicial efficiency

To measure judicial efficiency, previous studies have used mainly three types of proxies. In most of the cross-country studies that looked into the relationship of efficiency of justice and finance, (e.g. Modigliani and Perotti, 1997; La Porta et al., 1998; Kumar et al. 1999; Giannetti 2001; Giannetti 2003), the authors have used a subjective index either prepared by the authors themselves or by some international organization like the Business International Corporations (BIC).

In studies where judicial efficiency is measured within a single country, more objective measures of judicial efficiency have been used. For example, Fabbri and Padula (2004), Fabbri (2002) and Jappelli et al. (2005) used either a ratio of pending cases to number of disposed-off cases or the ratio of pending cases to number of cases instituted in a one year. A similar proxy of judicial efficiency used by some studies is the ratio of pending cases per 1000 persons in a given district/province (Jappelli et al., 2005). And a third proxy is the average time taken by the district/provincial court from the point of institution of cases up to the point of disposal of the same (Magri, 2006).

Options available to this study do not allow the use of the first proxy because judicial efficiency index like the one prepared by Business International Corporations is not available / suitable for districts in Pakistan. The study cannot use the third proxy as well because data on average time taken in deciding a case by a high court at district level is also not available. Given these constraints, the study can only use the proxy of judicial efficiency where pending cases are normalized by some base figure like number of cases disposed off in a year, number of cases instituted in a year, or population of the given district. This study uses the following measure of judicial efficiency:

$$JE1 = \frac{\text{Number of cases pending in a given district at the end of the year}}{\text{Number of cases initiated during that year}}$$

Other possible proxies for judicial efficiency may include:

$$JE2 = \frac{\text{Number of cases pending in a given district at the end of a year}}{\text{Number of cases disposed-off during that year}}$$

$$JE3 = \frac{\text{Number of cases pending in a given district at the end of the year}}{\text{Population of the district measured in thousands}}$$

$$JE4 = \frac{\text{Number of cases pending in banking court (where such courts are present)}}{\text{Population of the district measured in thousands}}$$

Efficiency of the high court is expected to be lower if we get a higher value for *JE* because greater number of pending cases in relation to number of cases disposed-off, would indicate that the given high court is either slow in deciding cases or unable to meet the demand placed on it in comparison to other district high courts.

As discussed above, another useful proxy of the efficiency of justice can be median time analysis which measures the average time taken by a district high court in solving a case from the point of institution of the case to the point of final decision. However, availability of data in Pakistan on the length of trials is the main constraint in the way of conducting such an analysis. Fortunately, research studies report that proxies of judicial efficiencies based on pending cases and median time are well correlated. For example, using data on 27 Italian districts, Jappelli et al. (2005) report that measures like *JE1* or *JE2* have a correlation of 0.6 with a measure of judicial efficiency based on median time taken by a court in deciding a case.

As mentioned above, the study uses the ratio of pending cases at the end of the year to cases initiated during a year. For simplicity, the *JE1* is simply represented by *JE* in the rest of the paper. This measure is well correlated with the other measures of judicial efficiency, which indicates that any of these measures can be used to proxy for the efficacy of justice in Pakistan.

3.2.3 Measurement of other explanatory variables

The following table presents list, measurement, and hypothesized signs of the explanatory and explained variables and the interaction terms in light of the discussion in the theoretical framework and literature review. These proxies have been widely used in debt-maturity structure research.

Table 1: Names and Measurement of the Variables

Name of Variable	Denoted by	Measured by
Debt-maturity	*DEMA*	Ratio of long-term liabilities to total liabilities
SIZE	*SIZE*	Natural log of total assets
Tangibility	*TANG*	Net fixed assets / total assets
Growth1	*GROWTH*	Average of annual percentage change in total assets
Growth2	*MVBV*	Market value per share/ book value per share
Volatility	*VOL*	Coefficient of variation of PROF
Jud. Efficiency	*JE*	Ratio of pending cases at year's end to disposed-off cases during the year
QUALITY	*QUALITY*	Equals 1 if abnormal profit is positive in majority of years, otherwise zero
S1×JE		S1 is equal to 1 if afirm is in the 1st quartile of *SIZE*, otherwise 0
S2×JE		S2 is equal to 1 if afirm is between the 1st and the 2nd quartile of *SIZE*, otherwise 0
S4×JE		S4 is equal to 1 if a firm is above the 3rd quartile of *SIZE*, otherwise 0
T1×JE		T1 is equal to 1 if afirm is in the 1st quartile of *TANG*, otherwise 0
T2×JE		T2 is equal to 1 if afirm is between the 1st and the 2nd quartile of *TANG*, otherwise 0
T4×JE		T4 is equal to 1 if a firm is above the 3rd quartile of *TANG*, otherwise 0
P1×JE		P1 is equal to 1 if *PROF* is equal to or below the 1st quartile, otherwise 0
P2×JE		P2 is equal to 1 if *PROF* is between the 1st and the 2nd quartile, otherwise 0
P4×JE		P4 is equal to 1 if *PROF* is above the 3rd quartile, otherwise 0
G1×JE		G1 is equal to 1 if *MVBV* is equal to or below the 1st quartile, otherwise 0
G2×JE		G2 is equal to 1 if *MVBV* is between the 1st and the 2nd quartile, otherwise 0
G4×JE		G4 is equal to 1 if *MVBV* is above the 3rd quartile, otherwise 0
D1×JE		D1 is equal to 1 if *DIV* is equal to or below the 1st quartile, otherwise 0
Quality×JE		Quality Equals 1 if abnormal profit is positive in majority of years, otherwise zero
SIZE×JED		JED is equal to 1 if *JE1* is above the 50th percentile, otherwise 0
TANG×JED		JED is equal to 1 if *JE1* is above the 50th percentile, otherwise 0
VOL×JED		JED is equal to 1 if *JE1* is above the 50th percentile, otherwise 0

3.3 Specification of the Models

This study uses a panel data framework to analyze the relationship between proxies for firms' financial decisions and a set of explanatory variables including judicial efficiency. Panel data has several distinct advantages over simple cross-sectional or time series data as discussed by Hsiao (1986). For example, panel data allows us to account for unobserved heterogeneity and provides us large data points that results in more degrees of freedom and lower collinearity among explanatory variables. The basic form of the regression equation is as follows:

$$y_{it} = \beta x_{it}^{'} + \alpha z_i + \varepsilon_{it} \qquad (1)$$

Where i ranges from 1,2,3,4,…N and t ranges from 1,2,3,4,…T, hence y_{it} is the debt-maturity ratio of firm i at time t. $x_{it}^{'}$represents various explanatory variables. $\alpha z_i^{'}$ is individual effect and $z_i^{'}$denotes a constant term and captures all observable and unobservable variables. If $z_i^{'}$is constant across all cross-sectional units (i.e the cross-sectional units do not differ among themselves with respect to debt-maturity decisions and/or the constraints they face), then the pooled ordinary least squares(OLS) is a better option to use as OLS will provide consistent and efficient estimates of the coefficients of the explanatory variables under such assumptions.

However, it is reasonable to expect that there will be systematic differences in the debr-maturity ratios of different firms because of industry effects, managers' risk preferences, and/or different incentive structures available to some firms like government subsidized loans (e.g export refinance scheme of the State Bank of Pakistan that is available only to exporters). If these unobservable effects are not isolated, they will inflate the error term of regression like it happens in the case of omitted variables. To deal with such problems, panel data offers to use either fixed effects or random effects models. The fixed effects model can be specified in the following form:

$$y_{it} = \beta x_{it} + a_i + \varepsilon_{it} \qquad (2)$$

Where $\alpha_i = \alpha z_i^{'}$and captures the firms' fixed effects that are constant over time but varies across cross-sectional units. Fixed-effects model is costly as it looses too many degrees of freedom due to the construction of dummy variables. Random effects models give efficient estimates if it can be assumed that the individual effects are not correlated with the included explanatory variables. Greene (2006) suggests that such a model under a panel data framework may be formulated as under:

$$y_{it} = \beta x_{it} + [az_i^{'}] + \{az_i^{'} - E[az_i^{'}]\} + \varepsilon_{it} \qquad (3)$$

This could be simplified to the form

$$y_{it} = \beta x'_{it} + a + u_i + \varepsilon_{it} \quad (4)$$

The above random effect formulation considers the u_i to be group specific random element.

To choose between fixed-effects model and random-effects model in an objective manner, Hausman (1978) suggested a test which has a null hypothesis that fixed effects and random effects estimators do not differ systematically. If the null hypothesis is rejected, then the fixed effects model is the best one.

Using the above panel data framework, the study estimates two types of regression equations. In a restricted model, first it is assumed that the influence of judicial efficiency is uniform on all firms. And then in a less restricted model, the study allows for the possibility that judicial efficiency has differential impact on the debt-maturity decisions of firms that are classified in quartiles on basis of their selected attributes. To avoid the problem of simultaneity, all such explanatory variables are lagged one period back excluding *VOL* and *GROWTH*.

Since this study tests mainly two hypotheses, the panel data models are first estimated without including the interaction terms between explanatory variables and *JE* (Baseline estimation). Then for testing the effect of interactions between explanatory variables and *JE* on debt-maturity ratios, differential panel data models are estimated by including interaction terms between *JE* and the explanatory variables (differential regressions).

3.3.1 Baseline Estimation

Under the assumption that judicial efficiency has uniform effect on all firms, following restricted model is specified for the debt-maturity regressions.

$$\begin{aligned} Y_{it} &= a + \beta_1 SIZE_{i,t-1} + \beta_2 TANG_{i,t-1} + \beta_3 GRWOTH_{i,} + \beta_4 VOL_i \\ &+ \beta_5 QUALITY + \beta_6 JE_i + \eta_{1-5} YRS_i + \lambda_{1-27} IND_i + \varepsilon_{i_t} \end{aligned} \quad (5)$$

Where Y_{it} is the debt-maturity ratio for firm i at time t and *SIZE*, and *TANG*, are explanatory variables that have been lagged one period whereas *GROWTH* and *VOL* remain constant throughout the sample period for a given firm and hence does not need to be lagged. *QUALITY* is a dummy variable that takes the value of 1 if a firm has positive changes in its net income in most of the years; otherwise it takes the value of 0. *JE* is the measure of judicial efficiency. *YRS* are five dummy variables for years with one reference category to capture aggregate shocks that affect all firms alike and hence remain constant across firms but vary across time. *IND* represents dummy variables for each industry. There are twenty-eight industries in the sample. List of these industries is given in Table 4.5. All of these dummy variables are tested for their joint significance in each regression model.

3.2.2 Differential Impact of Judicial Efficiency

In the less restricted model, it is assumed that the relationship between judicial efficiency and debt-maturity is not linear for all firms as discussed in detail in the theoretical framework section. To check this possibility, this study introduces interaction terms between the measures of judicial efficiency and dummy variables that are based on the quartiles of selected explanatory variables. For an explanatory variable, three dummy variables and one referent category are defined. Against the referent category the other variables are compared. For example, if we specify *S3* as the 3rd quartile of the variable *SIZE* to be the referent category, the other three dummy variables *S1*, *S2*, *S4* corresponding to 1st , 2nd and 4th quartiles of the variable *SIZE* are defined as follows:

$$S1 = \begin{cases} 1 \text{ if SIZE value is in the 1st quartile} \\ 0 \text{ otherwise} \end{cases}$$

$$S2 = \begin{cases} 1 \text{ if SIZE value is in the 2nd quartile} \\ 0 \text{ otherwise} \end{cases}$$

$$S4 = \begin{cases} 1 \text{ if SIZE value is in the 4th quartile} \\ 0 \text{ otherwise} \end{cases}$$

.

These definitions yield the following values for each of the *SIZE* quartiles:

Quartile of *SIZE*	S1	S2	S4
1	1	0	0
2	0	1	0
3	0	0	0
4	0	0	1

The definitions and symbols of the dummy variables for the quartiles of other explanatory variables are given in Table 1. To avoid the problem of multicollinearity, interaction terms for all variables are not included in one regression model. Rather separate regressions are run to include interaction terms between a single explanatory variable and the *JE*. Each regression model is estimated twice this way; one for fixed effects and the other for random effects. All specifications include full set of dummy variables for years and industries.

To test the differential effect of judicial efficiency on the debt-maturity decisions of firms that are classified into quartiles on the basis of their selected attributes, the study includes three interaction terms between the dummy variables based on quartiles of the selected variables and the measure of judicial efficiency. The missing variable, which is a reference category, is represented by the variable *JE*. Since this analysis is focused on knowing the impact of judicial efficiency on the debt-maturity decision of small and large firms, firm having more and less tangible assets etc., it will be better that the referent category is one of the middle quartiles dummy variables against which the interactive effects of the 1^{st} and the 4^{th} quartiles can be compared. This is why the 3^{rd} quartile is selected to be referent category in all regression models.

4. REGRESSION RESULTS

4.1 Results of the main effects model

Table 2 reports the results of the main effects model where the dependent variable is the ratio of long-term debt to total debt. First column of the table displays the names of the variable whereas the second and third columns report the coefficient of the fixed-effects model and beta coefficients respectively. Beta coefficients have been calculated on the standardized value of the explanatory and the explained variables to show the relative importance of the explanatory variables on a standardized scale.

Table 2: Baseline Estimation

Variables	Fixed-Effects	Beta-coefficients
$SIZE_{i,t-1}$	0.093(0.017)*	0.694(0.017)*
$TANG_{i,t-1}$	0.136(0.061)**	0.148(0.061)**
$GROWTH_i$	−0.165(0.069)**	−0.112(0.069)**
VOL_i	0.019(0.012)	0.108(0.012)
QUALITY	0.005(0.034)	0.011(0.034)
JE_i	−0.155(0.057)*	−0.162(0.057)*
Constant	0.01(0.122)	0.01(0.122)
R^2 -		
Within	0.0432	
Between	0.1244	
Overall	0.101	
F-Statistics	6.48 (0.00)	

Table 2 presents results of main effects models where debt-maturity ratio of 370 KSE listed firms is regressed on a measure of judicial efficiency, *JE,* and other control variables over the period 2001-2006. The second and the third columns show coefficients of these variables from fixed effects model and their beta coefficients. Robust standard errors are given in parentheses. The *, **, and *** show statistical significance at 1% level, 5% level, and 10% level respectively. Lower part of the table presents R^2, and F-statistics for fixed-effects model. The regression specification includes five dummy variables for years and twenty-seven dummy variables for industries. The explained variable $DEMA_{it}$ is the ratio of long-term debt to total debt. *SIZE* is the natural logarithm of total assets. *TANG* is the value of net fixed assets over total assets. *GROWTH i*s the average of annual percentage change in total assets.*VOL* is the coefficient of variation of *PROF*. *QUALITY* is a dummy variable that takes the value of 1 if a firm has positive abnormal profit in most of the sampled years; otherwise 0. *JE* is the ratio of pending cases at the end of the year to cases initiated during a year.

debt-maturity ratio. The standard errors and t-statistics are the same for both the usual and beta-coefficients. Standard errors are shown in parenthesis with each explanatory variable.

As expected, firm size has positive coefficient. Its beta coefficient shows that firm size has the largest economic impact on the firms' debt-maturity ratios. For example, one standard deviation increase in firm size increases the debt-maturity ratio by 0.694 standard deviations. This confirms to the well-established signaling and trade-off theories of debt-maturity structure.

Similar to the effect of firm size on debt-maturity structure, the second variable *TANG* also has positive and statistically significant coefficient. Its coefficient in the fixed-effects model shows

that 100 percentage points increase in the ratio of fixed assets-to-total assets increases the debt-maturity ratio by 13.6 percentage points. Its relative economic significance is given by its beta coefficient which is 0.148, being third largest coefficient after *SIZE* and *JE*. This statistically and economically significant coefficient confirms the maturity-matching hypothesis.

The variable$GROWTH_i$has negativecoefficient and is significant only 5% level. And the next two variables do not have any statistical significance. The results indicate that volatility of net income (*VOL*) and a firm's quality ($QUALITY_i$) are not associated with the maturity structure of the firm's debt at reasonable level of statistical significance. Also their economic significance is the lowest among all explanatory variables.

Finally, the coefficient of *JE* suggests that worsening judicial efficiency is associated with lower debt-maturity ratios. The relationship is significant at 1% level of significance. Besides the high statistical significance, the coefficient of *JE* is also economically large, being the second largest after *SIZE*. For example, one standard deviation increase in judicial inefficiency results in 0.162 standard deviation decrease in the long-term debt-to-total-debt ratio. This confirms the hypothesis that lenders hesitate to extend long-term debt when judicial efficiency is low.

6.2.2 Results of regressions with interaction terms

To explore the possibility that worsening judicial efficiency does not impact all firms equally with respect to their debt maturity level, interaction terms among the selected explanatory variables and the measure of judicial efficiency are used in the next set of regressions. To avoid the problem of multicollinearly, interaction terms for all variables are not included in one regression. Rather a separate regression is estimated to interact three dummy variables based on the quartile of a selected variable with the measure of judicial efficiency. The three dummy variables are based on the 1^{st}, 2^{nd}, and 4^{th}quartile of the included explanatory variables where the missing 3rd quartile serves as reference category. Since the variable *QUALITY* is a dummy variable, the concept of quartile does not apply here, which means that only one interaction terms is available for it.

Results of these separate regressions are reported in Panel A and B of Table 3. The heads of the columns show the names of the variable for which the interaction terms have been included. Each regression specification includes five dummy variables for years and twenty-seven dummy variables for industries. The joint significance the years' dummies and industries' dummies is tested with Wald-test. In all regressions, all these dummy variables were found to be jointly significant at 1%. Wald-test is also applied to the interaction terms in each regression to test the joint significance of these interactions.

Table 3: Panel A - Differential Impact of *JE* on Debt-Maturity

Variables	*SIZE*	*TANG*	*GROWTH*
$SIZE_{i,t-1}$	0.07(0.018)*	0.087(0.018)*	0.093(0.017)*
$TANG_{i,t-1}$	0.125(0.06)**	0.092(0.063)	0.136(0.061)**
$GROWTH_i$	−0.175(0.07)*	−0.262(0.072)*	0.000(0.00)
VOL_i	0.006(0.015)	0.024(0.012)***	−0.04(0.02)**
QUALITY	−0.001(0.032)	0.013(0.035)	0.005(0.034)
JE_i	−0.144(0.05)*	−0.206(0.056)*	−0.012(0.164)
S1×JE	−0.072(0.029)*		
S2×JE	−0.02(0.015)		
S4×JE	0.063(0.018)*		
T1×JE		−0.046(0.02)**	
T2×JE		−0.029(0.012)**	
T4×JE		0.069(0.013)*	
GT×JE			0.056(0.08)
G2×JE			0.077(0.061)
G4×JE			0.11(0.115)
Constant	0.073(0.076)	0.073(0.076)	0.059(0.123)
R^2 - Within	0.0597	0.0432	0.0774
Between	0.1234	0.1244	0.2029
Overall	0.1019	0.101	0.1709
F-Statistics	5.10 (0.00)	5.52 (0.00)	4.20 (0.00)

Table 3: Panel A and Panel B present results of regression models with interaction terms where debt-maturity ratio of 370 KSE listed firms is regressed on a measure of judicial efficiency, *JE*, firm-specific variables, and the interaction terms between quartile dummies of the explanatory variables and the variable *JE* over the period 2001-2006. Robust standard errors are given in parentheses. The *, **, and *** show statistical significance at 1% level, 5% level, and 10% level respectively. Lower part of the table presents R^2, and F-statistics for fixed-effects model. The regression specification includes five dummy variables for years and twenty-seven dummy variables for industries. The explained variable $DEMA_{it}$ is the ratio of long-term debt to total debt. *SIZE* is the natural logarithm of total assets. *TANG* is the value of net fixed assets over total assets. *GROWTH i*s the average of annual percentage change in total assets.*VOL* is the coefficient of variation of *PROF*. *QUALITY* is a dummy variable that takes the value of 1 if a firm has positive abnormal profit in most of the sampled years; otherwise 0. *JE* is the ratio of pending cases at the end of the year to cases initiated during a year.

Results of the Hausman test in all regression models indicated that fixed effects model better fit the data; random effects models are not estimated and reported for the sake of parsimony. Dummy variables for the third quartile of included variables are not included in the regression so that the missing quartile serves as a reference category, the coefficient of *JE* represents slope of

judicial efficiency for firms in the third quartile of the given variable in all regressions of Panel A and B of Table 3. For example, coefficient of *JE* in Table 3 under the column *SIZE* is actually the slope of the judicial efficiency for firms belonging to the third quartile of *SIZE*.

Coefficients of the interaction terms like *S1*JE*, *S2*JE* and *S4*JE* are the incremental slopes of judicial efficiency above (if coefficient of the interaction term is positive) or below (if coefficient of the interaction term is negative) the slope of *JE*. Similar interpretations apply to other variables in their respective columns.

The differential slopes of the interaction term *S1*JE* and *S4*JE* are significantly different from the reference category at 1% level of significance. Coefficients of the first two interaction terms, *S1*JE* and *S2*JE*, are negative while coefficient of the last interaction term *S4*JE* is positive. As mentioned above, *JE* represents the coefficient of *JE* for firms belonging to the 3rd quartile of *SIZE*. The coefficient of *JE* is –0.144 indicating that 100 percentage points drop in judicial efficiency reduces debt-maturity ratio of firms in the 3rd quartile of *SIZE* by 14.4 percentage points. This effect is severe for firms that belong to the 1st quartile of *SIZE*. This is evident from the differential coefficient of *S1*JE*, which is −0.072. This negative coefficient suggests that worsening judicial efficiency has an additional negative effect of 7.2 percentage points on the debt-maturity ratio of firms in the 1st quartile of *SIZE* as compared to its effect on debt-maturity ratio of firms in the 3rd quartile of *SIZE*. The overall impact of judicial inefficiency on the debt-maturity of firms in the 1st quartile of *SIZE* is −21.6 percentage points (−14.4 −7.2). This impact is far greater than the impact of worsening judicial efficiency on the debt-maturity ratios of firms in the 4th quartile of *SIZE*. For example, the impact of worsening judicial efficiency on debt-maturity of firms in the 4th quartile of *SIZE* is only −9.1 percentage points (−14.4 + 6.3). These findings are in line with the hypothesis that firm size reduces information asymmetries and serves as a proxy for the firm's ability to absorb unexpected shocks. Such features of borrowers reduce the lenders' concern about the adverse selection and subsequent borrowers' delinquency.

The differential coefficients in the third column of Table 3 for the variable *TANG* indicate almost similar results as discussed above. The results indicate that poor enforcement of contracts has smaller negative impact on the debt-maturity levels of firms that have more fixed assets-to-total assets as compared to firms that have less fixed assets-to-total assets. For example, the overall impact of judicial inefficiency on the debt-maturity level is only −0.137 for firms in the 4th quartile of *TANG* whereas it is −0.252, −0.235, and −0.206 for firms in the 1st, 2nd and 3rd quartile of *TANG* respectively. These results indicate that firms having more fixed assets as a percentage of total assets are affected less by worsening judicial efficiency.

Table 3 - Panel B: Differential Impact of *JE* on Debt-Maturity

	VOL	*QUALITY*
$SIZE_{i,t-1}$	0.093(0.017)*	0.093(0.017)*
$TANG_{i,t-1}$	0.136(0.061)**	0.14(0.061)**
$GROWTH_i$	-0.649(0.15)*	−0.41(0.167)*
VOL_i	0.012(0.025)	−0.047(0.027)***
QUALITY	0.005(0.034)	−0.091(0.138)
JE_i	0.333(0.079)*	0.001(0.248)
V1×*JE*	−0.547(0.098)*	
V2×*JE*	0.009(0.039)	
V4×*JE*	−0.173(0.062)*	
Q×*JE*		0.111(0.135)
Constant	−0.474(0.22)**	0.059(0.1)*
		0.057(0.05)
R^2 - Within	0.0432	0.0439
Between	0.1244	0.1239
Overall	0.101	0.102
F-Statistics	5.52 (0.00)	4.84 (0.00)

Table 3: Panel B present results of regression models with interaction terms where debt-maturity ratio of 370 KSE listed firms is regressed on a measure of judicial efficiency, *JE,* firm-specific variables, and the interaction terms between quartile dummies of *VOL and QUALITY* and the variable *JE* over the period 2001-2006. Robust standard errors are given in parentheses. The *, **, and *** show statistical significance at 1% level, 5% level, and 10% level respectively. Lower part of the table presents R^2, and F-statistics for fixed-effects model. The regression specification includes five dummy variables for years and twenty-seven dummy variables for industries. The explained variable $DEMA_{it}$ is the ratio of long-term debt to total debt. *SIZE* is the natural logarithm of total assets. *TANG* is the value of net fixed assets over total assets. *GROWTH i*s the average of annual percentage change in total assets.*VOL* is the coefficient of variation of *PROF*. *QUALITY* is a dummy variable that takes the value of 1 if a firm has positive abnormal profit in most of the sampled years; otherwise 0. *JE* is the ratio of pending cases at the end of the year to cases initiated during a year.

The variable *GROWTH* was dropped by the econometric software STATA when interaction terms of its quartiles were included. This may be because of high collinearity between *GROWTH* and its interaction terms. To test it in an alternative way, a dummy *GT* variable was created based on the 50th percentile of *GROWTH*. *GT* assumed a value of 1 if a firm had a *GROWTH* value of more than the 50th percentile of *GROWTH*, otherwise 0. *GT* was interacted with the *JE*. A separate regression was estimated to include this interaction term *GT***JE* instead of including the dummy variables based on the quartiles of *GROWTH*. Results of the regression showed that *GT***JE* has a negative and statistically significant value of −0.298. However, the main variable *GROWTH* showed an insignificant coefficient. Thus growth opportunities and their interaction terms do not present a clear picture in the differential equation of debt-maturity structure.

The last two variables, reported in Panel B of Table 3, do not show consistent or significant results as well. For example, the coefficient of *VOL* is not statistically significant at any

conventional level. Its interaction terms, though statistically significant, do not demonstrate a consistent pattern. Debt-maturity ratios of firm in the 1st, 2nd, 3rd, and 4th quartiles of *VOL* change by −0.214, 0.3339, 0.333, and 0.16 units when there is one unit positive change in the *JE* (positive change in *JE* shows deterioration in the efficiency of justice). And finally, neither the variable *QUALITY* nor its interaction term is significant at conventional levels of 1%, 5% or 10%.

5. CONCLUSIONS

The main objectives of this paper was to quantify the effect of judicial efficiency on debt-maturity structure of firms listed at KSE and to highlight the importance of efficient judicial system for the development of capital markets. This paper accomplishes these objectives by analyzing the impact of judicial efficiency and other firms-specific factors on debt-maturity structure of 370 KSE-listed non-financial firms over the period 2001-2006. The baseline results show that large firms and firms with more tangible assets have more long-term debts whereas growing firms have more short-term debt. The results clearly indicate that debt-maturity decreases with inefficiency of judiciary; however, volatility of net income and firm's quality do not show any statistically significant relationship with debt-maturity ratio. Results of regressions also show that worsening judicial efficiency has greater negative effect on debt-maturity of small firms than on debt-maturity of large firms. Similarly, worsening judicial efficiency has greater negative impact on the debt-maturity ratios of firms with fewer tangible assets than on firms with more tangible assets.

Policy Implications

Results of the regression models have important implications for financial deepening and capital-market development in Pakistan. Results suggest that inefficient judicial system not only reduces debt-maturity at aggregate level, but also has an additional negative impact on the debt-maturity ratios of small firms and firms with little collaterals. These results highlight the importance of judicial efficiency for small firms both in their capital structures and debt-maturity structures. Being unable to borrow and achieve optimum capital structure, small firms lose one important and cheaper sources of capital. Second, small firms under inefficient judicial system will find it difficult to borrow for the long-term. The excessive use of short-term financing may be very risky for small firms because their cash flows are more likely to fluctuate than those of large firms. Second, in developing countries like Pakistan, small firms are considered to be the engine of economic growth. Difficulty in accessing long-term financing means that their growth opportunities remain limited. In addition, if they finance long-term projects with short-term debts, it will create a maturity mismatch between assets and liabilities, increasing the chances of financial distress which will subject such firms to those many indirect costs of financial distress/bankruptcy like lower expenditure on research and development and employees training, deterioration in quality of goods and services and decline in sales. The inability of small firms to borrow optimally for exploiting growth opportunities will translate into economic stagnation of the overall economy.

Several measures can be suggested to mitigate the negative impact of judicial inefficiency. The first measure, of course, is to expedite the process of pending cases resolution at all levels of the high courts. Since this requires huge allocation of additional resources, one alternative is to focus specifically on the efficiency of banking courts. Banking courts are limited in number and hence can be targeted even with limited resources. Second, the network of banking courts can be increased to lighten the burden on the existing courts. In the meantime, as the results suggest that information availability about the borrowers plays an important role both in the debt-maturity decisions of creditors, information sharing among financial institution should be encouraged and banks credit monitoring systems should be strengthened. At present, the Credit Information Bureau (CIB) is performing the duty of obtaining and disseminating information related to credit history of the borrowers. CIB is helpful in reducing the adverse selection problem;however, results of the study indicate that information unavailability is still a big issue in lending decisions. This highlights the need for improvement in the functioning of CIB. The second problem of information asymmetry i-e moral hazards can be overcome by strengthening the monitoring system.

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