The Determinants of Corporate Debt Maturity Structure

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Abstract

This study examines the determinants of corporate debt maturity structure decisions of French, German and UK firms using panel data. These countries are characterised by different financial systems and traditions that have implications on how firms decide their debt maturity structure. We apply several alternative estimation methods and show that in debt structure modelling endogeneity problem should be controlled for. We do so by using Generalised Method of Moments (GMM) estimation method. The GMM results suggest that firms in all three countries adjust their debt ratios to attain their target maturity structure. However, the speed at which firms adjust their maturity structure towards their target levels differs from one country to another. A direct association of debt maturity with leverage in all countries confirms the predictions of the liquidity risk argument. However, corporate tax rate, growth opportunities, liquidity, firm quality, earnings volatility, asset maturity and firm size have different degree and direction of effect on debt maturity across the sample countries. Apart from these firm-specific factors, we also find that the impact of market-related factors (term structure of interest rates, equity premium, share price performance, and interest rate volatility) on debt maturity is country dependent. Hence, the debt maturity structure of a firm is determined by both firm-specific factors and country-specific effects.

Keywords: Dynamic Debt Maturity Structure, Panel Data, System-GMM

JEL Classification: G20, G32

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I. INTRODUCTION

The copious literature on the choice between debt and equity dwarfs studies on the structure of debt maturity. Early works, for instance Merton (1974), assuming perfect capital markets, show the irrelevance of debt maturity structure in affecting firm value. Why firms use both short and long-term debts seems to be only partially understood under the existence of market imperfections. The choice of debt maturity structure is important to firms since a badly chosen mix may cause an inefficient liquidation of a positive-NPV project. It can also be used by firms as a signalling device in an imperfect market to provide information about their quality, credibility and future prospects. According to signalling models, under-(over-)valued firms issue short-(long-)term debt to signal their under-(over-)valuation. Indeed, Fama (1990) suggests that maturity structure of corporate debt reflects the incentive to provide information, monitoring and bonding relevant for contracts.

The main debt maturity theories are as follows. The first strand is based on *tax arguments*. Brick and Ravid (1985) contend that when the term-structure of interest rates is upward sloping long-term debt is optimal since the savings from leverage due to interest tax shield is accelerated (borrower's incentive) and recognition of interest income is delayed (lender's incentive). Brick and Ravid (1991) further demonstrate the optimality of long-term debt even if yield curve is flat or downward sloping assuming interest rates are uncertain. Stohs and Mauer (1996) find some support for the tax effect while Guedes and Opler (1996) did not. Second strand is based on *information asymmetries*. Flannery (1986) predicts that high-quality firms prefer short-term debt to signal their type. Stohs and Mauer (1996) provide empirical support to this. Diamond (1991) shows that even low-quality firms would prefer short-term debt due to liquidity risk; only medium-rated firms issue long-term debt. These arguments are empirically supported, among others, by Barclay and Smith (1995). The third strand deals with *contracting costs* arguments. Myers (1977) argues that short-term debt mitigates underinvestment problem if it matures before growth options are exercised, as there remains an opportunity for lenders and firms to re-contract. Similarly, Barnea et al. (1980) argue that short-term debt may mitigate asset substitution problem since the value of short-term debt is less sensitive to changes in firms' asset value. This contracting costs hypothesis is empirically supported by Barclay and Smith, and Guedes and Opler but not by Stohs and Mauer. Furthermore, asymmetric information arguments and contracting costs hypothesis argue that firms match the maturity of their assets and liabilities (Hart and Moore, 1994). This *matching principle* is heavily supported by extant empirical studies.

Early empirical studies examine the determinants of debt maturity only indirectly. Titman and Wessels (1988) find a negative correlation between size and short-term debt and argue that smaller firms cannot afford high issue costs of long-term debt. Mitchell (1991) suggests that unquoted firms are more likely to issue shorter-term debt due to information asymmetries. Mitchell (1993) finds a negative (positive) correlation between maturity and leverage (firm quality). More recently, several papers examine the possible determinants of firms' debt maturity decisions. Kim et al. (1995) report a significant positive relation between debt maturity, and leverage and firm size. Barclay and Smith (1995) find that larger firms with lower market-to-book ratio have longer debt maturity. Guedes and Opler (1996) report that larger, better and the firms with higher growth opportunities are most likely to issue short-term debt. Stohs and Mauer (1996), however, find only mixed support for an inverse relationship between debt maturity and market-to-book ratio. Ozkan (2000) reports negative relation of debt maturity with firm size and market-to-book ratio. Scherr and Hulburt (2001) find little evidence that tax status, growth options, and information asymmetries affect small firms' debt maturity choice. However, the hypotheses related to capital structure, default probability and asset maturity are found to be relevant to maturity decisions of such firms.

This study examines the determinants of debt maturity in the framework of taxes, contracting-costs, signalling, liquidity risk, and maturity-matching and contributes to the literature in several ways. First, hardly any prior study on debt maturity explicitly considers the endogeneity issue using Generalised Method of Moments (GMM)[1]. It is important because random shocks may affect both dependent variables and independent variables at the same time. It is possible that observed relations between debt maturity and its assumed determinants reflect the effects of debt maturity on the latter rather than vice-versa. We control for this problem by using the GMM procedure. GMM also overcomes the problems of heteroscedasticity, normality, simultaneity and measurement errors. Since the traditional difference-GMM estimator has weak instruments problem (see Blundell and Bond, 1998) we use recently developed GMM estimator of differences- and levels-equations system. This paper is the first to utilise this method on corporate debt maturity.

[1] Ozkan (2000) is an exception to consider this issue. Other panel data studies control for firm heterogeneity but not for endogeneity.

Second, we use a dynamic model that assumes firms have a long-run optimal debt maturity structure. It further assumes that this optimality, a necessary action due to changes in market conditions, cannot immediately be met through adjustment process. It is apparent that factors influencing firms' debt maturity structure change overtime. Thus, it would also be necessary to explain time-varying observed differences in debt maturity structure of firms. This paper focuses on this gap. We adopt an autoregressive-distributed lag model, by which we are able to examine the determinants of debt maturity structure and the speed of adjustment process to desired optimal debt maturity level, and to provide the *static* long-run relationship between debt maturity, and firm-specific and market-specific factors. To our knowledge, this is the first empirical debt maturity study to shed light on these issues.

Finally, most published studies are based on the US experience while this study examines the experiences of France, Germany and the UK. Each of these countries represents different financial structures and traditions. The UK is known to follow the *Anglo-Saxon* tradition where there are a large number of publicly listed companies and the instances of hostile takeovers owing to agency conflicts are common. Germany follows the *Germanic* tradition where corporate decisions and restructurings are made through the involvement of universal banks and financial holdings. The capital markets are not as effective as in the *Anglo-Saxon* tradition and a relatively fewer companies are listed. Finally, France is known to follow the *Latinic* tradition where corporate ownership structure can be characterised by family control, financial holdings, state ownership, cross-shareholdings. Unlike in the *Anglo-Saxon* tradition agency problems are internalised. Thus, this study attempts to shed light on the role of these financial and institutional traditions (accounting and taxation systems, bankruptcy laws, corporate governance) on corporate debt maturity structures[2]. Demirgüç-Kunt and Maksimovic [1999] use *aggregated* data to examine firm debt maturity in 30 countries. Their findings, e.g., debt maturity decisions are country-dependent, seem to validate the relevance of our international study.

Our results reveal that there are considerable differences in debt maturity patterns in France, Germany and the UK. French firms tend to adjust their maturity structure more quickly to attain their target level and their German or British counter parts. Debt maturity is significantly, positively associated with leverage and insignificantly correlated to firm quality in all three countries. The results further reveal that the effects of size of the firm, market-to-book ratio, asset maturity, earnings volatility, tax rates and liquidity on debt maturity vary

[2] For a detailed discussion on the possible implications of financial and institutional traditions on financing decisions of companies in France, Germany and the UK see Antoniou et al. (2002).

across the countries. In addition, we also find that the impact of market-specific factors (market equity premium, term structure of interest rates, share price performance, and interest rate volatility) on debt maturity decisions is country-dependent and more relevant in the UK, a market-oriented economy. Therefore, our findings suggest that corporate debt maturity structure is affected by the country's institutional and financial traditions as well.

The rest of the paper is organised as follows. The next section describes the variables and the related debt maturity hypotheses in the framework of country-specific financial and institutional traditions. Section 3 discusses the data and sample. Methodology, models and their robustness are developed in section 4. Section 5 discusses the performance of alternative estimation models in the context of modelling corporate debt maturity structure using panel data and the importance of dynamic modelling. Section 6 presents the empirical results. Last section concludes the paper.

II. THEORIES, VARIABLES AND HYPOTHESES DEVELOPMENT

This section provides theoretical justification and develops testable propositions for each variable included in the analysis within the framework of the financial and institutional traditions in sample countries.

The dependent variable: Measuring Maturity

There is no universal definition of short- or long-term debt. Some studies consider a debt as long-term if it is payable after a year (e.g. Scherr and Hulburt, 2001) while others define it as long-term if it is payable after three (Barclay and Smith, 1995) or five years (Schiantarelli and Sembenelli, 1997). Prior studies have used various measures of debt maturity. For instance, Dennis et al. (2000) use *duration*, Guedes and Opler (1996) use *maturity of new issues*, and Stohs and Mauer (1996) use *weighted average maturity of liabilities* as dependent variable. Scherr and Hulburt (2001) use two maturity specifications (long-term debt payable after one year to total debt; and weighted-average debt maturity) and report only minor sensitivity of the results to the choice of definitions. In this study, we define the long-term debt as the debt maturing in more than one year and the maturity ratio is defined as long-term debt divided by total debt. This is driven primarily by the data (un)availability.

Explanatory Variables: Reasoning and measurement

In the following hypotheses regarding the debt maturity determinants are discussed in five groups; taxes, liquidity risk and signalling, contracting costs, market-related arguments and debt maturity dynamics.

Tax Hypotheses:

Tax rates, Interest rate volatility and Term structure

Brick and Ravid (1985) argue that when term structure of interest rates is upward sloping long-term debt is optimal since tax gains are accelerated. They, in their 1991 paper, further show the optimality of long-term debt even if yield curve is flat or downward sloping assuming interest rates are uncertain. In their model, Brick and Ravid first set leverage and then maturity. However, Lewis (1990) argues that tax (assuming tax is the only market imperfection) has no effect on debt maturity decisions if optimal leverage and debt maturity are simultaneously determined. In a multi-period model with interest rate uncertainty, Kim et al. (1995) demonstrate that a long-term debt maturity strategy maximises investor tax-timing *option* value (repurchasing or reissuing the debt). The analysis, which is empirically supported, predicts that the firm lengthens debt maturity as interest rate volatility increases and as the slope of the term structure increases[3]. On the other hand, Kane et al. (1985) demonstrate that the trade-off between bankruptcy cost and the costs of raising debt, and per-period tax advantage of debt financing leads to an optimal debt maturity structure. They argue that optimal maturity is negatively associated with tax advantage of debt and the volatility of firm value and positively correlated with flotation costs. Hence, tax rates and debt maturity should be inversely related to ensure that tax benefits of debts are not less than amortised flotation costs.

Scholes and Wolfson (1992) propose the *tax clientele* argument to predict the relationship between debt maturity and taxes. It is argued that not all firms can afford to issue (luxury) long-term debt although transaction costs stemming from rolling-over short-term debt become higher. The authors contend that corporations having high marginal tax rates construct a natural clientele of cheap long-term debt (long-term debt yields higher tax shield). They, then, expect a positive relation between debt maturity and marginal tax rates as firms can use the ongoing tax advantages of long-term debt[4].

We measure effective tax rate (ETR) as the ratio of tax paid to taxable income. The term structure of interest rates is measured as the difference between the month-end yields on long-term (10 years or more) government bond and three-months treasury-bills, with a six-

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[3] Stohs and Mauer (1996) find a negative association between the slope of the yield curve and debt maturity. The argued reason being the attempt of firms to avoid term premium in long-term interest rates. Emery (2001) supports this inverse relationship.

[4] Harwood and Manzon (1998) show that the firms with high marginal tax rate use more long-term debt than the firms with low marginal tax rate.

month lag, matched to the month of firms' fiscal year-end. Interest rates volatility is the standard deviation of monthly government bond yield over the previous year, matched with the month of firms' fiscal year-end.

Firm level volatility:

Kane et al. (1985) and Sarkar (1999) account for the presence of taxes in their model and show that optimal debt maturity is inversely related to the firm value volatility. Low variability in firm value causes firms to avoid rebalancing their capital structure frequently due to the concerns about expected bankruptcy costs. Thus, such firms are expected to issue long-term debt rather than short-term debt. In other words, any change in firm value at high levels would lead firms to issue short-term debt periodically due to the presence of capital structure adjustment concerns. Our proxy for the firm value variability is the earnings volatility, which is measured by absolute difference between annual % change in earnings before interest, taxes and depreciation (EBITD) and average of this change.

Liquidity Risk and Signalling Hypotheses

Leverage

Leland and Toft (1996) theoretically show that if firms choose higher leverage, they also choose longer maturity and Morris (1992) suggest that firms with higher debt ratios tend to issue longer-term debt in order to delay their exposure to bankruptcy risk. On the other hand, the tax and bankruptcy (trade-off) arguments, implying optimal debt policies, predict a negative effect of leverage on debt maturity. Furthermore, Dennis et al. (2000) contend that leverage and maturity should be inversely related as the agency costs of underinvestment can be mitigated by reducing leverage as well as by shortening debt maturity. Therefore, the direction of effect of leverage and debt maturity structure is an empirical question. We measure leverage in two ways (a) as the ratio of book value of total debt to book value of total assets and (b) as the ratio of book value of total debt to market value of equity plus book value of total debt.

Liquidity

Myers and Rajan (1998) argue that high liquidity ratio may reduce fund raising capacity of the firms as excessive liquidity reduces managers' ability to commit credibly to an investment action. Non-depreciating assets (e.g. land) are evinced to increase debt maturity. Their paradox is that non-depreciating but liquid assets (e.g. inventories) do not support long-term debt and 'maturity shortens even further with increases in intrinsic asset liquidity'. On the other hand, by buying long-term bonds, lenders are also exposed to a risk that the firm's conditions may deteriorate or the management may shift to too risky projects before the bond is due. Morris (1992), thus, argues that lenders may impose restrictions on the long-term borrowers to control for such risks. He, then, hypothesises that firms with higher liquidity balances will be able to lengthen their debt maturity. We measure liquidity ratio as current assets divided by current liabilities, also known as working capital ratio.

Firm Quality

The *signalling hypothesis* implies that firms with high asymmetric information problems and high-quality projects choose to issue shorter-term debt (see Mitchell, 1991). Under asymmetric information, Flannery (1986) argues that long-term debt, which is more sensitive to firm value, can potentially be more mis-priced than short-term debt. Hence, high (low) quality firms are more likely to issue less (more) undervalued (overvalued) short (long) -term debt[5]. Datta and Iskandar-Datta (2000) find a negative relation between long-run abnormal returns and the maturity of debt-IPOs, which is predicted by Flannery (1986). Thus, a negative relationship between firm quality and debt maturity is expected. Following Dennis et al. (2000), we measure firm quality by *abnormal* earnings. This is estimated as the difference between the earnings per share in years (t+1) and (t) divided by share price in year (t).

Contracting Cost Hypotheses

Growth Opportunities:

This ratio is a proxy for expected future growth. Myers (1977) suggests that agency problems related to leverage are mitigated if firms issue short-term debt. That is, the underinvestment problem is mitigated if growth firms use short-term debt that expires before exercising the growth options, thereby borrowers and lenders can renegotiate. Similarly, agency costs of monitoring may be reduced if firms are evaluated periodically by issuing short-term debt. Titman (1992) argues that if growth firms have both the greater likelihood of bankruptcy and optimistic future-outlook then they can benefit from borrowing short-term and swapping for a fixed-rate contract. Briefly, there is a consensus in the literature that growth (market-to-book ratio) should be inversely correlated to debt maturity in the agency/contracting costs perspective.

However, the liquidity risk argument (e.g. Diamond, 1991) predicts that the firms with long-term investment opportunities requiring ongoing managerial discretion prefer to hedge against liquidity risk by issuing long-term debt. Thus, a positive correlation between growth

[5] Flannery (1986) shows that low-quality firm cannot afford to rollover short-term debt due to positive transaction costs, thus choose long-term debt. If transaction costs do not exist, low-quality firms can mimic high-quality firms and pooling-equilibrium occurs in short-term debt.

opportunities and debt maturity is predicted. Furthermore, Hart and Moore (1995) emphasise the role of long-term debt in controlling management's ability in raising funds for future projects. It is argued that long-term debt may prevent self-interested managers from financing unprofitable investments implying a direct variation of long-term debt with market-to-book ratio. Therefore, the nature of relation between growth and debt maturity structure is an empirical issue. We measure market-to-book ratio as the ratio of book value of total assets less book value of equity plus market value of equity to book value of total assets[6].

Size of the Firm

Arguably, larger firms have lower asymmetric information and agency problems, higher tangible assets relative to future investment opportunities, and thus, easier access to long-term debt markets. The reasons why small firms are forced to use short-term debt include higher failure rates and the lack of economies of scale in raising long-term public debt. It is further argued that larger firms tend to use more long-term debt due to their remaining financial needs (Jalilvand and Harris, 1984). Agency problems (risk shifting, claim dilution) between shareholders and lenders may be particularly severe for small firms. Then, bondholders attempt to control the risk of lending to small firms by restricting the length of debt maturity. Large (small) firms, thus, are expected to have more long (short)-term debt in their capital structure. Consequently, these arguments imply a positive relationship between firm size and debt maturity. We use two measures of firm size viz. the natural logarithms of total sales and total assets.

Asset Maturity Structure:

The immunisation hypothesis implies that firms match their debt maturities to their asset maturities. This principle has been widely accepted as it controls for the risk and costs of financial distress. Myers (1977) argues that the underinvestment problem can be mitigated by the matching principle. Firms can schedule their debt repayments in accordance with the decline in future value of assets-in-place. Emery (2001) argues that firms avoid the term premium by matching the maturity of their liabilities and assets. Hart and Moore (1994) confirm matching principle by showing that slower asset depreciation means longer debt maturity. Therefore, we expect a positive relationship between debt maturity and asset maturity[7]. Following Stohs and Mauer (1996), we measure asset maturity as net property, plant and equipment divided by depreciation expense.

[6] Data unavailability prevents us from using alternative proxies such as, R&D plus advertising expenses to total assets ratio.

The Control Factors

Share Price Performance

Signalling hypothesis argues that undervalued firms issue short-term debt to signal their undervaluation. The expectation is that these firms will have positive abnormal stock returns at the time of issue. Guedes and Opler (1996) state that past stock returns may be used as predictors of debt maturity as it is generally expected that issuing informationally disadvantaged securities (e.g. long-term debt) precedes share price run-up. We, thus, expect a positive correlation between debt maturity and share price performance, which is measured as the first difference of log of annual share price, with a six-month lag, matched to the month of firms' fiscal year-end. The six month lag is to allow for the time required in decision making and issue of debt.

Equity Risk Premium

This measures the cost of equity in relation to the return on risk-free investment. If equity premium is high, firms tend to prefer issuing debt rather than equity. Fama and French (1989) suggest that the premium of long-term share in total debt should have an impact on both equity and debt market. It is argued that expected bond returns are generally low when business conditions are good due to, e.g. the availability of profitable growth opportunities. Under such conditions, one may observe high equity returns. Baker and Wurgler (2000) find that firms tend to issue equity instead of debt when the future cost of equity is relatively low. Fama and French (1989) also report that expected returns on stocks and corporate bonds move together. Consequently, we expect equity risk premium to have different impact on debt maturity. For instance, it may be possible due to information asymmetries that firms issue short-term debt when equity premium is high as high equity premium can imply high premium on long term debt. We use six-month lagged equity premium, which is measured by the difference between return on stock market and return on treasury-bills, matched to the month of firms' fiscal year-end. As stated earlier, the six month lag is allowed to cover the time required in decision making and issue of debt.

Debt Maturity Dynamics

Lagged Maturity

The lagged dependent variable allows us to see whether firms have optimal debt maturity structure, and if any, the degree of divergence or convergence from (to) the target level may potentially be detected in the framework of adjustment costs. A recent study by Hovakimian et al. (2001) reveals that firms adjust their capital structure towards target debt ratios.

[7] In a survey of 392 US firms, Graham and Harvey (2001) find that matching maturity between

Jalilvand and Harris (1984) use partial adjustment model to empirically test whether firms' financing and dividend decisions are modelled as two-phase process, target value formation and adjustment to these targets. They find that, being consistent with market imperfections, firms partially adjust to their long-run financial targets. Mitchell (1993) uses lagged long-term debt ratio to control for the maturity structure of a firm's outstanding debt.

If the coefficient of lagged debt maturity is statistically significant, positive and below unity, then, one can conclude that firms have optimal debt maturity structure. If it is greater than one, it implies that they do not have a target maturity ratio. The tax, bankruptcy, and monitoring-related arguments predict a positive impact of lagged maturity but the signalling hypothesis implies no effect on debt maturity choice (see Mitchell, 1993). We expect a positive and significant relationship between current and past maturity structure in a dynamic framework. Table I summarises the empirical predictions of debt maturity hypotheses.

III. THE SAMPLE

The selection of sample countries is motivated by the presence of distinct financial and institutional traditions prevailing in France, Germany and the UK. As discussed earlier the UK system is market oriented while German tradition is more bank-oriented. France falls in between these two traditions. The sample includes all non-financial firms (dead or alive) traded in the stock exchanges of these three countries. The sample period is guided by the availability of data. It starts from 1969, 1983 and 1987 for the UK, France and Germany respectively and ends in 2000. To allow for dynamic model estimation firms with less than three consecutive observations are removed from the sample[8]. Data are obtained from Datastream.

Table II shows that the average long-term debt ratio is highest in France (58.8%) and the lowest in the UK (45.7%) while its standard deviation is highest in the UK and the lowest in France. The high volatility implies that British firms change their debt maturity structure more frequently than their French and German counter parts. As UK firms have highest volatility in earnings, these findings confirm that higher volatility in earnings causes the firms to rebalance their financing structure more frequently and, thus, lower the optimal debt maturity ratio.

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liabilities and assets is important in choosing the issuance of short or long-term debt.

[8] See Appendix B for further details on sample selection.

The analysis further reveals that the long-term debt ratios of French and German firms are declining (see Table II). This trend may be due to the development of more advantageous and efficient commercial paper markets and switching from long-term debt to equity as stock markets develop[9]. On the other hand, the long-term debt ratios of UK firms have been unstable during the sample period. From 1984 onwards, this ratio has been increasing but at a decreasing rate. The decreasing long-term debt to total assets ratio in France may indicate that the stock market is heating up.

Contradicting the trade-off and signalling arguments, correlation analysis (tables are not reported) show significantly positively relations between maturity and leverage in all countries. As anticipated, firm quality is negatively correlated with the debt maturity of the UK firms. The observed positive association of debt maturity with firm size in France and in the UK, and with asset maturity and liquidity in all countries is supported by the theory. The effective tax rate is positively correlated only in Germany. Not standing with the theory, market-to-book ratio is never significant. If leverage is strongly positively correlated to debt maturity and strongly negatively correlated to market-to-book ratio, we should control for leverage to prevent the downward bias in estimated coefficient of market-to-book ratio (see Stohs and Mauer, 1996). The results show that this is the case for all countries and, thus a measure if leverage should be included in the model.

IV. THE METHODOLOGY

This section first highlights the importance of using panel data and its relevance to study dynamic issues in financial economics. For this objective, we adopt a partial adjustment model to investigate the presence of target debt maturity structure of firms. Furthermore, we provide a discussion of alternative methodologies, i.e., the OLS, Instrumental Variables technique, and traditional difference-GMM as well as recently developed system-GMM methods. In the next section, an application of each method is conducted to test the theoretical explanations for and against these techniques. The endogeneity problem is either largely ignored or corrected for only using fixed effects or control variables in the literature. In this study, we control for this crucial problem by employing more advanced methods (GMM) to avoid significantly biased estimates.

[9] Until recently in Germany, public issue of commercial papers and longer-term bonds were discouraged through the issue authorisation procedure and the securities transfer tax (Bundesbank, Monthly Report, March 1992).

Determinants of maturity structure and estimation methods:

The main motivation for the extant panel data studies in the literature has been to control for unobservable firm heterogeneity. Unlike most previous studies on the determinants of corporate debt maturity, this study is based on dynamic panel data. Advantages in using panel data relative to period average cross-sectional data include increase in the degrees of freedom, availability of large number of observations, reduction in colinearity among explanatory variables. These advantages lead to more efficient estimation. To achieve a complete dynamic specification allowing for possible AR-process and to examine adjustment cost effect, the lagged dependent variable and lagged explanatory variables are incorporated into equation (1).

$$Y_{(it)} = \beta_0 + \beta_1 Y_{i(t-1)} + \sum_{k=1} \gamma_k X^a{}_{kit} + \sum_{k=1} \delta_k X^b{}_{ki(t-1)} + \nu_i + \nu_t + \varepsilon_{it} \qquad (1)$$

In equation (1) Y, the dependent variable, is a measure of maturity, X^a and (X^b) are the vectors of current and lagged explanatory variables, respectively, v_i represents time-invariant unobservable firm-specific effects (e.g., reputation, capital intensity), and v_t represents time-specific effects (e.g., interest rates, demand shocks) which are common to all firms and can change overtime. β_0 (the constant), β_1, γ_s and δ_s are unknown parameters to be estimated. The time-varying disturbance term ε_{it} is serially uncorrelated with mean zero and variance σ^2. The vector of explanatory variables incorporates the following variables (k = 1,12).

1. Leverage
2. Effective Tax Rate
3. Market-to-book Ratio
4. Firm Size
5. Liquidity
6. Asset Maturity
7. Firm Quality
8. Earnings Volatility
9. Market Equity Premium
10. Term Structure of Interest Rates
11. Share Price Performance
12. Interest Rate Volatility

For the definition of these variables, see section II.

It is highlighted by Hsiao (1985) that estimating equation (1) using OLS technique would not produce unbiased coefficients because v_i is unobservable. Furthermore, it is correlated with other regressors in the model. Since lagged dependent variable is correlated with firm-specific effects, this would be another reason for the inconsistent estimation of coefficients. A remedy to this could be to take the first-differences and thereby eliminate the time-invariant unobservable effects. Although it is possible to eliminate v_i by first-differencing, the OLS estimators are still inefficient as there $\Delta\varepsilon_{it}$ and $\Delta Y_{i(t-1)}$ are correlated because of the correlation between the terms $\varepsilon_{i(t-1)}$ and $Y_{i(t-1)}$. In addition, the OLS assumes that all the explanatory variables are strictly exogenous. Apparently, this is a naive assumption since the random events affecting the dependent variable are likely to have effect on the explanatory variables as well.

Anderson and Hsiao (1982) propose an instrumental variables (IV) technique to overcome problems of OLS stated above. They suggest that $\Delta Y_{i(t-2)}$ or $Y_{i(t-2)}$ can be used as instruments for $\Delta Y_{i(t-1)}$. This instrument selection is relevant and valid because $\Delta Y_{i(t-2)}$ or $Y_{i(t-2)}$ is correlated with $\Delta Y_{i(t-1)}$ but not with $\Delta\varepsilon_{it}$. If ε_{it} is not serially correlated then the IV estimates will be consistent. However, since the IV technique neither uses all the related moment conditions nor accounts for the differenced structure of the error term, the estimates are unlikely to be efficient.

On the other hand, Arellano and Bond (1991) suggest the Generalised Methods of Moments (GMM) to control for these problems. The GMM employs additional instruments obtained by utilising the orthogonal conditions that exist between the error term (ε_{it}) and the lagged dependent variable. Therefore, the GMM optimally exploits all the linear moment restrictions specified by the model. This is the main advantage of the GMM technique. It is argued that $E(\varepsilon_{it},\varepsilon_{it-1})$ in equation (1) is not necessarily zero but $E(\varepsilon_{it},\varepsilon_{it-2})$ should be zero as the consistency of GMM estimators is based on the absence of second-order correlation in differences and that of first-order correlation in levels. If we assume that the error terms are not correlated, it is expected that $\Delta\varepsilon_{it}$ is orthogonal to the past history of the variables X and Y so that ($X_{it-2,} X_{it-3,...} Y_{it-2,}\ Y_{it-3,...}$) can be used as valid instruments for $\Delta\varepsilon_{it}$. If ε_{it} follows a MA(1) process, then the instrument set will be ($X_{it-3,}\ X_{it-4,}$ …, $Y_{it-3,}\ Y_{it-4,}$…). That is, the first valid instruments start from the third lag not from the second because the differenced-disturbances follow an MA(2) process. Consequently, it is essential that there is no higher-order serial correlation to have a valid set of instruments independent from the residuals. One can investigate this by the use of Sargan test of over identifying restrictions. In this study, we use two-step GMM. Two-step GMM estimators, which use one-step residuals to construct asymptotically optimal weighting matrix, are more efficient than one-step estimators if the disturbances are expected to show heteroscedasticity in the large sample data with a relatively long time span. This two-step GMM methodology can control the correlation of errors overtime, heteroscedasticity across firms, simultaneity and measurement errors due to the utilisation of orthogonality conditions on the variance-covariance matrix.

The discussion above reveals that the GMM specification of the first differences (hereafter GMM-DIF) is superior to many other methodologies. However, recent research shows that GMM-DIF estimator has a problem related to weak instruments. It is known that first-differencing causes information loss across cross-section units (firms, in our case) and exacerbates measurement error biases. Arellano and Bover (1995) argue that the absence of information with respect to the parameters in the level-variables causes substantial loss of efficiency in models estimated in first-differences using instruments in levels. Therefore, they propose to use instruments in first-differences for equations in levels and instruments in levels for equations in first-differences. Blundell and Bond (1998) show that this system-GMM (hereafter GMM-SYS) estimator of Arellano and Bover (1995) has dramatic efficiency gains in cases where GMM-DIF estimator performs poorly especially for short sample period and persistent data[10]. This poor performance is particularly apparent when the coefficient estimate of lagged dependent variable approaches unity and the ratio of [variance(v_i)/variance(ε_{it})] increases (see, equation (1)). In such cases, the coefficient estimate of lagged dependent variable is downward-biased. Moreover, Blundell and Bond (1998) report that once lagged first-differenced and lagged-levels instruments are incorporated into the instrument set, the finite sample bias can be reduced considerably by exploiting the additional moment conditions coming from level-equations. They document that the instruments used by GMM-DIF estimator contain little information about the endogenous variables in first-differences, and lagged first-differences are informative instruments for the endogenous variables in levels. In this way, apart from controlling for individual heterogeneity, one could partially capture variations between firms. As explained above, thus, our examination of the determinants of corporate debt maturity structure is based on the estimation of equation (1) using the GMM-SYS method. In the next section, we discuss the estimates of equation (1) using OLS, Anderson-Hsiao type estimate method, GMM estimates in levels and first differences, for comparative purposes.

[10] Under extended GMM-SYS technique, the model is estimated in both levels and first-differences, i.e., in stacked regressions level-equations are simultaneously estimated using differenced lagged regressors as instruments.

Target maturity structure and speed of adjustment

Static panel data models implicitly assume that firms are able to adjust their financing structure without any delay[11]. This study, however, assumes that there might be delays in adjusting target maturity structure due to the presence of positive adjustment costs. This possibility is investigated through adopting a partial adjustment process. Assume that desired target maturity structure ($Maturity^{*}_{it}$) is a function of k explanatory variables as in equation (1).

$$Maturity^{*}_{it} = \sum_{k=1} \psi_k x_{kit} + \omega_{it} \tag{2}$$

where x is a vector k explanatory variables, ω_{it} is serially correlated disturbance term with mean zero and possibly heteroscedastic and ψ_k's are unknown parameters to estimate. The model assumes that firms adjust their current maturity structure (*Maturity*$_{i,t}$) with the degree of adjustment coefficient "ρ" to obtain the target maturity structure (equation 3).

$$Maturity_{it} - Maturity_{it-1} = \rho(Maturity^{*}_{it} - Maturity_{it-1}) \tag{3}$$

If $\rho = 1$, then the actual change will be equal to the desired change. If $\rho = 0$, however, no adjustments are made implying either the lagged level is the target level or the cost of adjustment is higher than the cost of remaining off target. We obtain the following equation by combining equations (2) and (3):

$$Maturity_{it} = (1-\rho)Maturity_{it-1} + \sum_{k=1} \rho\psi_k x_{kit} + \rho\omega_t \tag{4}$$

Equation (4) assumes that ρ lies between zero and unity. If the cost of being in disequilibrium is higher (lower) than the cost of adjustment ρ tends to unity (zero).

Long-term relation:

The long-term relation between the corporate debt maturity and its determinants may differ from short-term effect. Any difference in the sign of the coefficient of the contemporaneous and lagged values of explanatory variables reveals its possibility (see Blundell and Bond, 1998). We examine the long-run relationship by estimating equation (5).

[11] In Table X, we also account for this possibility for comparative purposes.

$$Maturity_{it}^{*} = \left(\frac{\gamma_1+\delta_1}{1-\beta_1}\right) Leverage_{it}^{*} + \left(\frac{\gamma_2+\delta_2}{1-\beta_1}\right) Tax\ Rate_{it}^{*} + \left(\frac{\gamma_3+\delta_3}{1-\beta_1}\right) Market\ to\ Book_{it}^{*} +$$
$$\left(\frac{\gamma_4+\delta_4}{1-\beta_1}\right) Firm\ Size_{it}^{*} + \left(\frac{\gamma_5+\delta_5}{1-\beta_1}\right) Liquidity_{it}^{*} + \left(\frac{\gamma_6+\delta_6}{1-\beta_1}\right) Asset\ Maturity_{it}^{*} +$$
$$\left(\frac{\gamma_7+\delta_7}{1-\beta_1}\right) Firm\ Quality_{it}^{*} + \left(\frac{\gamma_8+\delta_8}{1-\beta_1}\right) Earnings\ Volatility_{it}^{*} + \left(\frac{\gamma_9+\delta_9}{1-\beta_1}\right) Market\ Equity\ \Pr emium_{it}^{*} +$$
$$\left(\frac{\gamma_{10}+\delta_{10}}{1-\beta_1}\right) Term\ Structure_{it}^{*} + \left(\frac{\gamma_{11}+\delta_{11}}{1-\beta_1}\right) Share\ \Pr ice\ Change_{it}^{*} + \left(\frac{\gamma_{12}+\delta_{12}}{1-\beta_1}\right) Interest\ Rate\ Volatility_{it}^{*} \qquad (5)$$

The parameters used in the above model (β, γ and δ) are obtained using a dynamic estimation of equation (1). Furthermore, it is not easy to establish exogeneity in financial and accounting data. Hence, the direction of causation between variables could be problematic because of endogeneity. If, for instance, there has been a change in the market value of a firm in this year compared to last year, the source of this change should be obtained from the last year's financial decisions. Therefore, using the contemporaneous data for both maturity and the determinants may lead to spurious results[12].

As discussed in section II, there are conflicting theories on the possible impact of leverage, tax rate, liquidity and market-to-book ratio on maturity decisions. For the reasons described earlier, we expect the size of the firm and asset maturity to be directly related, while the firm quality to be inversely associated with debt maturity. However, the financial environment and traditions of the country in which the firms have to operate may result in differences in the influence (or magnitude) of the explanatory variables in their debt maturity structure. The results are discussed in section 5.

V. ALTERNATIVE ESTIMATION PROCEDURES AND DIAGNOSTICS

Equation (1) is estimated using five different methods outlined above and their results and diagnostics for France, Germany and the UK are reported in tables III, IV and V respectively. In these tables, Model 1 presents the OLS-type estimates in levels. Model 2 gives the Anderson-Hsiao (AH)-type estimates in first differences, which uses $\Delta MATURITY_{it-2}$ or $MATURITY_{it-2}$ as an instrument for $\Delta MATURITY_{it-1}$. Models 3 and 4 are the GMM estimates in levels and in differences respectively, where all explanatory variables, except the lagged dependent variable (LDV), are treated as exogenous. Thus, in both models only $MATURITY_{it-1}$ is instrumented, in which case GMM instruments used increase in each period

[12] Most prior studies use OLS, censored Tobit, random and fixed effects, Maximum likelihood methods etc. Dennis et al. (2000) criticise the previous empirical studies on that exogeneity assumption causes biased estimates.

through the panel, unlike in the case of AH instruments. In Model 5, we report GMM estimates in levels, where all right-hand side variables are treated as endogenous. The number of observations and the estimation period differ across alternative procedures, which are given in the tables. But in general one cross-section unit (first year) is lost due to first-differences and another (last year) due to the definition of quality variable. Five test statistics are reported are two Wald Tests (tests of the joint significance of the estimated coefficients, and industry dummies, respectively) distributed chi-squared under the null hypothesis of 'no relationship'. Two correlation tests (for the first and the second order autocorrelation of residuals) distributed standard normal N(0,1) under the null hypothesis of 'no serial correlation'. The last statistic (Sargan Test distributed chi-squared under the null hypothesis of 'valid instruments') tests the validity of the instrument set (overidentifying restrictions). Only the *two-step* GMM estimates will be discussed as they are more efficient than one-step estimates and Sargan Test is consistent only in this specification.

Firstly, considering all countries (Tables III to V), correlation tests reveal that in all cases the OLS (Model 1) and GMM-Level specifications (Models 3 and 5) violate the assumption of 'no serial correlation'. Apart from serial correlation in the error terms, OLS specification also suffers from endogeneity problem. The former is not surprising since LDV might be correlated with seemingly existent unobservable and time-invariant firm-specific effects. Furthermore, the estimated coefficient of LDV is relatively too high and significant in all OLS specifications ranging from 0.70 to 0.73. The same problem exists in the GMM estimates in levels and the upward bias is even higher in all cases (ranging from 0.81 to 0.86) as compared to the OLS coefficients. This upward bias, in spite of the industry dummies inclusion, can be attributed to the correlation between LDV and unobservable firm-specific fixed effects. Moreover, the Sargan Test of GMM-Level (Model 3) estimation results reveal that the instruments used are invalid in Germany and in the UK. This is because we assumed the strict exogeneity of all variables except LDV. However, it is likely that the explanatory variables related to firm-specific factors are endogenous. Therefore, due to the reasons stated above one can conclude that the OLS and GMM specifications in levels are not appropriate for a study of dynamic debt maturity structure model.

To overcome the problem inherent in level-specifications first-difference of the variables is taken and the estimates are reported in Models 2 and 4. The standard deviations of the coefficients of Model 2 (Table III to Table V) exhibit that in many cases AH-type estimates result in larger variances than GMM estimates in differences (GMM-DIF1). This is especially apparent with respect to the standard deviations of LDVs. The inference from this comparison can be regarded as a strong finding and is consistent with the findings of

Arellano and Bond (1991) that AH-type estimates cause substantial efficiency loss. Furthermore, the AH instrumental variable technique does not use all available moment conditions, which is not the case for GMM methodology. In the end, as discussed earlier, although AH-type estimates do not suffer from serial correlation (even it does for France) and are consistent, they are far from being efficient. As for GMM estimates in differences (Model 4), Sargan Test and Correlation-2 test for the UK in Table V indicate that the instruments used are not valid. (These tests seem to confirm the instrument validity for France and Germany). The reason for the rejection of instrument validity is apparent as we assumed that all the variables, except LDV by definition, are exogenous. We allowed the possibility that the past and current values of the regressors are uncorrelated with current shocks. However, it turned out to be a wrong assumption. In Model 5, the Sargan Tests again reject the validity of instruments for the UK but the Correlation Tests show serial correlation problem in all countries. This, in turn, implies that even if we relax the exogeneity of variables, the test statistics show the presence of misspecification in GMM-Level estimations. Therefore, if serial correlation exists and the coefficient of LDV is too high in GMM-Level, controlling firm heterogeneity is necessary despite the absence of endogeneity problem. To control for the potential unobserved firm-specific effects suggested by the serious upward bias on the LDV of Model 5, GMM-DIF method is applied. Thus, the discussion above reveals that the specification of OLS, AH, GMM-Levels and GMM-Differences assuming strict exogeneity of the variables are not appropriate methods of estimation for dynamic debt maturity structure models.

In Table VI, we report 'Within Groups' (WG; deviation from individual means), and GMM-DIF estimation results assuming the endogeneity of all explanatory variables except market-related control factors. Correlation tests confirm the validity of the assumption of serially uncorrelated errors in levels as Correlation-1 is significant but Correlation-2 is insignificant in all cases (except Correlation-2 for the UK). The reason why Correlation-2 rejects the null of no serial correlation for the UK is because the instruments are dated (t-3). We assume that the error has an MA(1) structure in the UK and therefore, in differences, there is correlation up to order 2. Furthermore, two-step Sargan Tests accepts the validity of lagged level instruments dated (t-2) and earlier for France and Germany, and the validity of instruments dated (t-3) and earlier for the UK. Note that instruments dated (t-2) for the UK are invalid.

Although the GMM results in Table VI do not suffer from serial correlation and endogeneity problems, recent econometric studies suggest the standard GMM-DIF estimator has the problem of weak instruments. As suggested by Blundell and Bond (1998), the weak instruments problem can be seen by comparing GMM-DIF estimates with WG in Table VI.

The results in this table are generally similar and the estimated coefficient of lagged maturity of GMM-DIF is not substantially higher than that of WG. Hence, it confirms the *downward-bias* in the lagged-maturity coefficient and, thus, shows the existence of weak instruments problem. It is known in the presence of firm-specific effects that OLS-Levels specification appears to cause an upward bias in the estimate of LDV while WG appears to cause a downward bias in the same coefficient's estimate. Consequently, one can expect this coefficient to be biased *downwards* in case of weak instruments usage. Therefore, system GMM (GMM-SYS) estimation procedure, in the end, has been found to be the most efficient and consistent methodology for our dynamic debt maturity structure model[13].

The standard GMM-DIF estimator is biased if the lagged and current dependent variables are highly correlated or heteroscedasticity is high across cross-sections. It causes downward bias especially when the coefficient of lagged dependent variable (LDV) approaches one or relative variance of fixed effects increases. This is very important with respect to our adjustment coefficient that has long-run implications through the LDV coefficient (see equation (5)). GMM-DIF also eliminates valuable information by taking first-differences and uses weak instruments. The results in Tables VII and VIII show that GMM-SYS estimates are more sensible than GMM-DIF estimates. This is particularly apparent in the estimated coefficient of lagged leverage, which is substantially higher in GMM-SYS case than in WG case. Hence, GMM-SYS estimator produces higher estimated coefficient of LDV than GMM-DIF does, which is higher than WG estimate and lower than OLS estimate. Consequently, the reported results are consistent with the analysis of Blundell and Bond (1998) that in autoregressive models with persistent series, GMM-DIF can cause serious finite sample biases due to weak instruments and these biases can be greatly reduced by including level equations in the system estimator. Therefore, in the following paragraphs we contain with the discussion of the results based on GMM-SYS.

VI. THE RESULTS

The above discussion suggests that the most appropriate method to test dynamic debt maturity structure is the two step GMM-SYS. Our results are robust for many reasons. First, potential endogeneity problem is eliminated by the GMM methodology. Second, the GMM process does not need the conditions of 'no autocorrelation', 'no heteroscedasticity', and 'normality' to be fulfilled especially for the large samples. Third, our panel data set for the UK

[13] Controlling of unobserved firm heterogeneity and endogeneity problem in dynamic debt maturity structure seem very important to infer correct inferences as some variables have turned out to be insignificant after using correct methodology (GMM-SYS) discussed below.

does not suffer from small sample bias, and asymptotic standard errors are robust to heteroscedasticity.

Table VII documents the GMM-SYS estimation results for the pooled sample data. The dummy variable for the UK is significant at 1%. This implies that country-specific factors are important in corporate debt maturity decisions, which necessitates the estimation of the model for each individual country.

Target Debt Maturity and Speed of Adjustment:

Consistent with the findings of Newberry and Novack (1999), among others, the positive, significant and less than unity coefficient of the lagged maturity (Table VIII[14]) imply the presence of costly and non-instantaneous adjustments towards target maturity structure in all three countries. With the highest adjustment speed (ρ=1-(coefficient of lagged maturity) French firms are the quickest in adjusting their debt maturity structure towards the target. As indicated by the lowest adjustment coefficient, the adjustment process is relatively costly and slow in the UK. This implies that the cost of being off-target is not much higher than the cost of adjustment process for the British firms. The adjustment speed of German firms lies between French and British cases. Overall, the results support the dynamic debt maturity structure implied by our model as the firms in all sample countries trade-off between adjustment cost and costs of being off-target.

Tax related hypotheses

Effective Tax Rate

The relation between tax rate and debt maturity differ across countries. The coefficient of effective tax rate (Table IX) is insignificant in France and the UK[15]. This may be due to the fact that unlike in France and Germany reported accounting income is not affected by tax considerations in the UK. In the case of France, it is known that potential tax benefits are prone to diminish under French tax system due to declining tax rates. This, in turn, reduces the importance of tax considerations while deciding debt maturity structure. Consistent with the findings of Newberry and Novack (1999) a significantly positive coefficient is found for Germany ('specific' case in Table IX). This evidence does not support the trade-off hypothesis that firms increase their debt maturity as tax benefits decline such that remaining benefits are not less than amortised flotation costs. The positive impact is consistent with tax

[14] The 'specific' estimates in Table VIII are obtained following general-to-specific approach, i.e. by excluding the insignificant lagged independent variables from the estimation of general dynamic model.

clientele argument where firms with high marginal tax rates and with better ability to use interest tax shields effectively issue long-term debt. This may be due to relatively high tax rates in Germany. It also implies that lenders are not concerned about the possibility that the relatively high required rate of return for long-term debt causes firms to shift to risky projects. This supports the view that corporate governance system in Germany is designed to mitigate agency costs.

Earnings Volatility

The results in Table IX show that earnings volatility has no significant influence upon debt maturity decisions of German and UK firms. Cai et al. (1999) also report insignificant and negative coefficients. Contrary to the theory's prediction and empirical finding of Dennis et al. (2000), debt maturity and earnings volatility are significantly positively correlated in France. This is consistent with the view that the firms with more volatile earnings prefer to issue long-term debt due to liquidation concerns. Consequently, the theory fails to explain the positive relationship in France. This leads us to suggest that country specific factors such as the corporate governance systems should be considered.

Liquidity risk and signalling hypotheses:

Liquidity

The association between debt maturity and liquidity is insignificant in France and in the UK (Table IX). However, consistent with the findings of Schiantarelli and Srivastava (1997) it is significant and positive in Germany. It may be that German firms with longer maturity hold greater liquidity to avoid cash shortages for debt-servicing. It is also known that once entered into the lengthy insolvency procedure, the cost of bankruptcy and probability of being liquidated are relatively high in Germany. This would motivate German firms to remain liquid if they decide to issue long-term debt since healthier balance sheet conditions could improve the access to long-term finance. This motivation may also come from the German banks who are capable of reducing the financial distress costs via close control and monitoring of management. Likewise, the insignificant liquidity coefficient in France may be due to the underlying philosophy of French bankruptcy laws, which is the rehabilitation of firms through reorganisation rather than liquidation. This provides relatively low incentives to French firms to remain liquid while raising long-term debt. The insignificant effect of liquidity on the debt maturity structure of the UK firms implies that they (being in a market oriented economy) may have better access to financing sources to avoid liquidity risk than their European counterparts.

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[15] Dennis et al. (2000) also report no impact of tax on debt maturity.

Leverage

The results in Table IX reveal significant and positive association between leverage and debt maturity in all countries[16]. This supports the view that firms with higher debt-ratios attempt to control bankruptcy risk and costs by lengthening debt maturity. Higher leverage increases the liquidation probability, thus issuing long-term debt becomes more advantageous. However, our estimates do not support the monitoring hypothesis that higher leverage causes higher monitoring costs and shorter maturity accelerates the frequency of creditors' audit. Similarly, tax-bankruptcy (signalling) arguments implying negative or no relationship between leverage and maturity also is rejected.

Firm Quality

Supporting the predictions of the signalling hypothesis Scherr and Hulburt (2001), among others, report significant and negative correlation between firm quality and maturity[17]. However, like Dennis et al. (2000), we find no support for the signalling hypothesis in Germany as the coefficient is insignificant (Table IX). However, a weak support (significant at 10%) is found this hypothesis in the UK in the short-run model (Table VIII). In the case of France, the association of debt maturity with firm quality is insignificant. There are several possible explanations for this. First, short-term debt may cause inefficient liquidation and, thus, good firms prefer a combination of short- and long-term debt due to liquidity risk (Diamond, 1993). Second, a non-monotonic relationship between debt maturity and firm quality i,e, only medium-rated firms issue long-term debt, and very low-rated and highly-rated firms choose short-term debt (Diamond, 1991)[18]. Finally, as Ball et al. (2000) argue that asymmetric information is more likely to be resolved in code-law countries than in common-law countries due to firms' close relations with major stakeholders. The insignificant quality coefficients in Germany and France may partially be explained by this view.

[16] These are based on book-leverage. The results based on market-leverage are quality similar.

[17] However, Barclay and Smith (1995) argue that firm quality tends to be unstable overtime and signalling hypothesis is relevant especially for time-series analysis; thus, may not be well captured by cross-sectional analysis.

[18]The prediction of reverse-U shape relation between firm quality and debt maturity gets strong empirical support from Stohs and Mauer (1996). To test this, we used *squared-quality* variable. To retain the original sign, it is multiplied by (-1) if *quality*<0. It is expected that maturity is positively

Contracting costs hypothesis

Market-to-book Ratio

The estimates (Table IX) reveal that market-to-book ratio and debt maturity are significantly positively correlated in the UK[19]. Consistent with Myers' (1977) argument that shortening debt maturity mitigates underinvestment problems, mostly a significantly negative association between growth opportunities and maturity is reported in the literature[20]. However, our estimate for the UK contradicts with the predictions of contracting-cost hypothesis and the argument that firms with greater information asymmetries issue more short-term debt[21]. Consequently, our results for the UK confirm the liquidity risk argument that by issuing long-term debt firms can avoid inefficient liquidation of their risky growth opportunities.

The insignificant coefficient of market-to-book ratio in France and Germany implies the insignificance of suboptimal investment concerns. This may be due to Chan-Lau's (2001) argument that the advantages of a specific corporate governance system are not necessarily related to information asymmetries; apart from mitigating the shareholders-managers conflicts, bank-oriented systems may also curtail underinvestment problems. Furthermore, Bah and Dumontier (2001) document that R&D-intensive (growth) firms in Europe and the USA use significantly higher levels of short-term debt due to underinvestment risks. They do not find any differences among firms in UK, France and Germany in this respect but imply negative relationship between maturity and growth. However, our results show that the relationship between maturity and growth opportunities varies across countries.

Firm Size

The results (Table IX) show that firm size has no significant impact on the firms' debt maturity decisions in France and in Germany[22]. This insignificance may be due to the country-specific reasons. For instance, this finding is in line with the conventional wisdom that indirect bankruptcy costs (implicit in firm size) are less in Germanic and Latinic economies than in Anglo-Saxon economies due to corporate ownership structure and long-

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correlated with *quality* and negatively correlated with *squared-quality* such that maturity increases as firm quality deteriorates at a decreasing rate. The coefficients are statistically insignificant in all cases.

[19] See, for example, Barclay and Smith (1995) and Ozkan (2000).

[20] See, for example, Dennis et al. (2000) and the references cited therein.

[21] See, for example, Barclay et al. (2002) and the references cited therein.

[22] These results are based on firm size measured by total sales. Alternative size measurement by total assets did not alter the quality of results.

run relationship between firms and external financiers in the former[23]. On the other hand, confirming the above argument, firm size and debt maturity are found to be significant and positive in the UK. This relation is very common in the literature[24]. This commonality may be due to the fact that most studies examine the US case and the financial and institutional traditions in the US and the UK are similar. This finding confirms the arguments related to affordable transaction costs, easy access to capital markets, lower information asymmetries, reputational considerations, and weak incentive problems, which are all relevant for larger firms to be able to issue long-term debt.

Asset Maturity Structure

The immunisation hypothesis suggests that the firms match their debt maturities to asset maturities. Most empirical studies report a significantly positive relationship between asset maturity and debt maturity. We find similar association for the UK firms (Table IX, 'general' specification) supporting the view that firms match the maturities of their liabilities and assets as a hedging policy, in part to control underinvestment and bankruptcy problems.

However, asset maturity has no significant impact on debt maturity decisions of German firms and the coefficient is only weakly significant in France. This confirms Claessens et al.'s (1999) argument that there is a mismatch between the maturity structure of assets and liabilities in civil law countries. The insignificant coefficients of market-to-book ratio and asset maturity imply the absence of underinvestment problems in Germany. The concentrated share-ownership structure and firms' close relation with their financiers could be the driving force in mitigating such agency problems.

Control Factors:

Equity risk premium

The estimates (Table IX) show that the association of debt maturity with equity premium is country dependent. It is insignificant in France and Germany, and positive and significant in the UK. These estimates imply that debt markets and equity markets are not integrated in France and Germany. On the other hand, the significant and positive association between these variables in the UK suggest that the UK firms issue long-term debt if equity premium is high. As discussed in Baker et al. (2001), this reflects managers' attempt to minimise the cost of capital and integration of debt and equity markets. This is consistent with Fama and French (1989)'s view that equity and debt markets move together.

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[23] In fact, the proportion of long-term credit to total credit in the corporate sector is 78%, 73%, 50% in Germany, France and the UK, respectively (Borio, 1996).

[24] See, for instance, Barclay and Smith (1995), Dennis et al. (2000), Ozkan (2000).

Term Structure of Interest Rates

Results in Table IX do not support for the tax hypothesis of Brick and Ravid (1985) in France and Germany, as the coefficients of the term-structure of interest rates are not significantly different from zero[25]. On the other hand, the coefficient is positive and significant in the UK lending strong support to the tax hypothesis that debt maturity is positively related to the slope of the term-structure[26]. It implies that UK firms issue more long-term debt when the slope of term-structure is positive in order to accelerate the tax benefits of debt. Hence, unlike the British firms the French and German firms do not seem to consider tax effects while deciding the debt maturity structure.

Share Price Performance

The results indicate that the association of debt maturity with share price performance is not uniform across countries. In France, changes in stock prices do not seem to affect the debt maturity decisions. However, it is positive and weakly significant in Germany and in the UK under 'general' specification (Table IX). This positive impact confirms the asymmetric information models (Lucas and McDonald, 1990) that firms issue informationally disadvantaged securities (long-term debt) after the rise in their share prices.

Interest Rate Volatility

Estimates presented in Table IX reveal that debt maturity structure is not affected by interest rate volatility in France and Germany. This is consistent with the empirical finding of Guedes and Opler (1996). However, this contradicts the predictions of tax timing theory that suggests a positive relation[27]. On the other hand, the association of debt maturity with interest rate volatility is significantly negative in the UK. Thus, UK firms tend to shorten their debt maturity if interest rates are volatile.

In general, it appears that the market-related factors have significant impact on debt maturity decisions in the UK, a market oriented economy, but not in other sample countries. Not surprisingly, the explanatory power of these variables, as indicated the coefficient of determination, is relatively higher in the case of the UK.

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[25] Cai et al.(1999), among others, also find an insignificant effect of term-structure on debt maturity.

[26] Positive association is reported by Newberry and Novack (1999) and Dennis et al. (2000) while Barclay and Smith (1995) and Guedes and Opler (1996) report negative relation.

[27] The tax-timing option theory argues that an increase in interest rate volatility reduces the present value of the tax shields from short-term debt financing while the present value of the tax shields from long-term debt financing does not change, assuming a convex corporate tax function. In this case, issuing long-term debt would be advantageous.

The Static Model

This model assumes that target debt maturity is instantaneously adjusted as a reaction to random changes in the business and firms' conditions and, hence, there is no lag in adjustment process toward an optimal debt maturity structure. The estimates of this model are presented in Table X.

The results of static models for the UK (Table X) deserve more attention as some of the estimates are different from the results of dynamic model (Table IX). As predicted by the signalling hypothesis, the quality of firm variable now exerts strongly negative influence on debt maturity. The tax rate and liquidity variables have positive and significant coefficients, which were insignificant in dynamic model (Table IX). However, market-to-book ratio and share price performance coefficients have turned insignificant. The results for the remaining variables are the same in both models. The significant variables in static models for France are tax rate and share price performance while they were insignificant in dynamic model (Table IX). As for Germany, the findings of static debt maturity structure generally support the results of dynamic models.

The corresponding coefficients of determination (R^2) and Wald Test-1 (joint significance) statistics of the dynamic models (Table VIII) are much higher than that of static models in every case (Table X). It shows the better explanatory power of dynamic models over static ones. In general, the results of dynamic and static models are not opposing to each other and support the use of dynamic GMM models in debt maturity structure studies.

VII. CONCLUSION

The primary objective of this paper is to investigate the possible effects of the choice of the method of estimation on the determinants of corporate debt maturity structure in three major European countries. Our results reveal the importance and presence of dynamism in modelling debt maturity structures. We show that the estimation specifications of OLS, Anderson-Hsiao type estimation method, GMM assuming strict exogeneity of the variables and GMM based on first-differences have considerable shortcomings. It is crucial to account for endogeneity problem that arises due to the correlation of regressors with the error term and causes inconsistent estimates. The system-GMM results, after controlling for endogeneity problem, reveal that the degree and type of association of debt maturity with firms-specific and market-specific factors are not separated from the firms' domestic financial and economic environment. The results suggest that firms in all countries adjust their debt maturity structure towards their target level but the adjustment process is costly and the France firms are swiftest in making adjustments.

Several firm-specific and market-related factors responsible for the corporate debt maturity structure are identified, but their importance varies across the countries. Among firm-specific variables, first, tax rates and earnings volatility test the tax hypotheses. The relation between tax rate and maturity differs across countries. This could be due to different taxation systems. We find no significant impact of tax on debt maturity structure of the French and British firms, while the tax clientele argument is confirmed in Germany with a significant and positive effect of tax on maturity. Earnings volatility has significant impact only in France but its effect is contrary to negative prediction of the theory.

Second, several variables examine the relevance of liquidity risk and signalling theories of debt maturity. There is no significant relationship between liquidity and debt maturity of French and British firms while it is positive and significant in Germany. It may reflect that French firms do not consider importance of remaining liquid while they borrow for long-term, as the French bankruptcy rules favour the saving of ailing firms. However, it is not the case for German firms since bankruptcy procedures in Germany emphasise the liquidation of insolvent firms. Confirming liquidity risk argument, a significant and positive association between leverage and maturity is found in all countries, which may be guided by reducing bankruptcy risk. Furthermore, we find little or no support for the signalling hypothesis in all countries as the coefficient of firm quality variable is insignificant.

Third group focuses on contracting costs arguments: Market-to-book ratio is positively associated with debt maturity structure of the UK firms. This confirms the liquidity risk argument that firms issue long-term debt to avoid inefficient liquidation of their risky growth opportunities. However, this variable does not play any significant role on the debt maturity of French and German firms. Firm size and debt maturity are insignificantly associated in France and Germany but significantly and positively associated in the UK. This may suggest that indirect bankruptcy costs, incentive problems and information asymmetries are less in Germanic and Latinic economies than in Anglo-Saxon economies due to corporate ownership structure and long-run relationship between firms and external financiers. Moreover, the relationship between asset maturity and debt maturity is significantly positive in the UK, which supports the maturity-matching hypothesis that firms pursue a hedging policy to control agency and bankruptcy problems. However, it seems that German firms do not apply this matching principle and the case of France is inconclusive. A possible explanation to this is that the concentrated corporate ownership, long and close relationship between firms and investors in civil-law countries curtails the problems that stipulate the application of maturity matching principle.

Among the control factors, as indicated by the relation between equity premium and debt maturity, debt markets and equity markets are more integrated in the UK. This result is not surprising for a market-oriented economy. This relation is insignificant in other countries. Similarly, the term structure of interest rates plays a significant and positive role in the UK only. This supports the predictions of the tax-hypothesis that firms lengthen their debt maturity if the term-premium is high in order to accelerate the tax benefits of debt. In addition, the relation between share price performance and debt maturity tests the signalling hypothesis that firms issue long-term debt after an increase in their share price. This hypothesis is weakly supported in the cases of Germany and the UK. Finally, the relation between interest rate volatility and debt maturity rejects the proposition that predicts a direct relation between maturity and interest rate uncertainty. Its association with debt maturity is significantly negative in the UK and insignificant in other sample countries.

In summary, the choice of the method of estimation is highly relevant in debt maturity modelling. The factors like capital structure, tax rates, quality and size of firms, growth opportunities, asset maturity and liquidity seem to play central role in determining the debt maturity structure of a firm. Apart from these firm-specific factors, this study obtains some market-specific factors that have substantial impact on debt maturity structure of the firms, especially in the UK. However, the nature and dominance of the impact of these factors on debt maturity depend on the financial environment and tradition of the domestic economy in which the firms have to operate. Moreover, country specific factors do play significant roles on how quickly the firms can and need to adjust their maturity position to achieve the target maturity structure. Consequently, the debt maturity decision of a firm is not only the result of its own characteristics but also the result of environment and tradition in which it operates.

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Appendix: A

The Definitions of the Variables

(Numbers or Text in brackets [ ] indicate to variable identifier in Datastream)

- *Long-term debt*: All loans repayable in more than one year. Loans from group companies and associates are included [321].

- *Book value of debt*: It is the total of all long and short-term borrowings, including any subordinate debt and 'debt like' hybrid finance instruments [1301].

- *Total sales*: The amount of sales of goods and services to third parties, relating to the normal activities of the company [104].

- *Depreciation*: Provisions for amounts written-off (AWO) and depreciation of fixed assets and assets leased in [136]. For industrials in Germany the figure includes AWO intangibles.

- *Total taxable income*: Pre-tax profit as disclosed by the company; no adjustments are made to exclude items of an exceptional/extraordinary nature [154].

- *Total tax charge*: This is the company's published charge for taxation [203].

- *Net tangible assets*: It shows the net total of land and buildings, plant and machinery, construction in progress and any other fixed assets excluding assets leased out [339].

- *Current Assets*: It includes stocks, work in progress, trade and other debtors, cash and equivalent, and any other current assets. Trade accounts receivable after 1-year are included. For Europe, common adjustments to the reported figure are; to exclude treasury stock if shown as part of current assets; to exclude long term loans and receivables not directly related to the trading activities of the company; to reposition deferred tax asset to net deferred tax liabilities [376].

- *Current Liabilities*: It includes current provisions, creditors, borrowing repayable within one year, trade accounts payable after one year and any other current liabilities. It also includes [389].

- *Total Assets:* Total assets employed by the company [392].

- *Book value of equity*: Total share capital and reserves [307].

- *Market value of equity*: Share price multiplied by the number of ordinary shares in issue (MV).

- *Earnings per share* [211]: adjusted earned for ordinary ([210]) divided by the year end number of shares. The average number of shares is used for UK where the figure is available for all companies. This item is adjusted for subsequent rights and scrip issues. For Germany; the per share earnings figure per share as calculated according to DVFA.

- *Size of the firm* is measured by total assets (and total sales) and is deflated by the Producer Price Index taking the earliest year in the sample as the base year, which are 1969, 1983 and 1987 for the UK, France and Germany, respectively.

Appendix: B

The structure of panel data

The panel data are constructed as follows. All dead and alive firms whose data are available are included in the sample. The total number of non-financial firms stands at 1,235 for France, 1,590 for Germany, and 3,153 for the UK. The firms with any missing variable are excluded from the sample. The panel data set is unbalanced as there are more observations for some firms than for others.

Sections in the table below are as follows: a) Number of firms having '*n*' continuous observations during the period; b) number of observations in each year; c) number of firms in each industry class; and d) number of observations in each industry class.

a) Number of firms

n (years)	France	Germany	UK
3	60	22	207
4	54	26	218
5	33	35	196
6	13	26	128
7	22	9	98
8	17	9	67
9	14	8	56
10	12	8	52
11	1	13	87
12	47	24	91
13	16	38	82
14	5	364	89
15	3	-	85
16	3	-	65
17	5	-	73
18	53	-	68
19	-	-	64
20	-	-	50
21	-	-	34
22	-	-	21
23	-	-	26
24	-	-	20
25	-	-	26
26	-	-	23
27	-	-	44
28	-	-	44
29	-	-	165
30	-	-	27
31	-	-	39
32	-	-	178
Total	**358**	**582**	**2423**

b) Number of observations

Years	France	Germany	UK
1969	-	-	466
1970	-	-	479
1971	-	-	489
1972	-	-	866
1973	-	-	903
1974	-	-	930
1975	-	-	936
1976	-	-	940
1977	-	-	951
1978	-	-	962
1979	-	-	979
1980	-	-	1000
1981	-	-	1029
1982	-	-	1067
1983	59	-	1122
1984	64	-	1200
1985	67	-	1260
1986	70	-	1303
1987	75	401	1314
1988	92	418	1325
1989	142	437	1312
1990	142	446	1288
1991	151	454	1247
1992	163	456	1216
1993	175	465	1222
1994	197	473	1269
1995	207	500	1318
1996	242	535	1402
1997	291	557	1483
1998	345	572	1471
1999	344	563	1340
2000	334	532	1177
Total	**3160**	**6809**	**35266**

c) Number of firms

Industry	France	Germany	UK
1	23	49	165
2	10	44	31
3	19	56	199
4	31	37	162
5	48	59	261
6	16	35	28
7	41	89	315
8	22	16	87
9	25	21	191
10	1	0	55
11	19	22	147
12	31	23	254
13	46	34	319
14	17	64	142
15	9	33	67

d) No. of observations

Industry	France	Germany	UK
1	253	575	2580
2	94	565	611
3	235	689	3600
4	268	462	2323
5	375	593	3248
6	153	437	476
7	397	1120	5395
8	186	199	1367
9	217	238	2311
10	4	0	585
11	143	269	2161
12	296	275	3954
13	348	225	3417
14	141	760	2694
15	50	402	544

Table I: The relation between the variables and theories

Variables	Hypotheses and predicted sign								
	Agency Costs			Asymmetric Information		Tax, Bankruptcy, Liquidity, Flotation costs arguments			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged Maturity				0	+	+	+		
Leverage	-						-	+	
Effective Tax rate						-/+	-		
Market-to-book ratio	-	+			-		-	+	
Firm size	+		+				+		+
Liquidity			+					-	
Asset Maturity	+							+	
Firm Quality				-					
Earnings Volatility						-	-		
Market Equity Premium				-					
Term Structure						+			
Share Price Performance				+					
Interest Rate Volatility						+		+	

(1): Underinvestment, (2): Overinvestment, (3): Asset substitution (risk-shifting), (4): Signalling, (5): Monitoring, (6): Tax arguments, (7): Bankruptcy costs, (8): Liquidity risk, 9) Transaction costs.

Table II: Summary statistics

Long1 (Long2) is the ratio of debt that matures in more than one year to total debt (total assets). *Leverage1* is the ratio of book value of total debt to book value of total assets. *Leverage2* is the ratio of book value of total debt to market value of equity plus book value of total debt. Effective Tax Rate (*ETR*) is the ratio of total tax charge to total taxable income. Market-to-Book Ratio (*MTBR*) is the ratio of book value of total assets less book value of equity plus market value of equity to book value of total assets. *Size1 (Size2)* is the natural logarithm of total sales (total assets). *Liquidity* is the ratio of current assets to current liabilities. *Asset-Maturity* is the ratio of net property, plant &equipment to depreciation expense. *Quality* is the difference between EPS in years (t+1) and (t) divided by share price in (t). *Earnings volatility* (EARNVOL) is the first-difference of earnings minus average of the first-differences. S*hare price performance (SHARE PF)* is the difference of log of annual share prices.

France	Mean	Median	Mode	Std.dev	Variance	Kurtosis	Skew.	Min.	Max.	Obsrv.
LONG1	0.58826	0.6067	1	0.26781	0.0717	-0.60174	-0.279	0	1	3160
LONG2	0.14267	0.1177	0	0.11916	0.0142	3.57668	1.4903	0	0.9488	3160
LEVERAGE1	0.23306	0.2207	0.049	0.1449	0.021	0.6268	0.652	8E-05	0.9985	3160
LEVERAGE2	0.31144	0.2745	0.052	0.22726	0.0516	-0.44132	0.6139	2E-05	0.9753	3160
ETR	0.31505	0.3544	0	0.45906	0.2107	62.3824	3.2036	-3.968	6.7836	3160
MTBR	1.56172	1.2202	13.16	1.10617	1.2236	33.8066	4.7671	0.3968	13.155	3160
SIZE1	14.8396	14.853	16.72	1.9347	3.7431	0.95938	-0.254	0	20.227	3160
SIZE2	14.8557	14.763	13.07	1.8989	3.6058	-0.22165	0.107	9.2072	20.502	3160
LIQUIDITY	1.49681	1.3383	0.853	0.77003	0.5929	67.6515	5.6043	0.0218	15.548	3160
ASSETMAT	5.87294	4.91	7.509	5.78183	33.43	74.0468	7.0934	0.026	92.949	3160
QUALITY	0.01642	0.005	0	0.42453	0.1802	306.889	4.4427	-9.062	10.264	2806
EARNVOL	0.7584	0.1994	0.0012	5.8530	34.2581	2058.76	42.274	0.0000	289.62	2889
SHARE PF	0.0930	0.0775	0.0000	0.4092	0.1674	2.6921	0.0912	-2.353	2.3690	2866

Germany	Mean	Median	Mode	Std.dev	Variance	Kurtosis	Skew.	Min.	Max.	Obsrv.
LONG1	0.53279	0.5705	0	0.31336	0.0982	-1.10016	-0.293	0	1	5882
LONG2	0.10748	0.0634	0	0.13261	0.0176	4.49199	1.9226	0	0.9955	6809
LEVERAGE1	0.19745	0.1501	0	0.19017	0.0362	0.42268	0.9818	0	0.9977	6809
LEVERAGE2	0.24561	0.1692	0	0.24728	0.0611	-0.15065	0.9108	0	0.9942	6239
ETR	0.39311	0.4533	0	1.0299	1.0607	110.206	-0.143	-16.47	16.638	6782
MTBR	2.01218	1.3113	1.285	4.24848	18.05	244.48	13.934	0.2536	93.883	6239
SIZE1	12.3354	12.379	11.08	2.30539	5.3148	0.64579	-0.25	1.2306	19.402	6563
SIZE2	12.2502	12.148	10.54	2.0225	4.0905	0.50858	0.2607	3.9219	19.594	6809
LIQUIDITY	4.14811	1.7159	6.553	23.3093	543.32	429.341	18.961	0.0012	654	6793
ASSETMAT	7.72738	5.2723	0	11.0058	121.13	76.9186	7.4382	0	174.33	6329
QUALITY	0.00867	0.0001	0	0.25041	0.0627	152.844	4.1379	-5.277	4.7472	6277
EARNVOL	3.2986	0.3718	0.1266	19.9380	397.523	535.953	19.638	0.0000	653.94	6153
SHARE PF	0.0069	0.0000	0.0000	0.3452	0.1192	4.4917	0.3725	-2.227	2.7783	5429

UK	Mean	Median	Mode	Std.dev	Variance	Kurtosis	Skew.	Min.	Max.	Obsrv.
LONG1	0.45708	0.4727	0	0.33876	0.1148	-1.36466	0.0289	0	1	32339
LONG2	0.08262	0.0478	0	0.10237	0.0105	7.45464	2.1329	0	0.9896	35266
LEVERAGE1	0.16694	0.1508	0	0.13746	0.0189	2.79683	1.2228	0	0.9958	35266
LEVERAGE2	0.24313	0.1882	0	0.22112	0.0489	0.2251	0.9545	0	0.9991	34947
ETR	0.35962	0.3607	0	0.55282	0.3056	470.554	-3.92	-18.5	18.43	35248
MTBR	1.51927	1.1124	2.285	2.17534	4.7321	574.897	18.9	0.1318	97.176	34947
SIZE1	9.03169	8.858	8.261	1.8893	3.5695	0.65115	0.1945	0.0156	16.224	35111
SIZE2	8.8299	8.5697	11.45	1.81985	3.3119	0.33371	0.601	1.5076	16.674	35266
LIQUIDITY	1.69656	1.4527	2	1.57749	2.4885	355.372	14.42	0.0242	61.42	35266
ASSETMAT	13.5762	9.3443	0	17.8024	316.93	66.7523	6.7541	0	282.63	35157
QUALITY	0.00628	0.0062	0	0.14052	0.0197	324.737	0.5481	-4.933	4.8651	34092
EARNVOL	1.1169	0.2498	0.0258	8.0445	64.7135	2767.908	44.649	0.0000	660.76	32835
SHARE PF	0.0544	0.0691	0.0000	0.4660	0.2172	3.5258	-0.355	-4.183	3.3032	32671

Table III: Dynamic corporate debt maturity structure in France: Alternative Estimations

			Dependent Variable:	$MATURITY_{i,t}$			
Independent Variables	Theory	Predicted Sign	(1) OLS-LEV	(2) AH-LEV	(3) GMM-LEV1	(4) GMM-DIF1	(5) GMM-LEV2
$MATURITY_{i,t-1}$	D	+	0.7208***	0.3733***	0.8561***	0.4358***	0.8499***
			(0.0257)	(0.0841)	(0.0271)	(0.0822)	(0.0259)
$TAX\ RATE_{i,t}$	T	-/+	-0.0001	0.0046	-0.0025	0.0023	0.0033
			(0.0058)	(0.0066)	(0.0078)	(0.0075)	(0.047)
$TAX\ RATE_{i,t-1}$			0.0003	0.0030	0.0035	0.0055	0.0018
			(0.0068)	(0.0084)	(0.0073)	(0.0094)	(0.0085)
$EARNINGS\ VOL_{i,t}$	T	-	0.0012	-0.0030	0.0012	-0.0024	0.0010
			(0.0013)	(0.0032)	(0.0014)	(0.0030)	(0.0024)
$EARNINGS\ VOL_{i,t-1}$			0.0003	0.0002	0.0002	0.0002	0.0004
			(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0005)
TERM-STRUCTURE	T	+	-0.0020	0.0002	-0.0001	-0.0002	-0.0021
			(0.0021)	(0.0035)	(0.0023)	(0.0033)	(0.0029)
INTEREST VOLATILITY	T	+	0.0009	0.0021	0.0019	0.0008	0.0027
			(0.0076)	(0.0074)	(0.0095)	(0.0075)	(0.0084)
$LIQUIDITY_{i,t}$	LS	-/+	0.1051**	0.0994*	0.1340*	0.1279*	0.0921*
			(0.0516)	(0.0566)	(0.0764)	(0.0747)	(0.0527)
$LIQUIDITY_{i,t-1}$			-0.0736*	-0.0282	-0.1151	-0.0483	-0.0834*
			(0.0426)	(0.0244)	(0.0712)	(0.0317)	(0.0436)
$LEVERAGE_{i,t}$	LS	-/+	0.0483	-0.0405	0.0388	-0.0585	-0.1487
			(0.0790	(0.1125)	(0.0886)	(0.1164)	(0.2289)
$LEVERAGE_{i,t-1}$			0.0796	0.2138***	0.0478	0.1907**	0.2047
			(0.0766)	(0.0805)	(0.0879)	(0.0819)	(0.2103)
$QUALITY_{i,t}$	LS	-	0.0266***	0.0354***	0.0256*	0.0386***	-0.0012
			(0.0072)	(0.0115)	(0.0094)	(0.0109)	(0.0270)
$QUALITY_{i,t-1}$			-0.0062	0.0066	-0.0083	0.0077	-0.0104
			(0.0044)	(0.0102)	(0.0058)	(0.0093)	(0.0072)
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	-0.0051	-0.0077	-0.0012	-0.0058	-0.0235
			(0.0091)	(0.0107)	(0.0087)	(0.0102)	(0.0238)
$MKT\text{-}TO\text{-}BOOK_{i,t-1}$			0.0122	-0.0066	0.0061	-0.0042	0.0325
			(0.0139)	(0.0185)	(0.0138)	(0.0181)	(0.0224)
$SIZE_{i,t}$	C	+	0.0620***	0.0794***	0.0672***	0.0717**	0.0310
			(0.0173)	(0.0281)	(0.0227)	(0.0297)	(0.0474)
$SIZE_{i,t-1}$			-0.0584***	-0.0611***	-0.0667***	-0.0615***	-0.0297
			(0.0174)	(0.0215)	(0.0227)	(0.0220)	(0.0468)
$ASSET\ MATURITY_{i,t}$	C	+	0.0033**	0.0026	0.0038	0.0025	-0.0025
			(0.0016)	(0.0021)	(0.0024)	(0.0018)	(0.0044)
$ASSET\ MATURITY_{it-1}$			-0.0026*	-0.0036	-0.0033	-0.0022	0.0031
			(0.0014)	(0.0030)	(0.0021)	(0.0024)	(0.0041)
EQUITY PREMIUM	M	-/+	-0.0001	-0.0001	0.0000	-0.0001	0.0003
			(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0004)
SHARE-PRICE PERF	M	+	0.0148	0.0124	0.0087	0.0125	-0.0150
			(0.0120)	(0.0152)	(0.0158)	(0.0158)	(0.0296)
Correlation1			-3.532***	-7.346***	-3.992***	-6.013***	-3.923***
Correlation2			2.511**	1.961**	1.010	1.891*	0.9979
Sargan Test (df)			-	-	16.15 (14)	14.92 (13)	116.2 (122)
Wald Test-1 (df)			1377 (21)***	94.80 (21)***	2110 (21)***	100.3 (21)***	1632 (21)***
Wald Test-2 (df)			52.47 (15)***	-	15.03 (15)	-	15.04 (15)
R^2			0.5754	-	0.5526	-	0.5486
Firms / Observations			299 / 2154	249 / 1855	299 / 2154	249 / 1855	299 / 2154
Estimation Period			1985-1999	1986-1999	1985-1999	1986-1999	1985-1999

Table IV: Dynamic corporate debt maturity structure in Germany: Alternative Estimations

			Dependent Variable:	$MATURITY_{i,t}$			
Independent Variables	Theory	Predicted Sign	(1) OLS-LEV	(2) AH-DIF	(3) GMM-LEV1	(4) GMM-DIF1	(5) GMM-LEV2
$MATURITY_{i,t-1}$	D	+	0.6955***	0.3135**	0.8121***	0.4890***	0.8074***
			(0.0174)	(0.1339)	(0.0220)	(0.0603)	(0.0248)
$TAX RATE_{i,t}$	T	-/+	0.0007	-0.0005	-0.0003	-0.0016	0.0197
			(0.0031)	(0.0036)	(0.0033)	(0.0039)	(0.0341)
$TAX RATE_{i,t-1}$			-0.0006	-0.0010	-0.0013	-0.0017	-0.0030
			(0.0026)	(0.0036)	(0.0028)	(0.0039)	(0.0031)
$EARNINGS VOL_{i,t}$	T	-	0.0002	-0.0004	0.0002	0.0000	0.0005
			(0.0004)	(0.0005)	(0.0005)	(0.0004)	(0.0008)
$EARNINGS VOL_{i,t-1}$			0.0000	0.0002	0.0001	0.0005*	0.0000
			(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0001)
TERM-STRUCTURE	T	+	0.0036*	0.0025	0.0042*	0.0054*	0.0044*
			(0.0021)	(0.0032)	(0.0022)	(0.0030)	(0.0025)
INTEREST VOLATILITY	T	+	0.0144	0.0057	0.0105	0.0093	0.0129
			(0.0220)	(0.0249)	(0.0231)	(0.0272)	(0.0271)
$LIQUIDITY_{i,t}$	LS	-/+	0.0036***	0.0043***	0.0036***	0.0047***	0.0006
			(0.0007)	(0.0005)	(0.0009)	(0.0007)	(0.0010)
$LIQUIDITY_{i,t-1}$			-0.0015	0.0016	-0.0023*	0.0013	0.0000
			(0.0009)	(0.0010)	(0.0013)	(0.0009)	(0.0008)
$LEVERAGE_{i,t}$	LS	-/+	-0.1518***	-0.2010***	-0.1430**	-0.1595**	0.2683
			(0.0568)	(0.0763)	(0.0615)	(0.0795)	(0.1865)
$LEVERAGE_{i,t-1}$			0.2099***	0.1971***	0.1967***	0.2042***	-0.1803
			(0.0571)	(0.0755)	(0.0629)	(0.0752)	(0.1671)
$QUALITY_{i,t}$	LS	-	-0.0089	-0.0031	-0.0066	-0.0062	-0.0041
			(0.0099)	(0.0113)	(0.0106)	(0.0133)	(0.0575)
$QUALITY_{i,t-1}$			-0.0281*	-0.0219	-0.0266	-0.0282	0.0031
			(0.0154)	(0.0158)	(0.0171)	(0.0187)	(0.0326)
$MKT-TO-BOOK_{i,t}$	C	-/+	0.0105	0.0101	0.0077	0.0055	0.0169
			(0.0065)	(0.0082)	(0.0083)	(0.0103)	(0.0264)
$MKT-TO-BOOK_{i,t-1}$			-0.0145**	0.0028	-0.0095	-0.0062	-0.0159
			(0.0068)	(0.0109)	(0.0083)	(0.0111)	(0.0226)
$SIZE_{i,t}$	C	+	-0.0016	0.0189	-0.0035	0.0182	0.0577
			(0.0134)	(0.0158)	(0.0146)	(0.0172)	(0.0669)
$SIZE_{i,t-1}$			0.0023	0.0101	0.0057	0.0082	-0.0546
			(0.0134)	(0.0119)	(0.0149)	(0.0151)	(0.0666)
$ASSET MATURITY_{i,t}$	C	+	0.0019***	0.0019***	0.0018***	0.0020***	0.0009
			(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0012)
$ASSET MATURITY_{it-1}$			-0.0008	-0.0009	-0.0009	-0.0008	-0.0003
			(0.0006)	(0.0012)	(0.0006)	(0.0008)	(0.0009)
EQUITY PREMIUM	M	-/+	-0.0002	0.0000	-0.0002	0.0000	-0.0003
			(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
SHARE-PRICE PERF	M	+	0.0317***	0.0041	0.0240*	-0.0010	0.0156
			(0.0122)	(0.0131)	(0.0129)	(0.0147)	(0.0216)
Correlation1			-4.960***	-4.483***	-5.486***	-10.83***	-5.521***
Correlation2			1.281	-0.8476	-1.464	0.6364	-1.688*
Sargan Test (df)			-	-	18.37 (11)*	14.81 (10)	104.3 (99)
Wald Test-1 (df)			1980 (21)***	98.93 (21)***	1794 (21)***	179 (21)***	2033 (21)***
Wald Test-2 (df)			61.36 (14)***	-	39.47 (14)***	-	22.03 (14)*
R^2			0.5273	-	0.5150	-	0.4819
Firms / Observations			484 / 3618	440 / 3076	484 / 3618	449 / 3134	484 / 3618
Estimation Period			1989-1999	1990-1999	1989-1999	1999-1999	1989-1999

Table V: Dynamic corporate debt maturity structure in the UK: Alternative Estimations

			Dependent Variable:	$MATURITY_{i,t}$			
Independent Variables	Theory	Predicted Sign	(1) OLS-LEV	(2) AH-DIF	(3) GMM-LEV1	(4) GMM-DIF1	(5) GMM-LEV2
$MATURITY_{i,t-1}$	D	+	0.7274***	0.3280***	0.8125***	0.3322***	0.8256***
			(0.0072)	(0.0595)	(0.0155)	(0.0519)	(0.0083)
$TAX\ RATE_{i,t}$	T	-/+	0.0011	-0.0007	-0.0503	-0.1431**	-0.0222
			(0.0023)	(0.0024)	(0.0353)	(0.0636)	(0.0171)
$TAX\ RATE_{i,t-1}$			-0.0032	-0.0049	0.0019	-0.0754**	-0.0010
			(0.0036)	(0.0036)	(0.0065)	(0.0319)	(0.0054)
$EARNINGS\ VOL_{i,t}$	T	-	0.0000	0.0001	0.0003	-0.0032	-0.0018*
			(0.0002)	(0.0002)	(0.0097)	(0.0058)	(0.0010)
$EARNINGS\ VOL_{i,t-1}$			-0.0002	-0.0002	0.0000	-0.0017	0.0000
			(0.0002)	(0.0002)	(0.0010)	(0.0027)	(0.0004)
TERM-STRUCTURE	T	+	0.0014***	0.0010	-0.0010	0.0000	0.0013**
			(0.0005)	(0.0006)	(0.0013)	(0.0012)	(0.0006)
INTEREST VOLATILITY	T	+	-0.0146***	-0.0078*	-0.0057	-0.0089	-0.0093*
			(0.0043)	(0.0046)	(0.0086)	(0.0062)	(0.0056)
$LIQUIDITY_{i,t}$	LS	-/+	0.0705***	0.0936***	0.2909***	0.4433***	0.0452**
			(0.0186)	(0.0169)	(0.0711)	(0.0876)	(0.0220)
$LIQUIDITY_{i,t-1}$			-0.0602***	-0.0154	-0.2459***	0.0345	-0.0483**
			(0.0184)	(0.0159)	(0.0621)	(0.0514)	(0.0194)
$LEVERAGE_{i,t}$	LS	-/+	-0.0093	-0.0325	-0.0019	0.9193***	-0.2051
			(0.0379)	(0.041)	(0.4419)	(0.3278)	(0.1523)
$LEVERAGE_{i,t-1}$			0.1506***	0.2188***	0.0464	0.2433**	0.2679**
			(0.0388)	(0.0382)	(0.3678)	(0.0955)	(0.1251)
$QUALITY_{i,t}$	LS	-	-0.0183***	-0.0233**	0.0770	0.0823	-0.0992
			(0.0087)	(0.0101)	(0.2054)	(0.1828)	(0.0624)
$QUALITY_{i.t-1}$			0.0192*	0.0011	0.0095	0.0847	0.0022
			(0.0113)	(0.0109)	(0.0501)	(0.1072)	(0.0186)
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	0.0001	-0.0005	0.0116	-0.0213	0.0069*
			(0.0009)	(0.0016)	(0.015)	(0.0195)	(0.0040)
$MKT\text{-}TO\text{-}BOOK_{i,t-1}$			-0.0007	-0.0008	-0.0026	-0.0039	-0.0044*
			(0.0010)	(0.0017)	(0.0096)	(0.0082)	(0.0023)
$SIZE_{i,t}$	C	+	0.0491***	0.0416***	-0.0772	-0.0335	0.0224
			(0.0077)	(0.0104)	(0.0745)	(0.0671)	(0.0262)
$SIZE_{i,t-1}$			-0.0340***	-0.0054	0.0909	0.0192	-0.0135
			(0.0077)	(0.0097)	(0.0727)	(0.035)	(0.0257)
$ASSET\ MATURITY_{i,t}$	C	+	0.0013***	0.0013***	0.0108***	0.0064	0.0000
			(0.0002)	(0.0003)	(0.0037)	(0.0045)	(0.0007)
$ASSET\ MATURITY_{it-1}$			-0.0004**	0.0004	-0.0076***	0.0016*	0.0004
			(0.0002)	(0.0003)	(0.0028)	(0.0008)	(0.0006)
EQUITY PREMIUM	M	-/+	0.0002***	0.0002***	0.0003	0.0000	0.0003***
			(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
SHARE-PRICE PERF	M	+	0.0061	0.0055	0.0000	0.0098	0.0011
			(0.0038)	(0.0042)	(0.0204)	(0.0101)	(0.0066)
Correlation1			-11***	-9.993***	-3.447***	-3.922***	-12.21***
Correlation2			2.595***	1.093	-0.2577	-2.499**	-3.586***
Sargan Test (df)			-	-	37.49 (21)**	29.02 (20)*	387(261)***
Wald Test-1 (df)			24540 (21)***	280.1 (21)***	16030 (21)***	679.3 (21)***	22520 (21)***
Wald Test-2 (df)			86.79 (15)***	-	49.88 (15)***	-	36.44 (15)***
R^2			0.6142	-	0.3623	-	0.5958
Firms / Observations			2216 / 26022	1938 / 23235	2216 / 26022	1981 / 23806	2216 / 26022
Estimation Period			1971-1999	1972-1999	1971-1999	1972-1999	1971-1999

Table VI: Dynamic corporate debt maturity structure: GMM-DIF vs. Within Group estimations

			Dependent Variable:	$MATURITY_{i,t}$				
Independent Variables	Theory	Predicted Sign	**FRANCE**		**GERMANY**		**UK**	
			WITHIN	*GMM-DIF2*	*WITHIN*	*GMM-DIF2*	*WITHIN*	*GMM-DIF2*
$MATURITY_{i,t-1}$	D	+	0.3319***	0.3390***	0.3427***	0.4667***	0.5321***	0.5628***
			(0.0371)	(0.0779)	(0.0260)	(0.0641)	(0.0099)	(0.0232)
$TAX\ RATE_{i,t}$	T	-/+	-0.0027	-0.0076	0.0023	0.0085	-0.0002	-0.0047
			(0.0068)	(0.0099)	(0.0034)	(0.0059)	(0.0024)	(0.0204)
$TAX\ RATE_{i,t-1}$			-0.0002	-0.0034	0.0011	0.0032	-0.0038	-0.0019
			(0.0070)	(0.0090)	(0.0036)	(0.0046)	(0.0034)	(0.0106)
$EARNINGS\ VOL_{i,t}$	T	-	-0.0003	-0.0010	-0.0002	-0.0011	0.0001	-0.0006
			(0.0020)	(0.0047)	(0.0004)	(0.0008)	(0.0002)	(0.0007)
$EARNINGS\ VOL_{i,t-1}$			0.0002	0.0001	-0.0001	-0.0003	-0.0001	-0.0006
			(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0005)
TERM-STRUCTURE	T	+	-0.0021	0.0013	0.0037	0.0028	0.0019***	0.0014**
			(0.0026)	(0.0039)	(0.0023)	(0.0026)	(0.0005)	(0.0007)
INTEREST VOLATILITY	T	+	-0.0035	-0.0030	0.0204	0.0139	-0.0125***	-0.0091*
			(0.0071)	(0.0069)	(0.0214)	(0.0258)	(0.0045)	(0.0052)
$LIQUIDITY_{i,t}$	LS	-/+	0.1194**	0.0879*	0.0043***	0.0067***	0.0802***	0.0745***
			(0.0541)	(0.0525)	(0.0007)	(0.0017)	(0.0203)	(0.0207)
$LIQUIDITY_{i,t-1}$			-0.0107	-0.0486	0.0008	0.0029**	-0.0384**	-0.0521***
			(0.0257)	(0.0310)	(0.0009)	(0.0012)	(0.0165)	(0.0163)
$LEVERAGE_{i,t}$	LS	-/+	0.1054	0.0742	-0.1034*	-0.1630	0.0169	-0.0017
			(0.0771)	(0.1406)	(0.0604)	(0.1747)	(0.0407)	(0.0719)
$LEVERAGE_{i,t-1}$			0.1554**	0.2035**	0.2306***	0.1971***	0.2148***	0.1895***
			(0.0648)	(0.0933)	(0.0600)	(0.0764)	(0.0372)	(0.0400)
$QUALITY_{i,t}$	LS	-	0.0252***	0.0237	-0.0084	0.0284	-0.0130	-0.0077
			(0.0063)	(0.0146)	(0.0134)	(0.0302)	(0.0094)	(0.0470)
$QUALITY_{i.t-1}$			-0.0019	-0.0009	-0.0292**	0.0053	0.0194*	0.0140
			(0.0052)	(0.0115)	(0.0148)	(0.0296)	(0.0107)	(0.0285)
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	0.0058	-0.0180	0.0093	-0.0111	-0.0011	0.0024
			(0.0113)	(0.0225)	(0.0069)	(0.0240)	(0.0014)	(0.0045)
$MKT\text{-}TO\text{-}BOOK_{i,t-1}$			-0.0007	-0.0063	-0.0025	-0.0061	-0.0027*	-0.0002
			(0.0149)	(0.0178)	(0.0073)	(0.0134)	(0.0015)	(0.0021)
$SIZE_{i,t}$	C	+	0.0417**	0.0222	0.0099	0.0484	0.0525***	0.0038
			(0.0173)	(0.0519)	(0.0127)	(0.0402)	(0.0085)	(0.0169)
$SIZE_{i,t-1}$			-0.0504***	-0.0580***	-0.0003	0.0060	-0.0216***	-0.0032
			(0.0173)	(0.0200)	(0.0118)	(0.0173)	(0.0082)	(0.0124)
$ASSET\ MATURITY_{i,t}$	C	+	0.0039***	0.0001	0.0022***	0.0027**	0.0013***	0.0003
			(0.0015)	(0.0036)	(0.0007)	(0.0012)	(0.0002)	(0.0005)
$ASSET\ MATURITY_{it-1}$			-0.002	-0.0030	-0.0012*	-0.0005	0.0000	0.0000
			(0.0017)	(0.0026)	(0.0006)	(0.0008)	(0.0002)	(0.0003)
EQUITY PREMIUM	M	-/+	-0.0001	0.0004	-0.0004	0.0000	0.0002**	0.0002***
			(0.0002)	(0.0004)	(0.0002)	(0.0003)	(0.0001)	(0.0001)
SHARE-PRICE PERF	M	+	0.0112	-0.0167	0.0292**	-0.0125	0.0126***	0.0076
			(0.0116)	(0.0304)	(0.0124)	(0.0148)	(0.0040)	(0.0056)
Correlation1			-2.659***	-4.662***	-3.614***	-8.422***	-5.918***	-18.66***
Correlation2			-0.0841	1.573	-3.786***	0.4788	1.126	2.310**
Sargan Test (df)			-	121.6 (113)	-	103 (90)	-	473.9 (504)
Wald Test-1 (df)			277.2 (21)***	53.31 (21)***	278.9 (21)***	177.8 (21)***	5154 (21)***	963.7 (21)***
R^2			0.2125	-	0.1354	-	0.3478	-
Firms / Observations			249 / 2104	249 / 1855	449 / 3583	449 / 3134	1981 / 25787	1981/ 23806
Estimation Period			1985-1999	1986-1999	1989-1999	1990-1999	1971-1999	1972-1999

Table VII: Corporate debt maturity structure: Short-run and long-run equilibrium

Dependent Variable: MATURITY$_{i,t}$						
Independent Variables	Theory	Predicted Sign	General		Specific	
			Short-run	*Long-run*	*Short-run*	*Long-run*
MATURITY$_{i,t-1}$	D	+	0.6772***	-	0.6885***	-
			(0.0261)	-	(0.0273)	-
TAX RATE$_{i,t}$	T	-/+	0.0195	0.0693	0.0164	0.0528
			(0.0153)	(0.0607)	(0.0173)	(0.0554)
TAX RATE$_{i,t-1}$			0.0029	-	-	-
			(0.0052)	-	-	-
EARNINGS VOL$_{i,t}$	T	-	-0.0004	-0.0022	-0.0007	-0.0022
			(0.0008)	(0.0030)	(0.0008)	(0.0027)
EARNINGS VOL$_{i,t-1}$			-0.0003	-	-	-
			(0.0003)	-	-	-
TERM-STRUCTURE	T	+	0.0015**	0.0045**	0.0016***	0.0052***
			(0.0006)	(0.0020)	(0.0006)	(0.0019)
INTEREST VOLATILITY	T	+	-0.0104**	-0.0321**	-0.0083*	-0.0266*
			(0.0045)	(0.0140)	(0.0043)	(0.0139)
LIQUIDITY$_{i,t}$	LS	-/+	0.0063**	0.0057	0.0059**	0.0050
			(0.0032)	(0.0074)	(0.0029)	(0.0072)
LIQUIDITY$_{i,t-1}$			-0.0044**	-	-0.0043**	-
			(0.0022)	-	(0.0020)	-
LEVERAGE$_{i,t}$	LS	-/+	-0.1308	0.4345***	-0.1028	0.4776***
			(0.1089)	(0.1402)	(0.1097)	(0.1485)
LEVERAGE$_{i,t-1}$			0.2711***	-	0.2516***	-
			(0.0686)	-	(0.0683)	-
QUALITY$_{i,t}$	LS	-	0.0022	-0.0007	0.0302	0.0971
			(0.0424)	(0.1815)	(0.0231)	(0.0749)
QUALITY$_{i,t-1}$			-0.0025	-	-	-
			(0.0178)	-	-	-
MKT-TO-BOOK$_{i,t}$	C	-/+	0.0040	0.0211	0.0038	0.0123
			(0.0052)	(0.0145)	(0.0038)	(0.0121)
MKT-TO-BOOK$_{i,t-1}$			0.0029	-	-	-
			(0.0021)	-	-	-
SIZE$_{i,t}$	C	+	-0.0389*	0.0329***	-0.0339*	0.0315***
			(0.0220)	(0.0041)	(0.0176)	(0.0042)
SIZE$_{i,t-1}$			0.0495**	-	0.0437***	-
			(0.0214)	-	(0.0168)	-
ASSET MATURITY$_{i,t}$	C	+	0.0009	0.0032***	0.0002	0.0006
			(0.0008)	(0.0012)	(0.0005)	(0.0017)
ASSET MATURITY$_{it-1}$			0.0001	-	-	-
			(0.0005)	-	-	-
EQUITY PREMIUM	M	-/+	0.0002***	0.0006***	0.0002***	0.0006
			(0.00007)	(0.0002)	(0.0001)	(0.0002)
SHARE-PRICE PERF	M	+	0.0087*	0.0270*	0.0089*	0.0285*
			(0.0052)	(0.0160)	(0.0048)	(0.0154)
Dummy Germany			-0.0086	-0.0265	-0.0079	-0.0253
			(0.0089)	(0.0280)	(0.0083)	(0.0269)
Dummy UK			0.0306***	0.0948***	0.0329***	0.1056***
			(0.0108)	(0.0320)	(0.0104)	(0.0314)
Constant			-0.0199	-	-0.0100	-
			(0.0286)	-	(0.0280)	-

Table VIII: Dynamic corporate debt maturity structure: system-GMM estimations

Dependent Variable: $MATURITY_{i,t}$

Independent Variables	Theory	Predicted Sign	FRANCE		GERMANY		UK	
			General	*Specific*	*General*	*Specific*	*General*	*Specific*
$MATURITY_{i,t-1}$	D	+	0.4370***	0.4258***	0.4970***	0.4988***	0.6412***	0.6347***
			(0.0535)	(0.0488)	(0.0433)	(0.0381)	(0.0216)	(0.0223)
$TAX\ RATE_{i,t}$	T	-/+	-0.0212	-0.0181	0.0092	0.0186*	0.0020	0.0034
			(0.0155)	(0.0185)	(0.0057)	(0.0102)	(0.0185)	(0.0205)
$TAX\ RATE_{i,t-1}$			-0.0056	-	0.0014	-	-0.0014	-
			(0.0088)	-	(0.0031)	-	(0.0058)	-
$EARNINGS\ VOL_{i,t}$	T	-	0.0056**	0.0052*	-0.0005	0.0000	-0.0005	-0.0009
			(0.0027)	(0.0031)	(0.0006)	(0.0006)	(0.0007)	(0.0011)
$EARNINGS\ VOL_{i,t-1}$			0.0001	-	0.0001	-	-0.0005	-
			(0.0002)	-	(0.0003)	-	(0.0003)	-
TERM-STRUCTURE	T	+	-0.0034	-0.0038	0.0027	0.0017	0.0016***	0.0021***
			(0.0027)	(0.0026)	(0.0022)	(0.0021)	(0.0006)	(0.0006)
INTEREST VOLATILITY	T	+	-0.0002	0.0053	0.0117	0.0191	-0.0102**	-0.0119**
			(0.0076)	(0.0073)	(0.0233)	(0.0218)	(0.0052)	(0.0053)
$LIQUIDITY_{i,t}$	LS	-/+	0.0417	0.0277	0.0030***	0.0028***	0.0326***	0.0278**
			(0.0322)	(0.0243)	(0.0009)	(0.0009)	(0.0111)	(0.0111)
$LIQUIDITY_{i,t-1}$			-0.0200	-	-0.0001	-	-0.0382***	-0.0301***
			(0.0166)	-	(0.0005)	-	(0.0099)	(0.0090)
$LEVERAGE_{i,t}$	LS	-/+	-0.0387	-0.1017	0.1187	0.0480	-0.1044	-0.0884
			(0.1162)	(0.0999)	(0.1516)	(0.0732)	(0.0887)	(0.0945)
$LEVERAGE_{i,t-1}$			0.1737*	0.2360***	0.0043	-	0.2380***	0.2370***
			(0.0897)	(0.0814)	(0.1218)	-	(0.0544)	(0.0573)
$QUALITY_{i,t}$	LS	-	0.0191	0.0087	-0.0033	-0.0006	-0.0708*	-0.0613
			(0.0138)	(0.0093)	(0.0313)	(0.0299)	(0.0402)	(0.0462)
$QUALITY_{i,t-1}$			-0.0056	-	-0.0128	-	0.0023	-
			(0.0075)	-	(0.0257)	-	(0.0212)	-
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	0.0023	0.0071	0.0256	0.0094	0.0059*	0.0073**
			(0.0176)	(0.0127)	(0.0209)	(0.0107)	(0.0035)	(0.0036)
$MKT\text{-}TO\text{-}BOOK_{i,t-1}$			0.0102	-	-0.0233	-	0.0008	-
			(0.0186)	-	(0.0154)	-	(0.0017)	-
$SIZE_{i,t}$	C	+	0.0288	0.0044	-0.0161	0.0063	-0.0178	-0.0269
			(0.0231)	(0.0085)	(0.0275)	(0.0088)	(0.0205)	(0.0201)
$SIZE_{i,t-1}$			-0.0276	-	0.0142	-	0.0355*	0.0440**
			(0.0229)	-	(0.027)	-	(0.0199)	(0.0194)
$ASSET\ MATURITY_{i,t}$	C	+	0.0020	0.0013	0.0013*	0.0014	0.0007	0.0004
			(0.0019)	(0.0018)	(0.0008)	(0.0010)	(0.0006)	(0.0004)
$ASSET\ MATURITY_{it-1}$			-0.0002	-	-0.0005	-	0.0003	-
			(0.0015)	-	(0.0006)	-	(0.0004)	-
EQUITY PREMIUM	M	-/+	0.0000	0.0000	-0.0003	-0.0001	0.0002***	0.0002***
			(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0001)	(0.0001)
SHARE-PRICE PERF	M	+	0.0103	0.0167	0.0253*	0.0150	0.0079*	0.0068
			(0.0129)	(0.0123)	(0.0151)	(0.0132)	(0.0050)	(0.0052)
Constant			0.1945*	0.1442	0.2593***	0.1697	-0.0182	-0.0091
			(0.1094)	(0.1333)	(0.0724)	(0.1369)	(0.0260)	(0.0273)
Correlation1			-5.681***	-6.065***	-8.810***	-9.094***	-19.81***	-19.76***
Correlation2			1.0815	1.0909	0.5639	0.3629	2.662***	2.659***
Sargan Test (df)			210.2 (602)	248.9 (611)	261.3 (296)	283.2 (305)	731.2 (764)	645 (679)
Wald Test-1 (df)			160.5 (21)***	158.3 (14)***	289.2 (21)***	194.7 (13)***	3853 (21)***	3695 (16)***
Wald Test-2 (df)			23.45 (14)*	37.22 (15)***	45.12 (14)***	36.51 (14)***	51.26 (15)***	60.73 (15)***
R^2			0.4938	0.4749	0.4786	0.4493	0.5985	0.5906
Firms / Observations			249 / 2104	283 / 2317	449 / 3583	455 /3823	1981 / 25787	2106 /27333
Estimation Period			1986-1999	1985-1999	1990-1999	1989-1999	1972-2000	1971-1999

Table IX: Static long-run relationship between debt maturity and firm- and market-specific factors

Dependent Variable: $MATURITY_{i,t}$								
Independent Variables	Theory	Predicted Sign	**FRANCE**		**GERMANY**		**UK**	
			General	*Specific*	*General*	*Specific*	*General*	*Specific*
$TAX\ RATE_{i,t}$	T	-/+	-0.0476	-0.0316	0.0210	0.0344*	0.0018	0.0094
			(0.0370)	(0.0317)	(0.0145)	(0.0190)	(0.0628)	(0.0562)
$EARNINGS\ VOL_{i,t}$	T	-	0.0101**	0.0091*	-0.0008	-0.0001	-0.0027	-0.0024
			(0.0047)	(0.0054)	(0.0014)	(0.0012)	(0.0021)	(0.003)
TERM-STRUCTURE	T	+	-0.0061	-0.0067	0.0054	0.0032	0.0044***	0.0059***
			(0.0049)	(0.0047)	(0.0044)	(0.0040)	(0.0017)	(0.0017)
INTEREST VOLATILITY	T	+	-0.0003	0.0092	0.0233	0.0353	-0.0284**	-0.0326**
			(0.0135)	(0.0127)	(0.0465)	(0.0403)	(0.0144)	(0.0146)
$LIQUIDITY_{i,t}$	LS	-/+	0.0386	0.0483	0.0059***	0.0052***	-0.0156	-0.0063
			(0.0346)	(0.0418)	(0.0020)	(0.0016)	(0.0194)	(0.0181)
$LEVERAGE_{i,t}$	LS	-/+	0.2398*	0.2340**	0.2444**	0.0900	0.3724***	0.4066***
			(0.1409)	(0.1135)	(0.0980)	(0.1356)	(0.1236)	(0.1242)
$QUALITY_{i,t}$	LS	-	0.0239	0.0151	-0.0320	-0.0011	-0.1909	-0.1678
			(0.0364)	(0.0162)	(0.1086)	(0.0552)	(0.1608)	(0.1266)
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	0.0223	0.0124	0.0044	0.0173	0.0188**	0.0199**
			(0.0171)	(0.0222)	(0.0157)	(0.0199)	(0.0095)	(0.0100)
$SIZE_{i,t}$	C	+	0.0021	0.0076	-0.0039	0.0117	0.0493***	0.0467***
			(0.0092)	(0.0148)	(0.0072)	(0.0163)	(0.0042)	(0.0044)
$ASSET\ MATURITY_{i,t}$	C	+	0.0031*	0.0023	0.0017	0.0026	0.0029***	0.0011
			(0.0019)	(0.0031)	(0.0015)	(0.0018)	(0.0009)	(0.0012)
EQUITY PREMIUM	M	-/+	-0.0001	0.0000	-0.0005	-0.0002	0.0006***	0.0006***
			(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0002)	(0.0002)
SHARE-PRICE PERF	M	+	0.0182	0.0291	0.0502*	0.0277	0.0219*	0.0186
			(0.0228)	(0.0214)	(0.0293)	(0.0239)	(0.0133)	(0.0140)

The results above are based on the models in Table VIII. See notes in Table II for variable definitions. Industry dummies are included in all models in Table VIII. Correlation 1 and 2 are first and second order autocorrelation of residuals, respectively; which are asymptotically distributed as N(0,1) under the null of no serial correlation. Sargan Test is test of the overidentifying restrictions, asymptotically distributed as χ^2(df) under the null of instruments' validity. Wald Tests 1 and 2 test the joint significance of estimated coefficients, and of industry dummies, respectively; asymptotically distributed as χ^2(df) under the null of no relationship. (*), (**) and (***) indicates that coefficients are significant or the relevant null is rejected at 10, 5 and 1 percent level, respectively.

Table X: Static debt maturity structure using system-GMM estimations

Independent Variables	Theory	Predicted Sign	Dependent Variable: $MATURITY_{i,t}$ FRANCE	GERMANY	UK
$TAX\ RATE_{i,t}$	T	-/+	-0.0458**	0.0280*	-0.0386*
			(0.0222)	(0.0162)	(0.0215)
$EARNINGS\ VOL_{i,t}$	T	-	0.0000	0.0003	0.0001
			(0.0002)	(0.0006)	(0.0008)
TERM-STRUCTURE	T	+	-0.0023	-0.0012	0.0043***
			(0.004)	(0.0028)	(0.0009)
INTEREST VOLATILITY	T	+	0.0061	-0.0345	0.0148**
			(0.0075)	(0.0264)	(0.0074)
$LIQUIDITY_{i,t}$	LS	-/+	0.0330	0.0033**	0.0356**
			(0.0345)	(0.0013)	(0.0174)
$LEVERAGE_{i,t}$	LS	-/+	0.2184**	0.0514	0.2778***
			(0.1107)	(0.1006)	(0.0836)
$QUALITY_{i,t}$	LS	-	0.0108	-0.0165	-0.1817***
			(0.0075)	(0.0305)	(0.0681)
$MKT\text{-}TO\text{-}BOOK_{i,t}$	C	-/+	-0.0073	-0.0021	0.0085
			(0.0147)	(0.0127)	(0.0055)
$SIZE_{i,t}$	C	+	0.0142	0.0149	0.0776***
			(0.0118)	(0.0135)	(0.0067)
$ASSET\ MATURITY_{i,t}$	C	+	0.0012	0.0007	0.0012**
			(0.0024)	(0.0015)	(0.0006)
EQUITY PREMIUM	M	-/+	-0.0003	-0.0007*	0.0007***
			(0.0004)	(0.0004)	(0.0002)
SHARE-PRICE PERF	M	+	0.0362*	0.0829***	0.0067
			(0.0214)	(0.0321)	(0.0134)
Constant			0.2264	0.3800*	-0.3671***
			(0.1862)	(0.1969)	(0.0861)
Correlation1			-5.292***	-7.627***	-17.16***
Correlation2			0.0501	0.8470	-6.614***
Sargan Test (df)			239.9 (340)	257.5 (267)	409.8 (451)
Wald Test-1 (df)			28.51 (12)***	21.43 (12)**	251.4 (12)***
Wald Test-2 (df)			61.54 (15)***	45.92 (14)***	115.3 (15)***
R^2			0.0783	0.0463	0.1310
Firms / Observations			283 / 2322	458 / 3894	2152 / 28113
Estimation Period			1985-1999	1989-1999	1971-1999

See notes in Table IX.

Notes for Tables III to VII

See notes in Table II for variable definitions. Letters in "theory" column represent the maturity theory each variable belongs to; D (maturity dynamics), T (taxes), LS (liquidity and signalling), C (contracting costs), and M (market factors). Model-1 is OLS estimation in levels. Model 2 is Anderson-Hsiao type estimation in differences, where $MATURITY_{it-2}$ (Table III) or $\Delta MATURITY_{it-2}$ (Tables IV and V) is instrumented for $\Delta MATURITY_{it-1}$. Models 3 and 4 are GMM estimates in levels and first differences, respectively, where only $MATURITY_{t-1}$ is treated as endogenous. Model 5 is GMM estimates in levels, where all firm-specific variables are treated as endogenous. Within-Groups (Table VI) is fixed-effects estimation. GMM-DIF2 (Table VI) is GMM estimates in first differences, where all firm-specific variables are treated as endogenous. Industry dummies are included in Models 1, 3 and 5. Correlation 1 and 2 are first and second order autocorrelation of residuals, respectively; which are asymptotically distributed as N(0,1) under the null of no serial correlation. Sargan Test is test of the overidentifying restrictions, asymptotically distributed as χ^2(df) under the null of instruments' validity. Wald Tests 1 and 2 test the joint significance of estimated coefficients, and of industry dummies, respectively; asymptotically distributed as χ^2(df) under the null of no relationship. The coefficients of intercept terms are not reported. (*), (**) and (***) indicates that coefficients are significant or the relevant null is rejected at 10, 5 and 1 percent level, respectively.

Diagnostics for Table VII:

	General	Specific
Correlation1	-20.04***	-20.03***
Correlation2	3.241***	3.283***
Sargan Test (df)	506 (512)	502 (512)
Wald Test-1 (df)	3474 (23)***	3318 (18)***
Wald Test-2 (df)	48.23 (15)***	50.06 (15)***
R^2	0.5862	0.5815
Firms / Observations	2679 / 31502	2844 / 33494
Estimation Period	1972-1999	1971-1999