RISK AND FIRM VALUE IN EUROPEAN COMPANIES: A DYNAMIC PANEL DATA APPROACH

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Abstract: *Recent uncertainties in financial markets and several company bankruptcies reinforce the relationship between risk and return as a cornerstone in corporate finance. Enterprise risk management theories offer unambiguous predictions about the relation between firm value and risk. The main aim of the paper is to provide new empirical evidence on the risk as a driver for company value creation process for European developed countries over the period 2001-2011. Using dynamic panel data model with two-step GMM-SYS method and enterprise multiple as a new approach to measure for firm value the results suggest that firm value is negatively related with risk, which is consistent with Bowman's risk and return paradox. The negative relation between firm value and risk is robust through alternative measures, but it does not hold for companies from civil law countries. Additional control variables included in the model are significant and suggest that both growth and capital structure are negatively related with firm value.*

Keywords: firm value, risk, growth, profitability, capital structure, dynamic panel models

JEL classification: G 32, G 33

1. Introduction

Recent uncertainties in financial markets and several company bankruptcies reinforce the relationship between risk and return as a cornerstone in corporate finance. However, the classical debate is centered on the sign of this relation, i.e. if is positive, negative or curvilinear. According to this topic, company's creation value process arouses a considerable concern by researchers and practitioners. This increasing topic is related to the business strategy which is not only about survival, but about creating and maximizing value. In this way, a lot of emphasize is focused on which factors could either create or destroy value.

Much of the empirical works concluded that wealth is maximized when company maximizes its total market value. According to the capital structure theory, which assume that companies use both equity and debt for financing, would lead to the conclusion that total value is not only the value of the equity but also includes the market values of all other financial claims, such as debt, preferred stock, and warrants. Thus, the total value of a company is reflected better by gathering values of equity and debt.

The desiderate of maximizing the stockholder's wealth has been widely accepted by strategic management through what is called value based planning. Value based planning provides a framework for using company value as a strategic performance measure. Value based planning includes among others parts understanding what create and affect the value of the company. Companies, as complex organizations, could not act directly on value, rather it could act indirectly, through issues that can have influence, called value drivers. Value drivers are either tangible or intangible elements which improve the perceived value of the company. There can be identified two types of value drivers, external which are considered to be out of the firm's control and internal which can be controlled by management. Thus, it is essential to highlight value drivers closely related to

strategies and explain the causal impact of the economic environment that leads these changes.
The agency theory states a positive relationship between risk and return which arise from risk-averse behavior (Ross, 1973). This theory is supported by several empirical works, whereas the using of beta from capital assets pricing model (CAPM) suggest a positive relationship with return (Maurer, 2008).
Another strand of the literature, starting with empirical works of Bowman found a negative relationship between risk and return. This is known as Bowman's paradox which state that decision makers are risk-seeking and assume higher risk for lower return (Bowman, 1980 and 1982). Bowman's paradox was also confirmed by other empirical works (Andersen et al., 2007).
Most of empirical works have focused on the relation between risk and return rather than the relation between risk and firm value and use variables such as ROA or ROE to measure return. At the same time, here is a large literature focused on company value creation process, both in emerging and developed markets. While most of empirical works tested for growth and profitability as main drivers for firm value, there is little investigation on the relation between risk and firm value. For companies from emerging markets empirical evidence highlight a positive relation (Pandey, 2005). On the contrary, for companies from developed markets, particularly USA, the results exhibit that an increase in total risk is associated with a fall in firm value (Shin and Stulz, 2000).
Based on previous studies, a strikingly question emerges regarding the risk-firm value relation: what is the pattern for companies from European developed markets? In this respect, the main aim of the paper is to provide new empirical evidence on the risk as a driver for company value creation process for European developed countries over the period 2001-2011. In order to avoid misspecification and to check if the sign of risk-value relation remains unchanged, four control variables were added. Lastly, dynamic panel data model with two-step GMM-SYS method was employed, and enterprise multiple as a new approach was used to measure for firm value. The results suggest that firm value is negatively related with risk, which is consistent with Bowman's risk and return paradox.
The paper is organized as follows. The next section reviews theoretical considerations and empirical findings regarding what are the drivers that explain company value creation process with a focus on risk. The third section describes the data, variables used in the model, and methodological framework. Section four presents the results for dynamic panel model, whilst section five concludes.

2. Literature review

The literature of company value creation is large, debatable and contradictory, especially when is referred to the most significant determinants. Nevertheless, there is no doubt that the firm's goal is maximizing the stockholder's wealth (Ben Naceur and Goaied, 2002). Value based planning models require the assumption that value is created if market value exceeds book value, value is destroyed on the opposite situation, and value is sustained in an equality relation between market value and book value. In order to highlight the strategy of a company, it is essential to determine the factors that drive the value of a company.
It is standard in literature that risk is closely related with return but, at the same time, risk is assumed depending on decision maker behavior. Decision theory acknowledges three behaviors towards risk (Tobin, 1958). First is referred to risk-averse where at the same level of expected return less risky investments are selected. Second is referred to risk-seeking where at the same level of expected return riskier investments are selected. Third is referred to risk neutral where investment selection is independent of risk level.
Starting from previous behaviors and empirical findings there were developed three major theories regarding the relationship between risk and return. Basic risk management theory states that in perfect markets firm value is independent of risk (Modigliani and Miler, 1958).

In practice, the efficient market hypothesis is rejected, and risks can lead to deadweight costs (Nocco and Stulz, 2006). The agency theory, based on hypotheses of rational behavior and economic utility, state a positive relationship which arise from risk-averse behavior (Ross, 1973). This theory is supported by several empirical works, whereas the using of beta from capital assets pricing model (CAPM) suggest a positive relationship with return (Fletcher, 2000; Maurer, 2008).
Another strand of the literature, starting with empirical works of Bowman found a negative relationship between risk and return. This is known as Bowman's paradox which state that decision makers are risk-seeking and assume higher risk for lower return (Bowman, 1980 and 1982). Bowman's paradox was also confirmed by other empirical works (Fama and French, 1992; Andersen et al., 2007).
Within the studies, there are two approaches for explaining the paradox, decision maker behavior and the strategic position firm respectively. From economic theory it was developed "Prospect Theory" while from organizational theory it was developed "Behavioral Theory" in order to explain decision maker behavior approach (Nickel and Rodriguez, 2002). Prospect Theory highlights a dual behavior for decision makers (risk seeking and risk averse). In this respect, there is a reference point in assessing risky projects and risk-seeking behavior is adopted below reference point while risk-averse behavior is adopted above that reference point (Kahneman and Tversky, 1979). Behavioral theory states that the level of risk assumed by managers depends on the expected performance in relation to the aspiration (Greve, 1998). In this respect, managers use two measures of performance (aspiration level and expected level) and depending on which one is higher differentiate between failures and success.
Recall that agency theory suggest that deadweight costs are supposed to maximize firm value while Bowman's paradox focus on managers' private utility which may decrease value. By reducing taxes, financial distress costs and avoiding underinvestment issue, risk management could provide a competitive advantage and create value. At the same time, an increase in total risk by passing up profitable projects could end up in destroying firm value.
It worth to be noticed that most of empirical works have focused on the relation between risk and return rather than the relation between risk and firm value and use variables such as ROA or ROE to measure return. However, few empirical works focused the relation between risk and firm value provides similar unambiguous results. On a US sample, it was found that an increase in total equity risk is associated with a fall in firm value, proxied by q Tobin (Shin and Stulz, 2000). Further, firm value is positively associated with systematic equity risk and negatively associated with unsystematic equity risk. These results are consistent with the Bowman's paradox.
On the other hand, Pandey (2005) wants to find if growth and profitability have an impact in value creation process, by employing an improved model proposed by Varaiya et al. However, the results for Malaysian companies are consistent with the constant growth model. Higher profitability is associated with higher value, and higher growth is associated with lower value. Their results also indicate a positive relation between firm value, business risk and financial risk which is consistent with the agency theory hypothesis.

3. Data and methodology

Data were collected from Bloomberg and Capital IQ databases and express firm level information. Variables were computed by merging annual companies datasets based on financial statements. It is also noteworthy that several criteria were applied for sample construction. First, there were selected only companies from developed European countries. The reason for this approach is related to the potentially large regional, country and sectoral factors between companies from developed markets versus emerging markets, factors that are likely to contribute to differences in value creation. Second, I

select companies which have available information for period from 2001 to 2011 and exclude financial firms. Third, to remain consistent with other papers, firms with negative book value of equity or negative EBITDA are removed. Thus, the final sample includes 7210 observations, with 721 companies from 16 European developed for the period 2002-2011.

Next, I'll focus on describing the variables used in the model. The dependent variable, the ratio used to determine the value of a company is referred to a new approach in valuation, i.e. enterprise multiple (EM). EM is calculated as the enterprise value (equity value + debt – cash) divided by operating income before depreciation (EBITDA). Firms with higher EM are high valuation firms while firms with lower EM are selling for a lower multiple of earnings (Loughran and Wellman, 2011). There are at least two main advantages for using this measure instead of other popular measure such as market-to-book ratios or q Tobin ratio. First, EM can be compared more easily across firms with different level of debt ratio (Damodaran, 2006). Second, by using EBITDA as earning variable at the denominator, EM will lead to a more accurate and less manipulable measure that allow to compare firms across industries (Koller et al., 2010). Therefore, natural logarithm of EM was used as a proxy for firm value.

According to the main aim of the paper, that is to test the relation between risk and firm value, standard deviation (STDEV) is used as a proxy for risk. STDEV account for volatility in a firm' earnings and value and is computed as 5 year standard deviation in monthly stock prices. If debt is positively related with equity volatility, then firm value is negatively related to equity volatility, i.e. STDEV. According to the main findings from the literature and the purpose of the study, the following hypotheses can be stated:

Hypothesis 1: *"Higher risk is associated with lower firm value, i.e.* $\mathrm{EM} = \mathrm{f}\left(\overline{\mathrm{STDEV}}\right)$*"*

In order to avoid misspecification and to check if the sign of risk-value relation remains unchanged, four control variables were added. Among these, profitability, growth, size and capital structure are of great interest. To remain consistent with other empirical works, I use sustainable growth rate (SGR) as a proxy for growth opportunities, natural logarithm of sales (SALES) as a proxy for size, debt ratio (DR) and square of debt ratio (DR^2) as a proxy for capital structure.

SGR is computed by multiplying ROE by reinvestment rate, (1-payout ratio) and the impact on firm value is affected by spread (ROE-ke, cost of equity). Thus, a positive spread will lead to a positive relation while a negative spread will lead to a negative relation between SGR and EM.

Sales reflect the firm's competitive strength and power staying in the market. Sales also provide information about size of the company and are expected to be positively correlated with value, given that larger companies have a lower probability of bankruptcy. On the other hand, larger companies are tempted to focus on stability rather than growth, which can lead to a negative relation between size and firm value.

Capital structure, through its most meaningfully variable, debt ratio, triggers a misleading signal for money suppliers. In other words, this behavior indicate a non-linear relation between capital structure and value creation because increasing the proportion of debt would decrease value up to a point, but beyond that point, further increases would increase company value.

In terms of the methodology employed, in my empirical work, I use panel data models since the sample contains data across firms and over time. Panel data, unlike cross-section data, allow controlling for unobservable heterogeneity across firm effect. When the hypotheses for consistency and efficiency hold, the coefficients are BLUE and OLS may be used (Baltagi, 2008). It has been widely discussed in literature the identification and using of fixed (FE) or random effects (RE) models, in one-way or two-way error form (Pitelis and Vasilaros, 2010). FE and RE models control for unobservable effects, but also they follow

different assumptions and approaches. FE models can reduce the omitted variable bias since are eliminated firm specific factors that are constant over time. On the other hand, RE models includes unobservable effects in the error term.
A major weakness of static models is referred to endogenous variables that are likely to appear in the model. Dynamic models correct for this problem, the advantages of using them being (i) effective control of endogeneity; (ii) greater control for possible collinearity between the regressors; (iii) control of the effects of possible omitted regressors and (iv) elimination of unobservable firm effects.
The simple dynamic OLS model corrects for omitted variables by using lagged dependent variable while GMM model control for endogeneity by using instrumental variables (Wintoki et al., 2012). An additional reason for using dynamic panel models is related to the theoretical background of company value creation, which suggests a dynamic specification. In my opinion, value creation is based on an accumulating process, with high correlation between current and previous periods.
The common dynamic models are GMM-in-first-differences (GMM-DIFF) and GMM-in-system (GMM-SYS). GMM-DIFF was proposed by Arellano and Bond (1991) and supposes estimation of the equation in first differences and use as instruments the lags of dependent and independent variables, at levels (Arrelano and Bond, 1991). Further, it has been demonstrated that in several situations GMM-DIFF may not be very efficient because the instruments used may not be valid. Blundell and Bond (1998) proposed a new estimator, i.e. GMM-SYS, where the variables at levels are used as instruments in first differences, and on the contrary when the variables appear transformed in first differences in the equation to estimate, they are used at levels as instruments (Blundell and Bond, 1998). Nevertheless, the consistency of GMM-SYS depends on two conditions, (i) validity of instruments and (ii) non-existence of second order autocorrelation.
As a consequence, two-step GMM-SYS method is preferred since it uses orthogonal conditions on the variance-covariance matrix and thus control for the correlation of the errors over time, heteroskedasticity across firms, simultaneity and measurement errors. In order to construct a complete and consistent dynamic panel model that allows for the possible effect of the AR process on the stochastic term, a one-period lagged dependent variable ($EM_{i,t-1}$) is included in the model. Overall, the empirical testable model can be expressed as:

$$EM_{i,t} = \alpha + \beta_1 * EM_{i,t-1} + \beta_2 * STDEV + \beta * X'_{i,t} + u_{i,t} \quad (1)$$

with $X'_{i,t}$ - set of control variables (SGR, SALES, DR, DR^2) and $u_{i,t} = \mu_i + \lambda_t + \nu_{i,t}$ where μ_i denotes the unobservable firm effect to allow for unobserved influences on the value creation for each firm, λ_t denotes the unobservable time effect that control for the effect of macroeconomic variables on the enterprise multiple and $\nu_{i,t}$ is the idiosyncratic error component.

4. Results

Descriptive statistics for the variables aforementioned and used in the model are reported in Table 1.

Table 1: Descriptive statistics

	EM	PBV	STDEV	BETA	SGR	SALES	DR
Mean	10.947	2.878	0.350	0.962	0.107	5,794.222	0.268
Median	8.260	1.986	0.320	0.890	0.083	846.800	0.224
Minimum	0.353	0.023	0.000	-0.423	-11.868	0.528	0.000

Maximum	867.864	73.103	1.886	4.591	29.889	423,528	1.302
Standard Deviation	19.742	3.479	0.160	0.504	0.485	17,544.284	0.225

Source: Author's calculation

In average, it could be noticed that European companies create value since PBV is higher than 1 (2.878) prefer equity as financing sources, since DR=0,268 and are less volatile than the market, since BETA is lower than unit (BETA=0.962). Furthermore, EM, PBV, SGR and SALES present some volatility while for remaining variables (STDEV, BETA, DR) volatility is not pronounced. A correlation matrix was performed too and led to the conclusion that none of the pairs has a very high correlation. This conclusion suggests that the estimation equation may not be affected by multi-collinearity problem. Further, the relation between DR and STDEV is positive which induce the potential negative relation between EM and STDEV.

Table 2 reports results for the model from equation 1, when dynamic panel methods are employed. Hence, these methods are ordinary least squares (OLS – columns 2 and 3), the fixed effect model (FE – columns 4 and 5) and GMM-system (GMM-SYS – columns 6 and 7). For each of these methods, the model was employed twice: a specific model when only variable of interest was considered and a general model when control variables were added. However, OLS and FE models are only informative since they are biased and inconsistent.

For GMM-SYS method, it is worth to establish if variable of interest is endogenous or not. I examine this assumption with a series of tests which involve OLS regressions, first of the current level of STDEV and second of changes in level on lagged EM. The results evidence that there is significance relation between STDEV and lagged EM and thus EM is treated as endogenous and variable. Furthermore, a second test of strict exogeneity suggested by Wooldridge which require estimating regressions on current EM against current and future STDEV confirms the endogeneity issue (Wooldridge, 2002).

Overall, the assumptions for GMM-SYS are that I (i) include one lag of EM in the dynamic model; (ii) use variables lagged three as instruments for all endogenous variables and (iii) treat STDEV as endogenous variable.

Table 2: Risk-firm value relation

VARIABLES	MODELS					
	OLS	OLS	FE	FE	GMM-SYS	GMM-SYS
EM_{t-1}	0.513***	0.495***	0.230***	0.219***	0.403***	0.421***
	(0.017)	(0.017)	(0.019)	(0.020)	(0.069)	(0.070)
STDEV	-0.303***	-0.275***	-0.462***	-0.223**	-0.520**	-0.639**
	(0.053)	(0.056)	(0.065)	(0.083)	(0.237)	(0.276)
SGR		-0.083***		-0.109***		-0.066***
		(0.020)		(0.029)		(0.020)
SALES		-0.032***		-0.115***		-0.043***
		(0.004)		(0.023)		(0.007)
DR		-0.308***		-0.450*		-0.365**
		(0.091)		(0.197)		(0.152)
DR^2		0.200		0.024		0.585**
		(0.123)		(0.231)		(0.234)
CONS	1.150***	1.463***	1.810***	2.673***	1.465***	1.813***
	(0.042)	(0.053)	(0.051)	(0.169)	(0.168)	(0.198)
R-squared	0.274	0.291	0.074	0.116		
RMSE	0.534	0.528	0.481	0.470		

VARIABLES	MODELS					
	OLS	OLS	FE	FE	GMM-SYS	GMM-SYS
F-statistic	565.583	233.248	128.602	67.177	133.821	111.491
AR(2)[a] (p-value)					0.804	0.656
Sargan[b] test (p-value)					0.592	0.471
Diff-in-Hansen[c] test (p-value)					0.632	0.495
# Instruments					14	18
# Groups	721	721	721	721	721	721
# Observations	7210	7210	7210	7210	7210	7210

Source: Author's calculation

Notes: OLS (columns 2-3), Fixed Effects (columns 4-5) and GMM-System (columns 6-7) estimations for dynamic panel models. Significance level at which the null hypothesis is rejected: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [a] AR(2) test for second order autocorrelation of residuals. [b] Sargan test of over-identification restrictions. [c] Difference-in-Hansen test of exogeneity of instrument subsets.

The consistency of GMM system is proved by the hypotheses that there is no serial correlation in the error term and the validity of instruments. The first hypothesis is confirmed since the residuals in first differences is correlated (p-value for AR(1) is 0.000), but there is no serial correlation in second differences (p-value for AR(2) is 0.656). The second hypothesis regarding the validity of instruments is confirmed too, the Sargan test revealing a p-value of 0.471. Moreover, GMM requires an additional exogeneity assumption, respectively any correlation between endogenous variables and the unobserved fixed effect to be constant over time. Difference-in-Hansen test does not reject the hypothesis, with a p-value of 0.495.

Since the negative relationship between STDEV and EM is significant in both models, (columns 6 and 7) hypothesis 1 is not rejected. Regarding control variables, all appear to be significant with SGR, SALES and DR having a negative relation and DR^2 having a positive relation with EM. However, the results reveal that STDEV has the greater impact on firm value, suggesting that risk is a fundamental driver in explaining firm value creation process.

To sum up, my empirical results are consistent with other findings. Risk is one of the most fundamental value driver and like Shin and Stulz (2000) risk negatively associated with firm value. Regarding control variables, the results are either similar or contradictory to those obtained by a number of previous studies. Capital structure has a negative effect on company value, according to Fama and French (1998) and others but require additional research for testing the non-linear relation. For size, the findings are various either significant (negative and positive) or insignificant, my results being similar with Liow's (2010).

5. Conclusions

The main aim of this empirical work was to explore the significance of risk as financial internal driver in explaining value creation process for European companies. The results suggest that firm value is negatively related with risk, which is consistent with Bowman's paradox. Further, the negative relation is robust to alternative measure for both firm value and risk, i.e. PBV ratio and BETA, but it does not hold for companies form civil law countries.

Additional control variables included in the model are significant and provide support for pecking order theory of capital structure and for the existence of a negative spread (ROE-ke) for companies from European developed countries.
This paper contributes to the existing literature in several ways since it has fundamentally different approaches on the topic. First, I use a unique sample consisting of 721 companies from European developed countries which allow examining whether results from previous findings could be generalized for developed markets. Second, I use EM as a valuation measure which is extensively used by practitioners and perform better than classical measures such as q Tobin or market-to-book ratio. To my best knowledge, this is the first empirical study which examines the relation between risk and firm value through enterprise multiple variable. However, in sensitivity analysis section classical approach market-to-book ratio was used to test if there are different results.
Nevertheless, the paper success in the main task and further research is relevant for a better understanding of what are the most significant drivers for company value creation process and also what are the most suitable methods to measure firm value.

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